Testimony

of

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before the

New York City Council Committee on Health

on

Intros 1020, 1021 and 250A

May 2, 2013

250 Broadway

New York, New York

Good afternoon, Chairperson Arroyo and members of the New York City Council Committee on Health. I am Dr. Thomas Farley, Commissioner of the New York City Department of Health and Mental Hygiene. Thank you for the opportunity to comment on Intros 1020, 1021, and 250A, three complementary bills that will reduce smoking among youth and young adults and save thousands of lives.

Working together, the Bloomberg Administration and the City Council have made historic progress to reduce smoking and protect all New Yorkers from the harmful effects of tobacco. I want to thank this committee and the Council for your courage in supporting groundbreaking legislation that has been central to this success. But there is still more that can be done, particularly to protect the City's youth from the deadly effects of smoking. These bills would build on the success we have had so far and give our next generation the opportunity to live tobacco-free.

Beginning in 2002, we launched a comprehensive program to reduce and prevent smoking. We raised cigarette taxes, promoted smoke-free spaces, educated New Yorkers about the risks of smoking, and helped smokers quit, and the result is that the smoking rate in adults has fallen by almost a third, to less than 15 percent, and the smoking rate in teenagers has fallen in half.[1,2]

However, tobacco is still a leading cause of preventable, premature death in New York City[3] and the rest of the country.[4] Smoking increases the risk of lung cancer, heart disease, stroke, asthma, emphysema, pre-term delivery, low birth weight, and many types of cancer. When used exactly as intended, cigarettes kill one-third of their users.[5] We estimate that some 7,000 New Yorkers die each year from tobacco-related illnesses.[6] In 2010, one of seven deaths among New Yorkers over the age of 35 was smoking-related.[7] Currently, 930,000 adults and 20,000 public high school students in New York City—close to one million people—smoke.[8,9]

Today we are particularly worried that the smoking rate in teenagers, which had been declining – as you can see on the graph - has stalled at 8.5 percent since 2007.[10] Preventing young people from smoking is critical. We know that 80 percent of New York City adult smokers started smoking regularly before reaching the age of twenty-

one. Nationally, 99 percent of daily adult smokers tried smoking by age twenty-six, and the average age at which they tried their first cigarette was 15 or 16. [11,12]

Young people often are simply unaware of how likely they are to become addicted to cigarettes. Only 3 percent of high school seniors who smoke daily think they will still be smoking in five years, but the reality is that about 8 years later, nearly two-thirds of them will still be regular daily smokers.[13] Adolescents tend to believe they are less likely to develop smoking-related diseases than others, and that they will be able to quit whenever they wish.[14] However, studies show that symptoms of nicotine dependence can start soon after an adolescent first tries smoking.[15] If children experiment with smoking, there is a substantial risk of them becoming long-term users.

Because tobacco use is still a leading cause of death and because it starts almost exclusively in youth and young adults, it is imperative that we do all we can to protect our young people from addiction and death. It is difficult to imagine any other scenario where we would stand by as 28,000 of our youth experiment each year[16] with a substance that could eventually kill one-third of them. These three bills seek to reduce suffering and death associated with smoking and other tobacco use by helping to reduce the visibility and accessibility of tobacco products by the City's young people.

Product Display

First, I'd like to spend some time discussing Intro 1020, which would restrict the display of tobacco products in most City retail stores. I want to thank Chairperson Arroyo for sponsoring this bill and more than a dozen other Council members who have co-sponsored it. Prominent displays of cigarettes[17,18,19,20] and other tobacco products[21,22] in retail stores both entice youth to try smoking and make it harder for current smokers to quit.[23,24,25,26,27,28] Studies consistently show the more often young people are exposed to cigarette displays in retail stores, the more susceptible they are to starting smoking.[29,30,31] It's no surprise that retail displays of cigarettes and other tobacco products heighten awareness of these products.[32] But we also know that the prominent presence of tobacco products alongside candy, snack foods and other items creates the impression, especially among children and adolescents, that tobacco use is not only normal and socially

acceptable, but also more common than it actually is, which increases the likelihood that young people will experiment with smoking.[33,34,35,36]

Children and adolescents are influenced by what they see around them. For instance, having a parent who smokes greatly increases the likelihood that a young person will smoke.[37] What is disturbing—and extremely important for today's discussion—is that retail tobacco marketing and product displays are nearly as influential.[38] Youth who are frequently exposed to tobacco product displays are more than two times as likely to start smoking than youth who receive less exposure.[39,40] Studies show that when young people are exposed to cigarette marketing that includes product displays in retail stores one or more times a week, it increases the odds that they will smoke by 40 percent to 60 percent.[41,42,43] Similarly, a study of New York City youth showed that the odds of experimenting with smoking in the past 12 months was 40 percent higher among youth exposed to tobacco retailers two or more times per week compared to those exposed less often.[44] As you can see on this graph, the more times a New York City youth visited a local retailer where he was exposed to tobacco marketing, the more likely he was to start smoking.

Restricting the display of cigarettes and tobacco products discourages youth from attempting to make illegal purchases by creating the impression that they are more difficult to purchase.[45,46] One recent study indicates that banning the display of tobacco products is the most important factor in reducing purchase attempts by underage youth, regardless of the presence of other forms of advertising.[47]

To protect their children from smoking, other countries around the world have prohibited retailers from displaying tobacco products. Where this has been evaluated, those countries, including Canada, have experienced significant drops in youth smoking.[48,49,50] This slide shows the different provinces of Canada that implemented product display laws at different times since 2005. In general, after these rules went into effect, youth smoking rates went down. Looking from left to right on this slide, you can see that the provinces where product display laws have been in effect the longest show the greatest reductions in youth smoking.

Other countries that have enacted product display restrictions include Ireland, Australia, England, Wales, Scotland, Iceland, and Norway. Industry representatives warned retailers in virtually all of these countries that a product display law would be difficult to implement. As it turned out, implementation was neither costly nor burdensome, and the industry warnings proved to be unfounded. This shows what a typical tobacco retail display looks like now. But under the proposed law, retailers can put them in drawers, as shown here, or simply put a curtain over them.

Product display restrictions also help smokers who want to quit achieve their goals. When smokers who are trying to quit see a pack of cigarettes, it can trigger a craving to smoke, which can lead to their buying a pack on impulse.[51,52,53,54,55,56] Removing product displays removes that cue, which makes it easier for smokers to quit successfully.[57]

Overall, though, product display restrictions have not resulted in substantial declines in cigarette sales to adults. According to several studies, adult customers who are not actively trying to quit are extremely loyal to their brands and do not notice product displays as much as youth,[58,59,60,61] nor do they use tobacco displays to decide what brand of cigarettes to buy.[62,63]

Restricting the display of cigarettes and other tobacco products is an important step forward to prevent youth smoking in New York City, and one that enjoys widespread support. According to a recent poll of New York City voters, two thirds support tobacco product display restrictions,[64] and we expect support for the measure to increase further after implementation, as it has elsewhere.[65]

Sensible Tobacco Enforcement

The next bill that I would like to discuss today, Intro 1021, or the Sensible Tobacco Enforcement bill, addresses the availability of illegal and low-cost tobacco products in the City. Thanks again to Chairperson Arroyo and more than a dozen other Council members who have co-sponsored this important piece of legislation. It is well established that increasing cigarette prices helps reduce smoking, especially among young people.[66] A 10 percent increase in cigarette prices reduces demand among adult smokers by 3-5 percent and among youth by 7 percent.[67] But cigarette tax evasion and

the sale of discounted tobacco products are increasing, which undermines the benefit of the City and State's high cigarette taxes. The Sensible Tobacco Enforcement bill targets many of the sources of inexpensive tobacco, including smuggled cigarettes that are untaxed, cigarette discounting and individually sold or low-cost cigars.

Although the Department of Finance and the Law Department have increased enforcement and have had success in stopping many illegal operations, more needs to be done to address the serious problem of cigarette trafficking and tax evasion. A pack of cigarettes sold legally in New York City generally costs about $11 or $12. A pack of cigarettes that sells for $5 at retail value in Virginia can be trafficked to New York City and sold illegally for $9, well below the legal price.

This is bad for New York City for several reasons. I will touch on some of the economic implications very briefly, and Commissioner Frankel and Sheriff Domenech will expand on these when you hear from them momentarily. First, retailers who sell illegal, untaxed cigarettes are cheating and have an unfair advantage on their honest competitors. A store that cheats the system can sell cigarettes for less than the legitimate retail price, enabling them to sell more cigarettes, along with other products that that customer purchases. And that means that honest retailers who sell properly-taxed cigarettes lose business. Second, an estimated $250 to $600 million is lost annually in unpaid taxes from cigarette trafficking in New York City.[68,69] Third, illegal tax-free cigarettes are cheap, and when prices are lower, young people can buy them more easily.

This bill would increase penalties when retailers are found in possession of illegal cigarettes and at different points along the chain of distribution, authorizing the Department of Finance to crack down on stores that repeatedly break the law by offering to sell these illegal products. Together, these and other provisions promote fairness, reduce the incentives for retailers to break the law and to cheat, and help law-abiding retailers compete on a level playing field.

The bill also eliminates discounting of tobacco products. Retail price discounts are widely available in New York City.[70] Research shows these price reductions are particularly appealing to young adults, women, and minorities, especially among African American smokers who smoke menthol cigarettes.[71] Recent evidence suggests that

tobacco companies target discount coupons at younger smokers.[72] These discounts work to keep people buying and smoking cigarettes when they might otherwise be persuaded by the high price to quit. Intro 1021 would end discounting by prohibiting "specials" – like buy-one, get-one free – and prohibiting retailers from redeeming discount coupons for tobacco products.

Intro 1021 will require that cigarettes and little cigars must be sold for no less than $10.50 per pack. In a recent study that included more than 300 New York City tobacco retailers, we found that this price floor was lower than most posted prices for cigarettes available for retail sale.[73] This "price floor" would complement these prohibitions on discounting. The price floor is easy for the public to understand; it's simple to enforce; and it maintains high prices that protect public health.

Inexpensive Cigars

The Sensible Tobacco Enforcement Bill will also help reduce youth smoking by decreasing access to cheap cigars. The tobacco industry has carefully manipulated their products over time so that they are very similar to cigarettes, but different enough to qualify for lower tax rates and less regulation.[74] Here's an example of a pack of cigarettes under the brand name "Cheyenne", that the company changed slightly so they were categorized at "little cigars", then added just enough weight so that they were categorized as "cigars", both of which are taxed at a much lower rate than cigarettes. And here are two products that look virtually identical, except this pack of cigarettes costs $12.50, and this pack of what is classified as "little cigars" costs roughly $6.50. They are definitely not what we think of as cigars.

Many little cigars are sold in packs of 20, and they are virtually indistinguishable from cigarettes. Little cigars are the same size as cigarettes, they have filtered tips, they are inhaled like cigarettes, and they are dangerous like cigarettes. The physical difference is that cigarettes are wrapped in white paper, and little cigars have brown wrappers that include tobacco as an ingredient. Lower prices have contributed to a surge in popularity of smaller cigar products, including little cigars.[75] They are especially popular with youth.[76,77] We are seeing the shift toward cigar use here in New York City,

where the proportion of youth smokers who smoke cigars exclusively nearly tripled between 2001 and 2009.[78]

Youth and adults are less aware of the health risks associated with cigar smoking[79] than they are of the health risks of cigarettes,[80,81,82] which is especially dangerous because the nicotine levels in cigars are generally much higher than nicotine levels in cigarettes, which may make them even more addictive.[83]

Given the similarities to cigarettes, this bill simply requires little cigars to be sold like cigarettes, in packs of no fewer than 20, and with the same $10.50 minimum price. This bill also requires larger cigars that costing $3 or less each to be sold in packs of at least 4. These measures would raise the price at which these cigars can be sold and help reduce their use among adolescents.

Tobacco 21

Finally, I'd like to address Intro 250A, which would simply raise the minimum age for selling tobacco products from 18 to 21. This bill is an important complement to the other two bills I've just discussed. As I mentioned earlier, the vast majority of smokers start before the age of 21, but what is also notable is that the transition from experimental to regular smoking occurs around the age of 20.[84] This bill is also important because increasing the legal age will reduce the accessibility to tobacco products to kids who are much younger than 18. We know that 90 percent of people purchasing cigarettes for minors are themselves between 18 and 20 years old. We also just received data that strongly suggests that increasing the legal age for sales works to reduce teen smoking. In 2005, the town of Needham, Massachusetts increased the legal sales age from eighteen to twenty-one years. Between 2006 and 2012, high school students in Needham who reported smoking in in the past month declined from 12.9 percent to 5.5 percent, a decrease of over 50 percent. This decrease was far greater than the decrease in smoking in the rest of that region of Massachusetts or here in New York City.

There is also evidence from other countries that raising the legal sales age works. After the minimum sales age in England was increased from 16 to 18, there was a 30 percent decline in smoking among youth ages 16-17; and younger students, those

between 11 and 15, were also less likely to be regular smokers. Obviously, proper enforcement of the law is critical, which is one more reason why the Sensible Tobacco Enforcement bill I discussed earlier is so important.

Conclusion

Preventing youth from starting to smoke, and helping adult smokers succeed when they want to quit are two of the most critical steps we can take to improve the health of New Yorkers. This City is recognized worldwide as a leader in smoking prevention and because of our efforts smoking rates in the City are at historic lows. But despite implementing leading evidence-based practices, tobacco use is still a leading cause of preventable death in the City, and we need to do more. These bills will help ensure that we continue to decrease smoking rates in our children and young people. If we succeed, we may just be able to raise an entire generation free of addiction to the world's most dangerous drug.

Thank you. I am happy to answer any questions.

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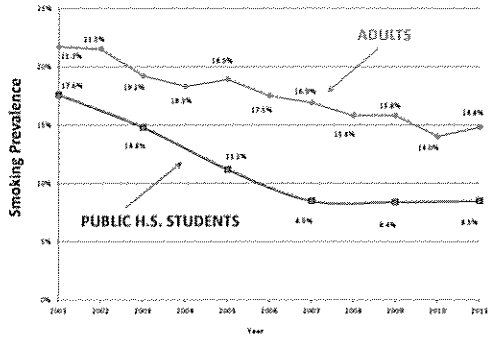
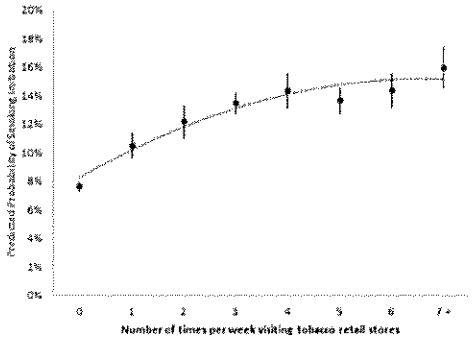
Declines in smoking in NYC

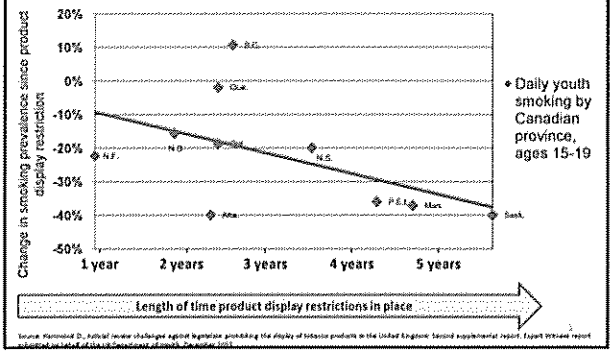


NYC Youth Who Visit Stores Selling Tobacco More Often Are More Likely to Start Smoking



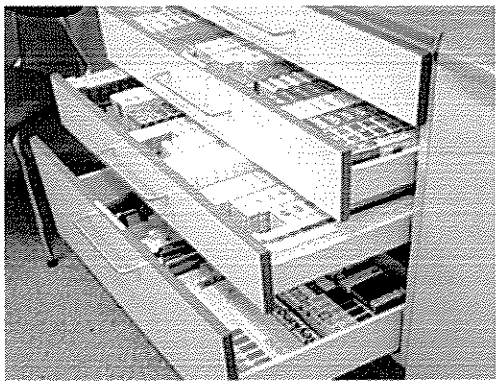
The longer product display restrictions are in place, the greater the decline in youth smoking

Evidence from Canada

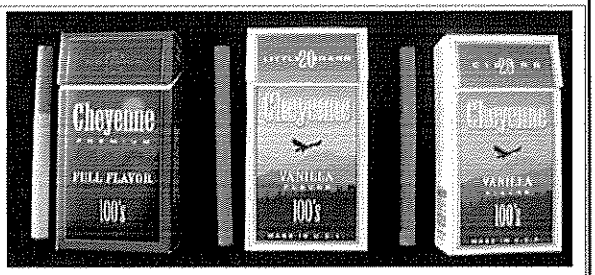




Tobacco Storage Options



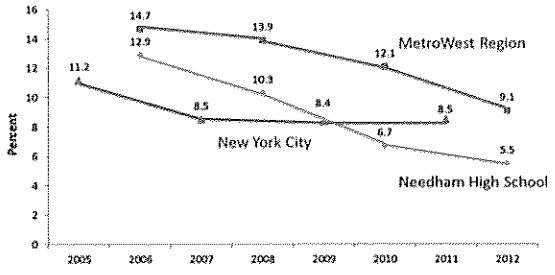
Cigarettes → Little Cigars → Cigars



Cheyenne products transitioned from cigarettes to "little cigars" to just "cigars," yet versions are sold in 20-packs like cigarettes, which circumvent certain regulation and taxation.

Source: Campaign for Tobacco Free Kids. 2013. Not Your Grandfather's Cigar: A New Generation of Cheap and Sweet Cigars Threatens a New Generation of Kids. Last accessed April 23, 2013. Available at: [illegible]

Smoking Rates in High School Students Massachusetts and New York City 2006-2012



Sources: NYC Community Youth Risk Behavior Survey, 2005-2011.
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Influence of Tobacco Displays and Ads on Youth: A Virtual Store Experiment

WHAT'S KNOWN ON THIS SUBJECT: Youth exposure to retail tobacco advertisements and displays is associated with smoking initiation. The Family Smoking Prevention and Tobacco Control Act of 2009 gives states and local governments legal authority to regulate the time, place, and manner of tobacco advertising.

WHAT THIS STUDY ADDS: This is the first experimental study using a virtual store environment to provide evidence that a policy banning tobacco product displays at the point of sale may deter youth from attempting to purchase tobacco products at retail stores.

abstract

FREE

OBJECTIVE: To examine the potential impact of banning tobacco displays and ads at the point of sale (POS) on youth outcomes.

METHODS: An interactive virtual convenience store was created with scenarios in which the tobacco product display at the POS was either openly visible (status quo) or enclosed behind a cabinet (display ban), and tobacco ads in the store were either present or absent. A national convenience sample of 1216 youth aged 13 to 17 who were either smokers or nonsmokers susceptible to smoking participated in the study. Youth were randomized to 1 of 6 virtual store conditions and given a shopping task to complete in the virtual store. During the shopping task, we tracked youth's attempts to purchase tobacco products. Subsequently, youth completed a survey that assessed their perceptions about the virtual store and perceptions about the ease of buying cigarettes from the virtual store.

RESULTS: Compared with youth in the status quo condition, youth in the display ban condition were less aware that tobacco products were for sale (32.0% vs 85.2%) and significantly less likely to try purchasing tobacco products in the virtual store (odds ratio = 0.30, 95% confidence interval = 0.13–0.67, $P < .001$). Banning ads had minimal impact on youth's purchase attempts.

CONCLUSIONS: Policies that ban tobacco product displays at the POS may help reduce youth smoking by deterring youth from purchasing tobacco products at retail stores. *Pediatrics* 2013;131:e88–e95

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KEY WORDS
adolescence, tobacco advertising, tobacco control policy, tobacco use/smoking

ABBREVIATION
POS—point of sale

Drs Kim and Nonnemaker, Mr Loomis and Ms Baig contributed to study design, data collection, data analysis, and writing of the manuscript; Mr Hill and Mr Holloway contributed to study design, data collection, and review of the manuscript; Dr Farrelly contributed to study design and review of the manuscript; and Mr Shafer contributed to revising of the manuscript and addressing reviewer comments.

www.pediatrics.org/cgi/doi/10.1542/peds.2012-0197

doi:10.1542/peds.2012-0197

Accepted for publication Aug 30, 2012

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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FINANCIAL DISCLOSURE: *The authors have indicated they have no financial relationships relevant to this article to disclose.*

FUNDING: Funded by the New York State Department of Health.

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Pediatrics 2013;131;e88; originally published online December 3, 2012;
DOI: 10.1542/peds.2012-0197

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://pediatrics.aappublications.org/content/131/1/e88.full.html

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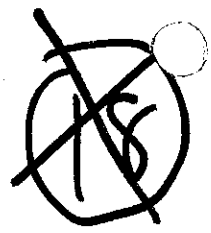

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Despite significant progress in reducing youth smoking in the United States, the rates of decline have stalled in the past decade.[1] States have experienced dramatic budget cuts for tobacco prevention programs, but the tobacco industry continues to market its products aggressively with nearly 90% of its $10 billion marketing expenditure spent on retailer incentives and price promotions at the point of sale (POS),[2] making retail stores the most important advertising channel for the tobacco industry. The level of retail cigarette advertisements and promotions has increased over time,[3,4] and cigarette products are prominently placed on shelves behind checkout counters, exposing all store customers, including youth, to tobacco products. Studies show that youth are highly aware of tobacco ads in stores,[5] and such exposure influences youth perceptions regarding ease of access to cigarettes, smoking prevalence, and peer approval of smoking.[6] Youth who are exposed to retail tobacco marketing are also more likely to experiment with smoking and to become smokers.[7–16]

The Family Smoking Prevention and Tobacco Control Act of 2009 gives states and local governments legal authority to regulate the time, place, and manner of tobacco advertising. As states consider policies such as banning the display of tobacco products, empirical studies are needed to determine the potential impact of these regulations. Case studies in Ireland and Canada show that youth and adult awareness of POS tobacco marketing dropped significantly after a ban on tobacco displays and ads.[17,18] Although these case studies suggest that banning POS tobacco displays and ads could help deter youth smoking, few studies have systematically examined the potential impact of these policies on smoking outcomes.

In an experimental study, Wakefield and colleagues[19] examined the potential impact of regulating POS tobacco product displays and ads by showing Australian youth photos in which cigarette packs were displayed with ads (status quo in retail stores), without ads, and with neither ads nor packs displayed. They found that exposure to tobacco product displays with and without ads was associated with increased perceptions that tobacco products were easy to purchase at the store compared with those who viewed the no cigarette display condition. In addition, they found that, compared with those in the no cigarette display condition, students who were exposed to the cigarette advertising condition perceived it would be less likely they would be asked for proof of age and that a greater number of stores would sell them cigarettes. A potential limitation of this study is that the stimuli were photographs shown in a classroom setting, which does not reflect real-world exposure to POS displays.

We extend the Wakefield et al study by using a virtual store to simulate a more interactive exposure to POS tobacco product displays and ad bans. Virtual reality applications are intended to simulate features of the real-world environment, which enables researchers to immerse participants into a hypothetical context and study their behavioral responses to environmental cues that may be difficult to assess in a real-life setting. Virtual reality environments have been used to study a wide range of behaviors[20] including behaviors among youth[21,22] and to test the effect of smoking cues on smokers' cravings for cigarettes in young adults[23,24] and adults.[25] However, to date, no studies have used virtual environments to study the impact of tobacco displays and ads on youth. We designed a virtual store and gave youth a specific shopping task to assess whether youth exposed to the display ban condition are less likely to attempt buying tobacco products in the virtual store and perceive that it is difficult to buy cigarettes at the virtual store. A secondary aim was to examine whether the presence of tobacco ads in the store moderates these relationships.

METHODS

Study Design

We designed a 3 × 2 experimental study with 3 variations of the POS tobacco product displays (open, enclosed, enclosed with ads on cabinet) and 2 variations of tobacco ads in store (present, absent) for a total of 6 conditions (defined in Table 1 and exhibited in Figs 1 and 2).

An off-the-shelf model of a convenience store was purchased and extensively customized for this study by using Unity 3D interactive gaming software. The initial beta version of the virtual store was pilot tested with focus groups of 12 youth aged 14 through 17 who were current smokers or nonsmokers susceptible to smoking. The virtual store was updated on the basis of feedback from the focus groups (eg, improved navigation speed, expanded product selections).

Participants and Virtual Shopping Task

A national convenience sample of current smoker or nonsmoker susceptible to smoking youth aged 13 to 17 were recruited from Research Now's e-Rewards online youth panel and via parents in their adult panel who indicated having children aged 13 to 17. Current smokers were defined as smoking at least 1 cigarette per day in the past 30 days. Nonsmokers susceptible to smoking were defined as those who had not smoked in the past 30 days and answered "definitely yes, probably yes, or probably not" to any 1 of these 3 questions: "Do you think you will smoke a cigarette anytime during the next year?" "Do you think you will try a cigarette soon?" and "If one of your best friends offered you a cigarette, would you smoke it?"

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TABLE 1 Study Conditions

Tobacco Product Display at POS	Tobacco Ads in Store	
	Present	Absent
Open Display: Open, fully visible current status quo situation	C1	C4
Enclosed Display: Not visible, enclosed behind opaque cabinet with black and white signs noting "Cigarette Center" and "Chewing Tobacco & Cigars" at the top of the display cabinet [a]	C2	C5
Enclosed display + ads on cabinet: Not visible, enclosed behind opaque cabinet with "Cigarette Center" sign at top + ads on cabinet doors [b]	C3	C6

[a] Enclosed display condition was modeled after an actual policy adopted by stores in New York State to ban the display of tobacco products.

[b] We created this scenario as a potential unintended consequence of the display ban.

E-mail invitations were sent, and 4189 panelists consented to participate and met the eligibility criteria (Fig 3). Participants initiated the study by clicking on a link that randomized them to 1 of 6 conditions. If participants already had the Unity 3D player installed on their computer, the virtual store application loaded, and they began the virtual shopping task. If participants did not have the Unity player, they were prompted to download the player.

For the virtual shopping task, participants were instructed to select 4 items for purchase: a snack from the aisles, a drink from the coolers, and 2 items of their choice from the checkout counter. Participants were not specifically instructed to purchase tobacco. Participants had a total of 10 minutes to complete their shopping task. As participants navigated through the store, they were exposed to one of two versions of the store environment in which tobacco ads were either present or absent (see Fig 2). When the participant moved to the checkout counter to purchase the last 2 items, he or she was exposed to 1 of the tobacco display conditions (Fig 1). At the checkout counter area, if the participant attempted to purchase tobacco by clicking on the tobacco product display, the animated cashier asked, "Do you want to buy tobacco products?" If the participant clicked "No," the cashier responded "OK" and resumed talking on his phone. If the participant clicked "Yes," the cashier responded "Sorry, you are not old enough to purchase this product" and resumed talking on his phone. Once the final 2 items from the checkout counter had been selected, the participant was exposed to the display for another 10 seconds before the shopping task ended and the participant was directed to the survey.

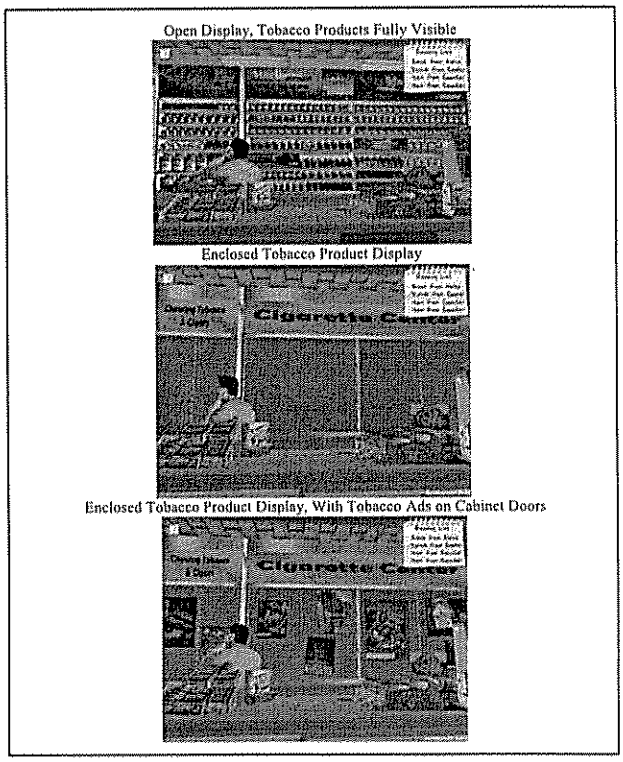

FIGURE 1
Screenshots of tobacco product display conditions in virtual retail store.

One thousand two hundred sixteen participants completed the study, and most were recruited from the parent panel (62%). There were no meaningful sociodemographic differences among youth who qualified (n = 4189) versus completed (n = 1216) the study. Youth received a $6.50 e-Rewards dollar incentive to be redeemed for products/services upon study completion. This study was approved by Institutional Review Boards at RTI International and the New York State Department of Health.

Measures

The 2 key study outcomes were whether youth perceived cigarettes as easy to purchase in the virtual store and whether youth tried to click and purchase tobacco in the virtual store. Perceived ease of access was measured with the following item: "Imagine that a real store like this virtual store was near where you live; how easy or hard would it be for you to buy cigarettes from this store?" Youth were defined as attempting to purchase tobacco if during their shopping task they clicked

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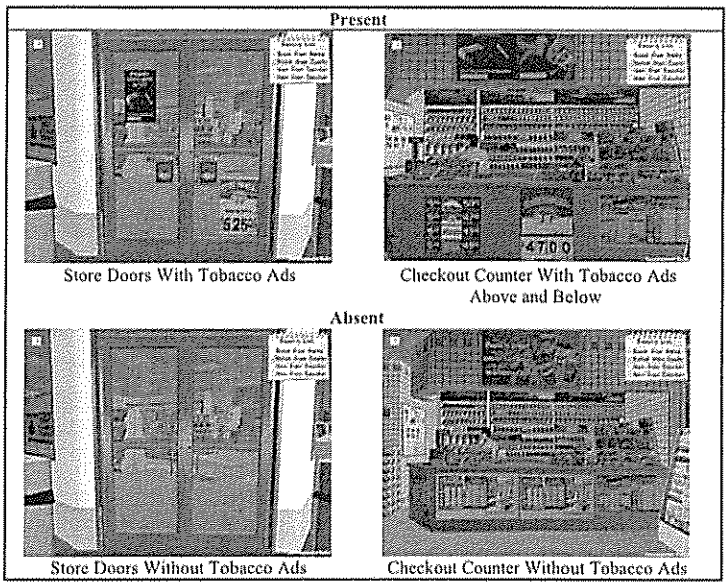

FIGURE 2

Screenshots of tobacco ad conditions in virtual retail store. Note: in the conditions in which tobacco ads were present in the store (C4–C6), there were 2 ads on the exterior door along with 2 branded "pull" signs, 2 ads above the checkout counter, and 2 ads below the checkout counter. In the conditions in which tobacco ads were absent (C1–C3), there were no ads on the exterior door and ads for soft drink and lottery tickets above and below the checkout counter.

on the tobacco product display and confirmed they wanted to purchase tobacco. This information was captured by the Unity 3D software.

We also assessed perceptions about the virtual store, including whether youth were aware that tobacco products were for sale in the virtual store and the extent to which they thought the virtual store resembled a real convenience store. We also measured the following covariates: smoking behavior, youth's usual source of cigarettes (retail or nonretail), social influence to smoke (whether youth lives with smoker, number of best friends who smoke), sensation-seeking behavior (additive scale constructed from 4 items that assessed the extent to which youth like to explore new places, like to do frightening things, like new and exciting experiences, and prefer friends who are exciting and unpredictable), and key demographics (age, gender, race/ethnicity).

Analysis

Process data from the virtual store shopping tasks were linked to the survey data via unique identifiers for each study participant. We tested for potential differences in each outcome by condition. Logistic regression was used because the main outcomes were dichotomized. In general form, we estimated the following regression equation:

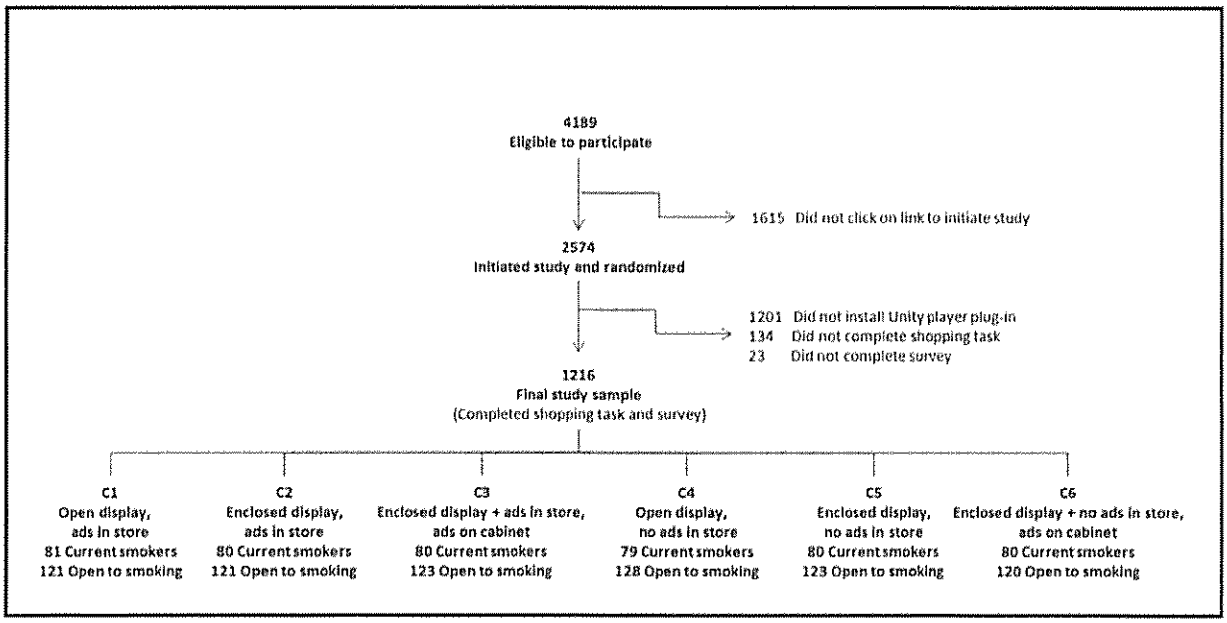

FIGURE 3

Study sample. Note: "Did not install Unity player plug-in" indicates participants who did not already have the Unity player and were unwilling to download it. "Did not complete shopping task" indicates participants who did not have complete data from the virtual retail store. These participants may have ended their virtual shopping task early and thus did not have survey data. "Did not complete survey" indicates participants who completed the virtual retail store data but did not complete the survey.

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$$logit(outcome) = \alpha + \beta_2 C_2 + \beta_3 C_3 + \beta_4 C_4 + \beta_5 C_5 + \beta_6 C_6 + \sum_{j=7}^{k} \beta_j X_j$$

C_i are the indicators for each condition with condition 1 omitted as the referent category (ie, we compared each condition to the open display with ads in the store condition because this is the current practice in stores). X_j refers to the set of covariates delineated in the measures section. The perceived ease of access model excludes participants who attempted to purchase tobacco in the virtual store. All descriptive statistics and regression models were estimated by using Stata 11.0 (Stata Corp, College Station, TX).

RESULTS

Sample characteristics are summarized in Table 2. The distribution of demographics was similar across the 6 conditions. The majority of study participants were aged 15 to 17, male, and white. More than half of participants visit convenience stores more than once per week and 17.4% of current youth smokers report usually getting their cigarettes in a retail store. On average, participants took 172.3 seconds to complete the virtual store shopping task with ~32.1 seconds spent at the checkout counter. More than 80% of respondents agreed that the virtual store resembled a real convenience store.

The proportion of participants who reported seeing tobacco products for sale was highest in the open display condition with ads (C1, 85.2%) and lowest for the enclosed display condition with no ads (C5, 32.0%). When tobacco advertisements are present in the store, 24.3% of study participants clicked to purchase tobacco in the open display condition (C1) compared with only 9.0% in the enclosed display condition (C2). When no tobacco ads were present in the store, 16.4% of youth clicked to purchase tobacco in the open display condition (C4), compared with 10.8% in the enclosed display condition (C5).

The proportion of youth who perceived that it would be hard or very hard to buy cigarettes from the retail store was higher for youth in the open display condition with tobacco ads in store (51.5% for C1) than in the enclosed display condition (48% for C2). This pattern holds when tobacco advertising was removed from the store, with 47.6% in the open display condition (C4) versus 40.5% in the enclosed condition (C5).

Table 3 presents adjusted odds ratios for the 6 experimental conditions for the key outcomes of perceived ease of access to cigarettes and attempting to purchase tobacco. Current smokers did not show significant differences across conditions regarding perceived ease of access to cigarettes. Among nonsmokers susceptible to smoking, youth in condition C5 (enclosed display, no ads in store) were significantly less likely to believe that it would be hard to purchase cigarettes in the virtual convenience store than youth in condition C1 (open display; odds ratio = 0.49, 95% confidence interval = 0.28–0.85, $P < .05$). Current smokers in condition C2 (enclosed display, ads in store) were significantly more likely to say it would be hard to buy cigarettes from the virtual store than current smokers in condition C3 (enclosed display, ads in store, ads on cabinet; $P < .05$). Nonsmokers in condition C4 (open display, no ads in store) were significantly more likely to say it would be hard to buy cigarettes from the virtual store than those in condition C5 (enclosed display, no ads in store; $P < .05$).

After controlling for the covariates, all youth who were exposed to any of the enclosed display conditions (except open-to-smoking youth in C5) were significantly less likely to try purchasing tobacco in the virtual store than youth who were exposed to the open display condition (C1; see Table 3). Current smokers in conditions C5 (enclosed display, no ads in store) and C6 (enclosed display, no ads in store + ads on cabinet) were less likely than current smokers in condition C4 (open display, no ads in store) to attempt purchasing tobacco.

DISCUSSION

In summary, we found that enclosing tobacco product displays significantly lowers the likelihood that youth will try to purchase tobacco in the virtual store but inconsistent results on whether they perceive cigarettes to be difficult to purchase. Whereas Wakefield and colleagues[19] found that youth who were exposed to no display or ads were more likely to perceive tobacco as difficult to purchase from the store, we found opposite results among nonsmokers. One possible explanation for this may be that youth in enclosed conditions may perceive cigarettes to be more difficult to access and thus are more likely to try and purchase because they see it as a challenge. Policies that restrict access to tobacco products may have the unintended consequences of youth perceiving these products as "forbidden fruit" that are more desirable because they are associated with being an adult.[26] Tobacco industry documents reveal that tobacco advertising has explicitly attempted to convey the message that smoking cigarettes is synonymous with being an adult. In our experiment, although tobacco products were not visible in the enclosed conditions, the cabinets were labeled with the word "cigarettes," which indicated cigarette products may be available for sale. Enclosing the display in this manner may have the unintended effect of emphasizing the message that tobacco is for adults, thereby increasing youth's desire to use those products. We included this signage in our design because it resembled how stores in New York State and in other countries[27] had implemented tobacco product display

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TABLE 2 Characteristics of Study Sample

Characteristic	Total (N = 1216)	C1 Open Display, Ads in Store (N = 202)	C2 Enclosed Display, Ads in Store (N = 201)	C3 Enclosed Display + Ads in Store, Ads on Cabinet (N = 203)	C4 Open Display, No Ads in Store (N = 207)	C5 Enclosed Display, No Ads in Store (N = 203)	C6 Enclosed Display + No Ads in Store, Ads on Cabinet (N = 200)
Smoking status, %							
Open to smoking	60.5	59.9	60.2	60.6	61.8	60.6	60.0
Current smoker	39.5	40.1	39.8	39.4	38.2	39.4	40.0
Age, y (%)							
13	4.8	6.4	4.0	5.9	4.8	4.9	2.5
14	13.8	11.9	14.4	14.8	14.5	8.9	18.5
15	21.1	23.8	17.9	22.2	19.8	22.2	20.5
16	30.1	33.2	26.9	31.5	30.9	31.0	27.0
17	30.3	24.8	36.8	25.6	30.0	33.0	31.5
Male, %	53.5	52.0	56.2	51.7	56.0	50.7	54.5
Race, %							
White, non-Hispanic	72.4	68.3	72.6	76.4	69.1	72.9	75.0
Nonwhite, non-Hispanic	14.6	15.4	12.9	13.8	20.3	15.3	10.0
Hispanic	13.0	16.3	13.8	9.9	10.6	11.8	15.0
Sensation scale: 0 (lowest sensation seeking) → 20 (highest sensation seeking), avg (SD)	13.6 (3.8)	13.5 (3.6)	13.6 (3.2)	13.6 (3.3)	13.5 (3.4)	13.3 (3.4)	13.9 (3.3)
Current smokers who purchased from a convenience store, supermarket, or gas station, %	17.4	19.7	16.9	14.3	17.7	18.2	18.1
Live with smoker, %	32.3	31.7	32.0	36.5	29.6	34.2	30.0
Said they have 2–5 best friends who smoke, %[a]	38.2	38.3	39.5	40.6	34.3	40.4	36.4
Time spent in shopping aisles, s, avg (SD)	172.3 (91.0)	171.1 (87.7)	169.5 (81.4)	173.7 (83.5)	176.2 (109.80)	166.1 (87.6)	177.1 (93.0)
Time spent at counter, s, avg (SD)	32.1 (16.7)	32.4 (15.9)	30.8 (16.8)	31.0 (15.9)	33.9 (18.3)	32.3 (16.1)	32.1 (16.7)
Said the virtual store resembles real-world convenience stores a lot, very, or somewhat, %[b]	84.8	83.1	89.1	80.8	89.4	82.3	84.0
Saw tobacco for sale, %	60.3	85.2	54.2	62.1	79.2	32.0	48.5
Saw tobacco advertisements, %	57.1	75.3	59.2	69.5	49.8	29.6	59.5
Said they go to convenience stores at least a few times a week, %[c]	54.8	58.7	53.7	52.7	58.0	53.7	52.0
Tried to purchase tobacco, %	13.5	24.3	9.0	10.3	16.4	10.8	10.0
Said it would be hard or very hard to buy cigarettes in virtual store, %[d]	45.0	51.5	48.0	40.9	47.6	40.5	41.7

avg, average.

[a] Dichotomized variable: reference category is 0–1 best friends who smoke.

[b] Dichotomized variable: reference category is the virtual store resembles real-world stores a little or not at all.

[c] Dichotomized variable: reference category is those who go to convenience stores approximately once a week, once a month, or hardly ever.

[d] Dichotomized variable: reference category is those who said it would be very easy, easy, neither easy nor hard to buy cigarettes from the virtual store.

bans and therefore represents a likely scenario of how such policies may be adopted in the United States.

Although we found no evidence that enclosing the display decreased youth's perceived ease of access, we found that youth who were exposed to the enclosed display conditions were less likely to try purchasing tobacco in the virtual store. We believe that an observational measure of youth clicking on the tobacco product display and affirming that they want to purchase tobacco products may be a more valid measure of youth's desire and intention to buy cigarettes than a self-reported measure about how easy it would be to purchase cigarettes from a pictured store. It is better to observe what youth will actually do in a situation in which tobacco product displays are enclosed than to simply ask them about what they might do. Additionally, the virtual store may be a more realistic way to expose participants to potential display ban conditions than static images and to engage them with the environment by

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TABLE 3 Adjusted Odds Ratios (95% CI) for Perceived Ease of Access to Cigarettes and Attempting to Purchase Tobacco in the Virtual Store

	Perceived Ease of Access to Cigarettes		Attempting to Purchase Tobacco	
	Current Smokers	Open to Smoking	Current Smokers	Open to Smoking
	(N = 293)	(N = 681)	(N = 409)	(N = 723)
C1: Open display, ads in store	1.00	1.00	1.00	1.00
C2: Enclosed display, ads in store	1.20[a] (0.45–3.22)	0.78 (0.45–1.35)	0.30** (0.13–0.67)	0.28* (0.08–0.96)
C3: Enclosed display, ads in store + ads on cabinet	0.38[a] (0.14–1.06)	0.68 (0.40–1.18)	0.39* (0.18–0.86)	0.22* (0.06–0.85)
C4: Open display, no ads in store	0.65 (0.23–1.86)	0.96[b] (0.56–1.65)	0.84[c,d] (0.40–1.74)	0.45 (0.15–1.34)
C5: Enclosed display, no ads in store	1.19 (0.45–3.16)	0.49*[b] (0.28–0.85)	0.27**[c] (0.12–0.63)	0.46 (0.16–1.33)
C6: Enclosed display, no ads in store + ads on cabinet	0.68 (0.25–1.83)	0.70 (0.41–1.21)	0.32**[d] (0.14–0.69)	0.22* (0.06–0.86)

All odds ratios adjusted for age, race, gender, sensation-seeking scale, number of best friends who smoke, living with a smoker, frequency of going to a convenience store, and virtual store resembles a real convenience store. Current smoker models also control for source of cigarettes (retail versus social source). Perceived ease of access to cigarettes model excludes those who attempted to purchase tobacco in the virtual store.

[a] Significant difference ($P < .05$) between C2 and C3 in current smoker model.

[b] Significant difference ($P < .05$) between C4 and C5 in open to smoking model.

[c] Significant difference ($P < .05$) between C4 and C5 in current smoker model.

[d] Significant difference ($P < .05$) between C4 and C6 in current smoker model.

* $P < .05$.

** $P < .01$.

giving them a specific shopping task. Indeed, previous studies in the field of experimental psychology confer the benefits of using interactive virtual environments to simulate and test the impact of environments or situations that are difficult to study.[28–30] In addition, we also confirmed that youth thought our virtual store was a realistic representation of convenience stores that they frequent. Despite these strengths, our study has some potential limitations. First, youth's exposure to the conditions may not have been sufficient. We attempted to provide substantial exposure to the display conditions by having youth select multiple products at the checkout counter and having the animated retailer purposely keep the youth waiting by talking on his cell phone, but youth only spent an average of 3.4 minutes in the virtual store, which is considerably less than the average of 16 minutes teenagers typically spend when visiting convenience stores.[31] However, a previous eye-tracking study[32] found differences in outcomes when youth viewed tobacco ads for only 9 to 17 seconds, suggesting that the 32 seconds our study participants spent on average at the POS may have been adequate exposure to the display conditions. Second, it is possible that participants may have been aware that the virtual task was related to smoking. To select the right participants, the screener questions asked about smoking and, per institutional review board guidelines, the consent form mentioned that the survey would assess perceptions about smoking. This may have primed the respondent that the shopping task was about smoking. However, the shopping task itself did not mention anything about smoking and participants were not directed to purchase cigarettes. Furthermore, if priming occurred, it should affect participants across all conditions. Finally, our results have limited generalizability because Research Now's panelists are a convenience sample recruited via non-probability-based online methods. However, because the purpose of our study was to test the potential impact of banning tobacco displays and ads, our primary concern was to minimize potential threats to internal validity at the cost of potentially limiting external validity. Using an online panel like Research Now provided the benefits of accessing a large number of youth who could be systematically screened and randomized to the virtual store conditions via the Internet.

CONCLUSIONS

We found that enclosing tobacco product displays could deter youth from attempting to purchase tobacco in retail stores. These results provide support for policies that would ban the display of tobacco products at the POS. The virtual store application can be used to test the impact of other POS policies, such as whether antismoking messages at the POS could mitigate the impact of open tobacco displays or potentially strengthen the impact of enclosed tobacco displays on smoking-related outcomes for youth and adults.

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Influence of Tobacco Displays and Ads on Youth: A Virtual Store Experiment

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Pediatrics 2013;131;e88; originally published online December 3, 2012; DOI: 10.1542/peds.2012-0197

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IMPLICATIONS OF THE JUNE 2008 $1.25 CIGARETTE TAX INCREASE



NEW YORK STATE
DEPARTMENT OF HEALTH
NOVEMBER 2010

RTI Project Number
0211568.002.016

Implications of the June 2008 $1.25 Cigarette Tax Increase

Topical Report

November 2010

Prepared for

New York State Department of Health
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Executive Summary

On June 3, 2008, New York raised its cigarette excise tax by $1.25, to $2.75 per pack, at the time making New York the state with the highest cigarette excise tax in the nation. New York City levies an additional $1.50 per pack. On July 1, 2010, New York's cigarette excise tax was increased by an additional $1.60 per pack and new legislation was enacted to curb cigarette excise tax avoidance. These actions have the potential to appreciably reduce cigarette use and increase tax revenues to the state.

By increasing cigarette prices, cigarette taxes have a significant impact on tobacco use behaviors. Increases in cigarette prices have been shown to prevent youth and adults from starting to smoke and encourage those who do smoke to quit or cut back. However, rising cigarette prices prompt some smokers to seek out low-cost alternatives, either by switching to cheaper brands or by shopping online or from Indian reservations or lower taxed neighboring states.

This report examines the impact of the June 2008 cigarette tax increase on a range of smoking outcomes among New York adult smokers, including price paid, tax avoidance, cigarette sales, and cessation. Key findings are as follows:

- Self-reported cigarette prices have increased significantly since the tax increase, from an average of $4.95 in the year before the tax increase to $6.19 in the year after.
- In 2009, smokers in New York City reported paying $7.68 per pack of cigarettes, compared with $5.35 in the rest of the state.
- Half of all smokers (50.1%) reported purchasing cigarettes from low-tax locations, such as Indian reservations, the Internet, duty-free shops, toll-free telephone numbers, and neighboring states and Canada in 2009.
- In 2009, smokers who purchased at low-tax locations paid on average $5.49 per pack, compared with $6.93 paid by smokers who purchased at full-tax locations.
- A majority of smokers (54.3%) reported being "very or extremely concerned" about the cost of cigarettes in 2009.

- The percentage of smokers who purchase cigarettes from Indian reservations has increased significantly from 1 year before the tax increase (24.7%) to 1 year after (31.7%). Similarly, the percentage of smokers who purchase cigarettes from the Internet has increased significantly from 1.9% to 5.0%.
- The top three Internet cigarette vendors to New York residents are located on Indian reservations in New York State.
- Cigarette purchases that avoid taxes decrease potential revenues to the state by between $467.5 million and $612.8 million per year and undermine the public health benefits of the cigarette tax increase.
- In the year since the tax increase, from June 2008 to May 2009, cigarette excise tax revenues collected by New York rose 54%, to $1.31 billion, while tax-paid cigarette sales decreased 22.8%.
- No significant increase in quit intentions or quit attempts has been noted since the June 2008 tax increase.

The impact of the July 2010 tax increase will be examined in future reports.

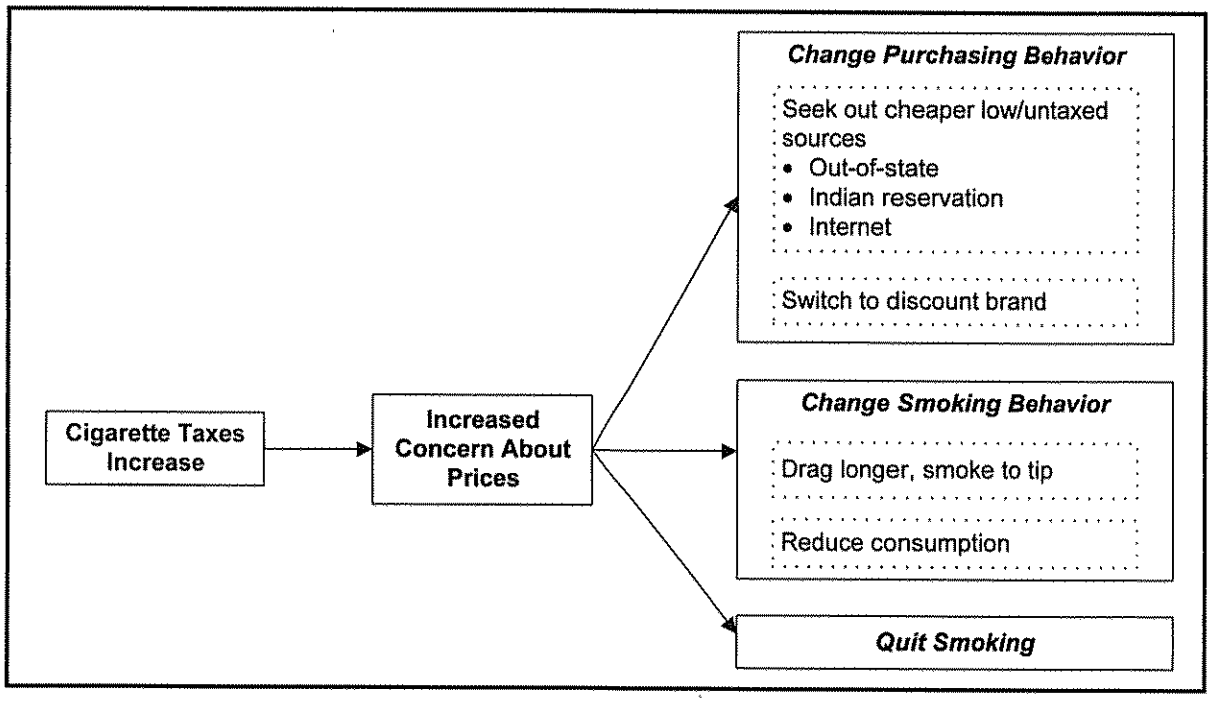
1. Introduction

On June 3, 2008, New York raised its cigarette excise tax by $1.25, to $2.75 per pack, at the time making New York the state with the highest cigarette excise tax in the nation. New York City levies an additional $1.50 per pack. On July 1, 2010, New York's cigarette excise tax was increased by an additional $1.60 per pack and new legislation was enacted to curb cigarette excise tax avoidance. These actions have the potential to appreciably reduce cigarette use and increase tax revenues to the state.

Raising the price of cigarettes is one of the most effective interventions to prevent and reduce cigarette use (Warner, 2006). Increasing the cigarette tax results in an increase in retail cigarette prices as wholesalers and retailers pass the additional cost of the tax on to smokers (Keeler et al., 1996). This price increase, in turn, provides an incentive for smokers to quit or cut back. Among adults, a 10% increase in the price per pack of cigarettes is associated with a 3% to 5% decline in overall consumption, with approximately half of this decline resulting from smokers quitting altogether (Chaloupka and Warner, 2000). However, recent work suggests that the reduction in cigarette consumption that follows a tax increase may be smaller than the consensus estimate, as cigarette prices and taxes are now much higher, on average, than has been the historical norm (Farrelly and Engelen, 2008; Farrelly et al., 2008).

Smokers who continue to smoke following a tax or price increase may change their purchasing and smoking behaviors to accommodate the increased cost (Exhibit 1-1). Smokers may switch from premium to discount brands; buy fewer cigarettes overall but smoke those cigarettes more intensively; or seek out low- or untaxed sources of cigarettes, such as Indian reservations and Internet vendors. Purchasing from Indian reservations, in particular, is common in New York (Davis et al., 2006). Cigarette tax avoidance not only reduces smokers' intentions to quit smoking (Hyland et al., 2005) but also results in a substantial loss of tax revenue to the state.

Exhibit 1-1. Impact of Cigarette Tax Increase on Purchasing and Smoking Behaviors



In this report, we first examine changes in cigarette prices, smokers' concerns about rising prices, and tax-avoiding shopping behaviors, such as frequent purchasing at Indian reservations, because we expect those outcomes to show the fastest response to the tax increase. Next, we report on changes in cigarette sales and self-reported daily cigarette consumption. Finally, we examine intentions to quit smoking, quit attempts in the past 12 months, and changes in call volume to the New York State Smokers' Quitline.

On July 1, 2010, New York's cigarette excise tax was increased by an additional $1.60 per pack and new legislation was enacted to curb cigarette excise tax avoidance. The results presented in this report suggest that these actions have the potential to appreciably reduce cigarette use and increase tax revenues to the state.

2. Data and Methods

This report relies primarily on data from the 2005–2009 New York Adult Tobacco Survey (NY-ATS), a representative household survey of New York residents aged 18 or older. One adult is randomly selected in each responding household. The sample includes list-assisted random-digit-dial and directory-listed numbers. The survey is conducted using computer-assisted telephone interviews and includes items that measure the prevalence of smoking behaviors, attitudes and beliefs about tobacco and tobacco control legislation, exposure to secondhand smoke, and perceptions of pro- and antitobacco advertising. Approximately 2,000 NY-ATS telephone interviews are completed each quarter, or about 8,000 interviews per year.

To better assess the extent to which New Yorkers evaded higher taxes by purchasing cigarettes online, RTI purchased Web site traffic and sales transaction data from Web analytics firm comScore, Inc. comScore is an industry leader in measuring online audience behavior and has conducted studies estimating online cigarette purchases for private clients (Moritz, 2008). comScore data are collected from a custom panel of more than 2 million Internet users who have given comScore permission to confidentially and continuously monitor their online behavior. comScore unobtrusively captures the details of panelists' Internet browsing behavior at every site, including details of online purchases. The comScore tracking software can distinguish multiple users in the household by each user's unique mouse and typing behavior (e.g., time between keystrokes and mouse usage). This ensures that Web site exposure and purchasing behaviors are accurately linked to each panelist in a household. All data are aggregated, weighted, and projected to the Internet user population to arrive at population estimates of exposure. RTI purchased data on the number of unique visitors to the top 158 Internet cigarette vendor Web sites, as well as the number of cartons purchased, estimated dollar sales, and demographic characteristics of visitors. The comScore data cover the period from January to December 2008, with monthly estimates for New York State compared with the rest of the United States.

Other data included in this report are monthly tax-paid cigarette sales from New York from 1999 to 2009, number of

calls to the New York State Smokers' Quitline, and number of units of nicotine replacement therapy from 2006 to 2009.

The $1.25 tax increase took effect on June 3, 2008. We tested for statistically significant differences in outcomes between the year before the tax increase (Q3 2007–Q2 2008) and the year after the tax increase (Q3 2008–Q2 2009). We also tested for statistically significant trends over time in each outcome from Q3 2005 to Q2 2009, spanning 16 calendar quarters of data.

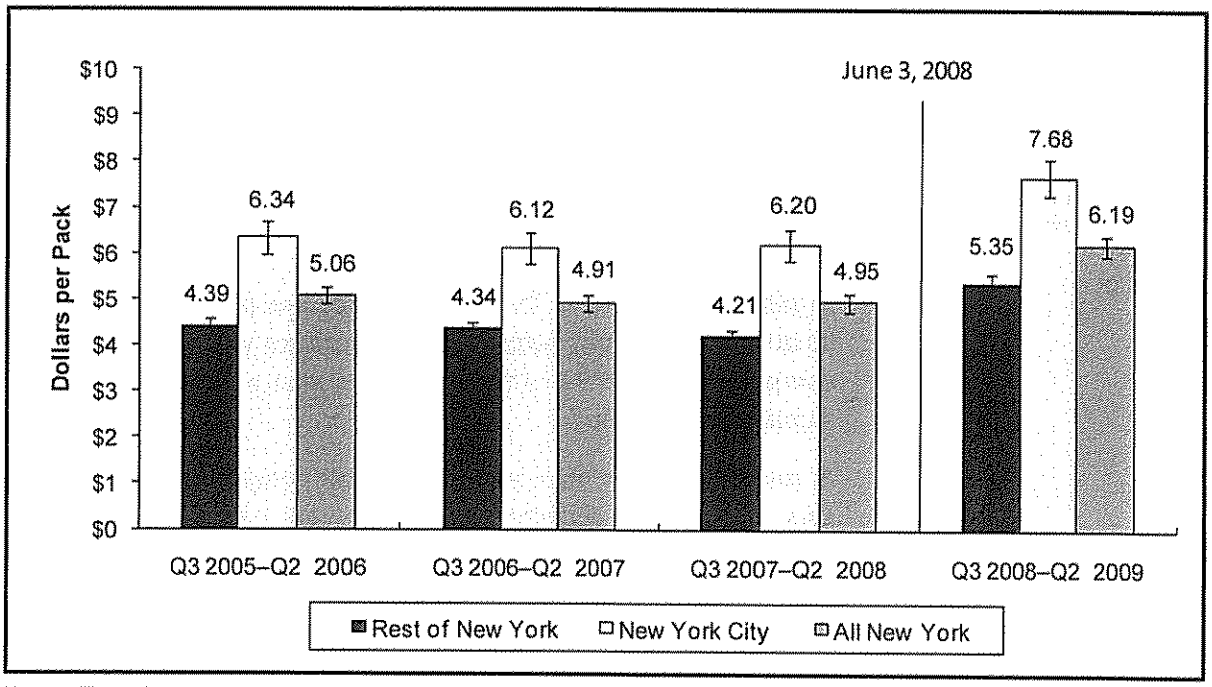
On April 1, 2009, 10 months after New York raised its cigarette tax, the federal government raised its cigarette excise tax by $0.62, to $1.01 per pack, a 159% increase. Because this tax increase occurs within the 1-year post-tax period used for testing differences in outcomes before and after the New York tax, it undoubtedly caused average cigarette prices to appear significantly higher in the post-tax period than in the pre-tax period.

3. Results

3.1 Cigarette Prices

The average price per pack of cigarettes in New York increased significantly from $4.95 per pack in the year before the June 2008 cigarette tax increase to $6.19 per pack in the year after the tax increase (Exhibit 3-1) (all prices in this report are adjusted for inflation and are self-reported by smokers). Among New Yorkers, smokers in New York City pay the highest prices, $7.68 per pack on average, compared with $5.35 for smokers in the rest of the state.

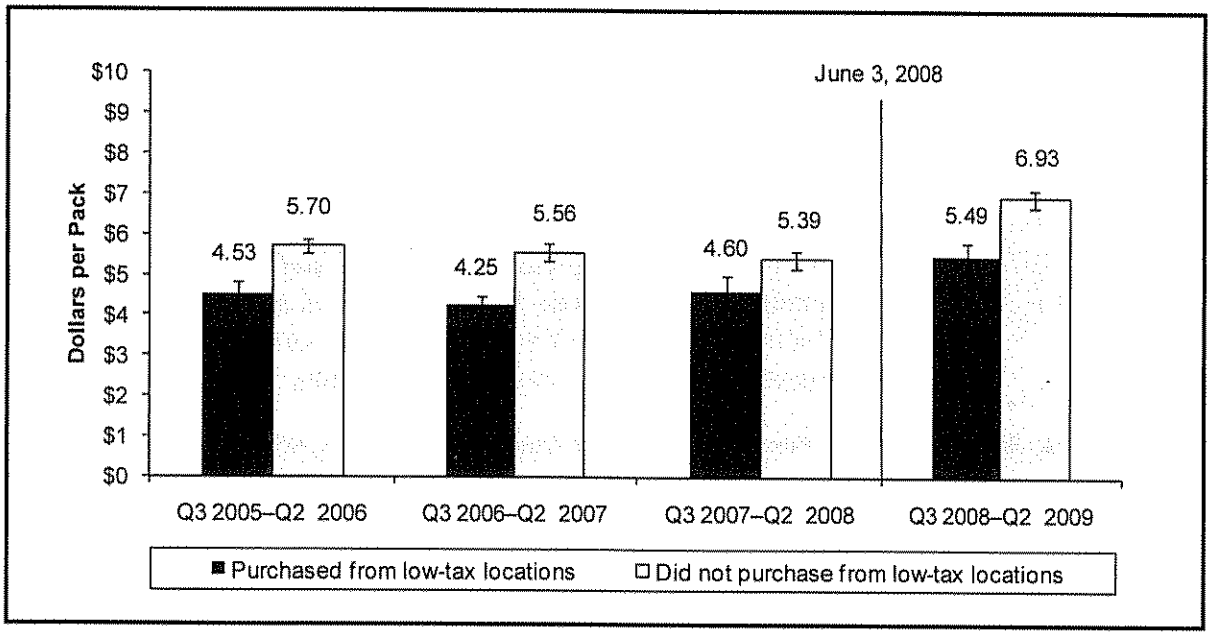
Exhibit 3-1. Average Price Per Pack Paid by Current Smokers, NY-ATS Q3 2005–Q2 2009



Notes: There is a statistically significant upward trend in the price per pack of cigarettes from Q3 2005 to Q2 2009. The average price per pack in New York is significantly higher in the year after the tax increase than in the year before. All prices are adjusted for inflation. The June 2008 New York State tax increase is indicated by a vertical line.

New Yorkers who purchased their cigarettes from a low-tax location (Indian reservations, Internet, toll-free numbers, duty-free shops, and other states and countries) paid significantly less than smokers who purchased at full-tax locations (Exhibit 3-2). The average price per pack at low-taxed locations the year before the tax increase was $4.60, compared with $5.49 in the year after the tax increase, a statistically

Exhibit 3-2. Average Price Per Pack Paid by Current Smokers by Purchase Location, NY-ATS Q3 2005–Q2 2009



Notes: The difference in price per pack between the year before and the year after the tax increase is statistically significant. All prices are adjusted for inflation. Low-tax locations include Indian reservations, Internet, toll-free numbers, duty-free shops, and other states and countries. The June 2008 New York State tax increase is indicated by a vertical line.

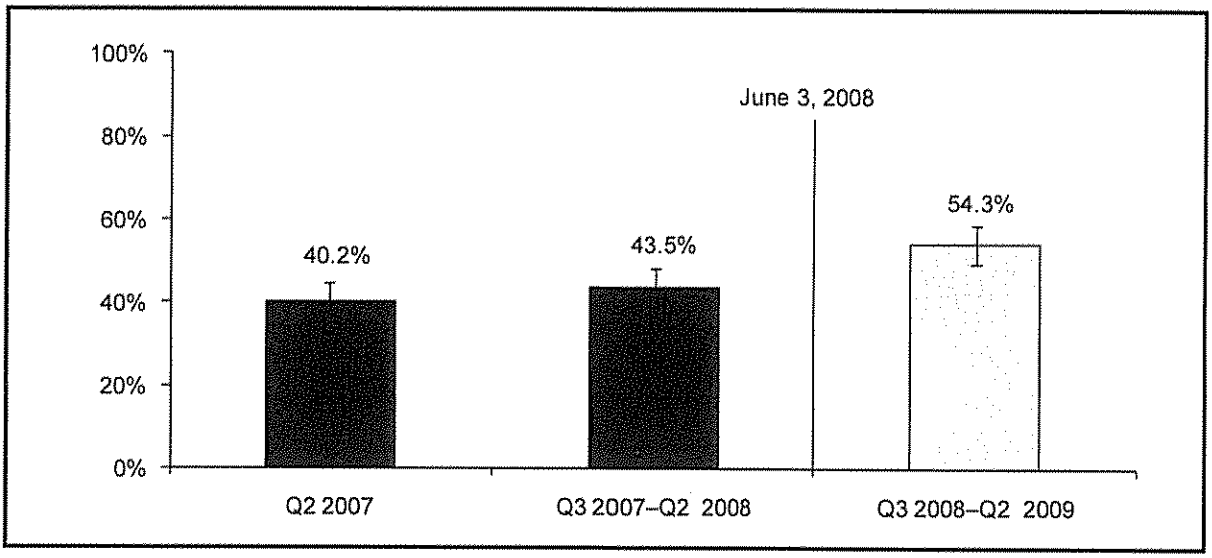
significant difference. The average price per pack at full-tax locations in the year before the tax increase was $5.39, compared with $6.93 in the year after, also a statistically significant increase.

A majority of New York smokers remain concerned about the cost of cigarettes (Exhibit 3-3). In the year before the tax increase, 43.5% of smokers reported being very or extremely concerned about the price of cigarettes, compared with 54.3% in the year after the increase, a statistically significant increase. Concerns about cigarette prices began to rise before the cigarette tax increase took effect, perhaps in anticipation of the impending tax hike.

3.2 Cigarette Purchasing Behavior

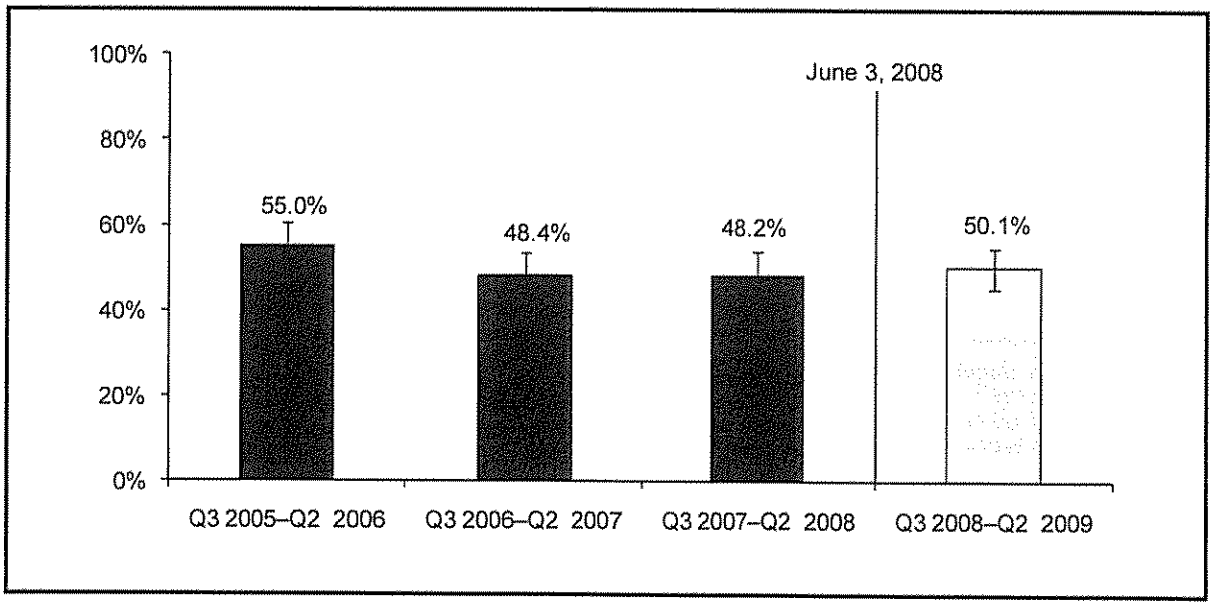
Just over 50% of New York smokers purchased cigarettes from low-tax locations in the year after the tax increase (Exhibit 3-4), up only slightly from the year before the tax increase. Therefore, despite facing rising cigarette prices and expressing concern about the cost of cigarettes, more New York

Exhibit 3-3. Percentage of Adult Smokers in New York Who Are Very or Extremely Concerned about the Cost of Cigarettes, NY-ATS Q2 2007–Q2 2009



Notes: Smokers were first asked about their concern for cigarette prices in Q2 2007. There is a statistically significant upward trend in the proportion of smokers who are concerned about cigarette prices from Q2 2007 to Q2 2009. The difference in the proportion of smokers who are concerned about cigarette prices in the year before the tax increase and the year after the tax increase is statistically significant. The June 2008 New York State tax increase is indicated by a vertical line.

Exhibit 3-4. Percentage of Adult Smokers Who Purchased Cigarettes from Any Low-Tax Location in the Past 12 Months, NY-ATS Q3 2005–Q2 2009

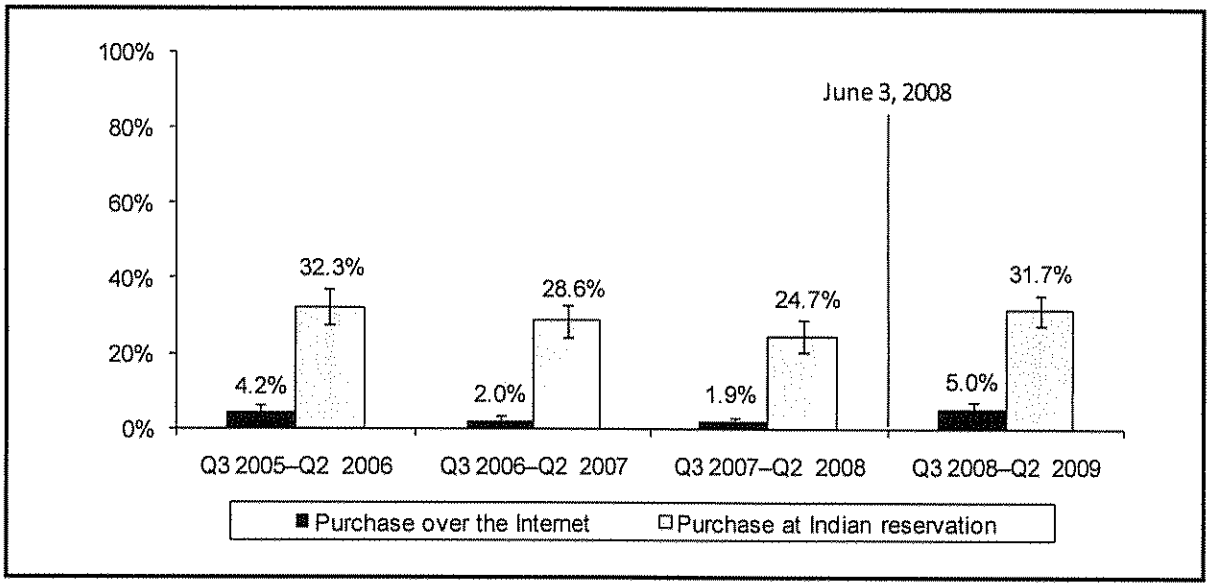


Notes: Low-tax locations include Indian reservations, Internet, toll-free numbers, duty-free shops, and other states and countries. The June 2008 New York State tax increase is indicated by a vertical line.

smokers do not appear to be shopping at low-tax sources, such as Indian reservations, the Internet, duty-free shops, and neighboring states that may have lower cigarette tax rates.

Although the overall trend in purchases from low-taxed locations has changed little since Q3 2005, we do observe significant increases in the percentage of smokers who report purchasing specifically from Indian reservations and the Internet (Exhibit 3-5). The percentage of smokers who purchased cigarettes from Indian reservations increased significantly from 24.7% in the year before the tax increase to 31.7% in the year after. Similarly, the percentage of smokers who purchased cigarettes from the Internet increased significantly from 1.9% to 5.0%.

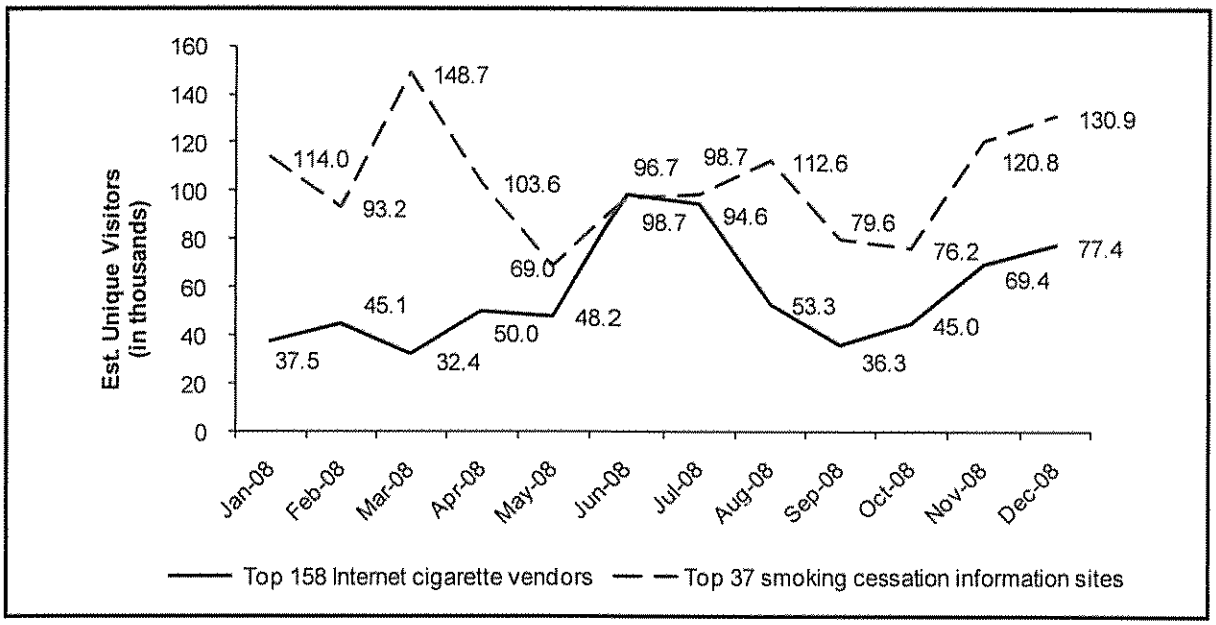
Exhibit 3-5. Percentage of Adult Smokers Who Purchased Cigarettes from an Indian Reservation or on the Internet in the Past 12 Months, NY-ATS Q3 2005–Q2 2009



Notes: There is a statistically significant increase in purchasing cigarettes on the Internet between the year before and the year after the tax increase. There is a statistically significant increase in purchasing cigarettes at an Indian reservation between the year before and the year after the tax increase. The June 2008 New York State tax increase is indicated by a vertical line.

Exhibit 3-5 shows that more New Yorkers are purchasing cigarettes online, and this is supported by Internet traffic data from comScore. Exhibit 3-6 shows an increase in the number of New Yorkers who sought out cheaper prices online when the tax increase went into effect in June 2008. The number of New York residents visiting the top 158 Internet cigarette vendors

Exhibit 3-6. Estimated Number of Unique New York State Visitors (in thousands) to Internet Cigarette Vendors and Cessation Web Sites, comScore Internet Panel, January–December 2008



peaked in June 2008 at 98,700 unique visitors. This number of visitors compares well with results from the NY-ATS. Five percent of the approximately 2.6 million smokers in New York equals about 130,000 smokers who admit purchasing cigarettes over the Internet. Monthly visits to cessation Web sites peaked before the June 2008 cigarette tax increase. However, overall, more New Yorkers visited cessation Web sites than Web sites that sell cigarettes in 2008.

Three Web sites—Smokes-Spirits.com, SmartSmoker.com, and CigarettesExpress.com—captured the majority of online cigarette sales among New York residents (Exhibit 3-7). All three of these Internet cigarette vendors are based on American Indian reservations in western New York. All claimed they would verify age and utilize the United States Postal Service for shipping, and one Web site (SmartSmoker.com) claimed it accepted credit cards, despite the fact that the leading credit card companies voluntarily banned credit card payments for online transactions of tobacco sales under the 2005 agreement with state Attorneys General.

Exhibit 3-7. Characteristics of Major New York–Based Internet Cigarette Vendors, comScore Internet Panel

Web Site	Accept Credit Cards	Age Verification	Shipping	Location
Smokes-Spirits.com	No	Copy of ID	USPS	Salamanca, NY
SmartSmoker.com	Yes	Signature at delivery	USPS	Salamanca, NY
CigarettesExpress.com	No	Copy of ID	USPS	Irving, NY

Note: USPS = United States Postal Service

The top three Internet cigarette vendors also claimed that their sovereign status allowed them to sell cigarette products tax-free and that buyers were responsible to comply with existing tax laws:

> *"We are a Native American business located on the Seneca Nation (a Sovereign Nation) in Western New York. It is the responsibility of the Buyer to ascertain and comply with any laws in regard to the purchase and use of any cigarette products."—Smokes-Spirits.com*

> *"As part of the Seneca Nation of Indians and the Iroquois Confederacy, SmartSmoker is currently not required to collect state sales tax for products sold on Native land. Nonetheless, we are required under federal law to report all sales and shipments of cigarettes to the state taxing authority within your home state. You should contact the taxing authority within your state to determine your tax obligation on the use of these products within your state. LINKS TO STATES TAX DEPARTMENTS."—SmartSmoker.com*

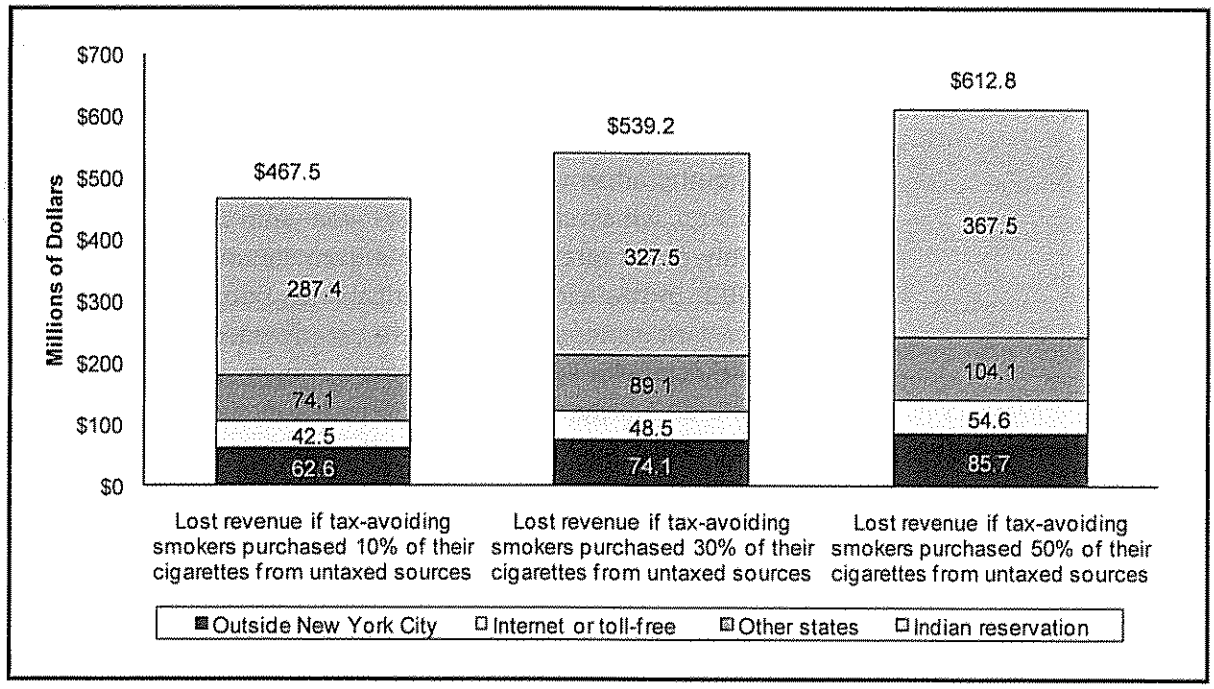
> *"Federal legislation permits the purchase and interstate shipment of cigarette products for personal consumption in all 50 states. It is the responsibility of the customer to comply with any laws regarding the purchase and use of any cigarettes in their State. In order to determine the applicable limits on purchases or taxing responsibilities, if any, imposed by your particular State, you may want to contact your State tax authorities. We do not collect Sales or Excise taxes on the behalf of any State, nor are we required to do so."—CigarettesExpress.com*

SmartSmoker.com was the only site that stated it would report purchases to state taxing authorities.

With half of all New York smokers reporting some tax avoidance behavior, and significant increases in the percentage of smokers who report purchasing from Indian reservations and

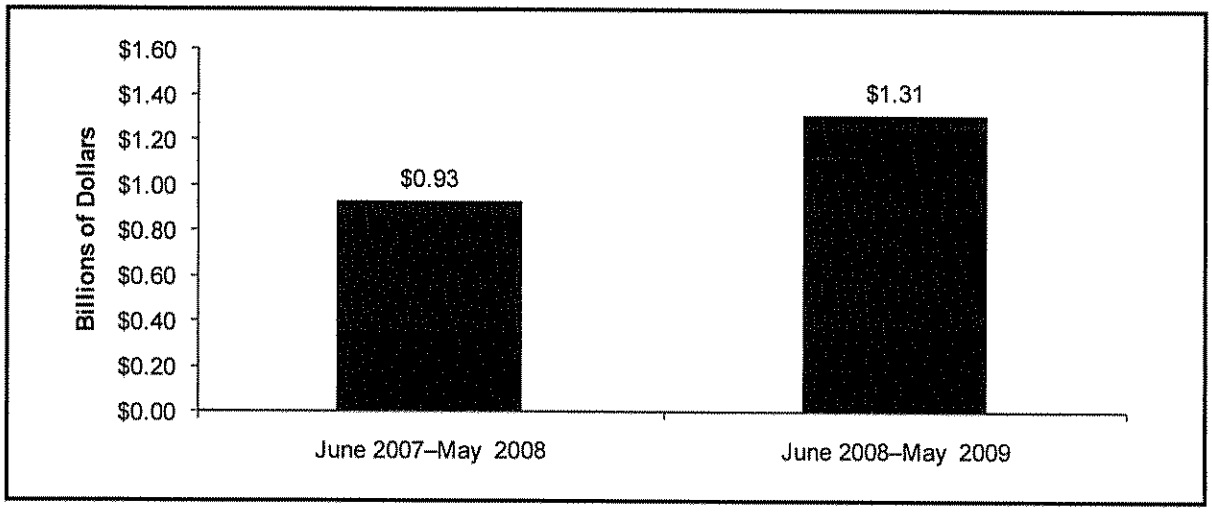
the Internet, cigarette tax evasion remains a serious concern in New York. Exhibit 3-8 shows estimated revenue lost to New York State from tax-avoiding smokers from July 1, 2008, through June 30, 2009. The state could lose $467.5 million per year if smokers purchased 10% of their cigarettes from untaxed sources, and up to $612.8 million if 50% of such purchases were from untaxed sources. This is a slight decline from the 2008 estimates of $489 million and $669 million, respectively, due to lower overall cigarette sales that resulted from the higher tax and the long-term downward trend in cigarette consumption. These estimates include losses due to uncollected cigarette excise taxes as well as forgone sales taxes and are calculated using the same methods as in previous reports (Davis et al., 2006; RTI International, 2009).

Exhibit 3-8. Estimated Lost Revenue in New York State from Tax Avoidance, in Millions of Dollars, July 1, 2008–June 30, 2009



Despite the extent of tax evasion, cigarette excise tax revenues to the state increased from $930 million in the year before the tax to $1.31 billion in the year after the tax, an increase of 41% (Exhibit 3-9). Over that same period, tax-paid cigarette sales decreased 22.8% from 618.3 million packs to 477.6 million packs.

Exhibit 3-9. Cigarette Excise Tax Revenue to New York State, June 2007–May 2009, in Billions of Dollars



3.3 Cigarette Sales and Use

Between 1999 and 2009, tax-paid cigarette sales dropped from 6.8 packs per person per month to 2.5 packs, a 63% decline (Exhibit 3-10). Tax-paid cigarette sales show a marked decrease in the months after a cigarette tax increase, as illustrated by Exhibit 3-11, which shows the year-over-year percentage change in monthly per capita tax-paid sales from January 1999 through June 2009. In the exhibit, the vertical lines note when federal and New York state cigarette excise tax increases occurred. The first state cigarette excise tax increase shown occurred in March 2000 and raised the tax from $0.56 to $1.11 per pack, the second in April 2002 raised the tax to $1.50, and the third in June 2008 increased the tax to $2.75. The federal cigarette excise tax increases occurred in January 2000 and raised the tax from $0.24 to $0.34; in January 2002, the tax went to $0.39; and in April 2009, the tax went to $1.00 per pack. Exhibit 3-11 suggests that tax-paid cigarette sales decline steeply after a state tax increase and then rise back to a new, lower equilibrium level over time. For example, in April 2002, 1 month after the March 2002 state cigarette tax increase, cigarette sales were 14% lower than in April 2001. In September 2002, a full 6 months after the March 2002 tax increase, cigarette sales were 40% lower than in the previous September. Per capita sales appeared to finally return to a stable trend pattern around June 2003, 15 months after the March 2002 tax increase.

Exhibit 3-10. Per Capita Monthly Tax-Paid Cigarette Sales, New York State, Orzechowski and Walker, January 1999–June 2009

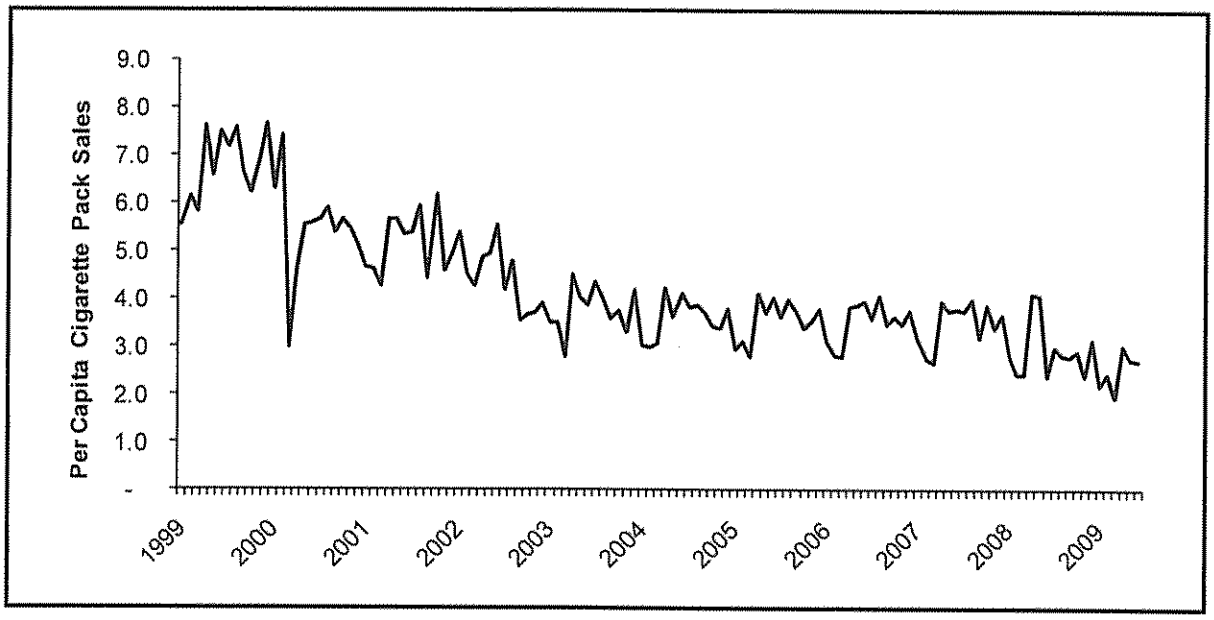
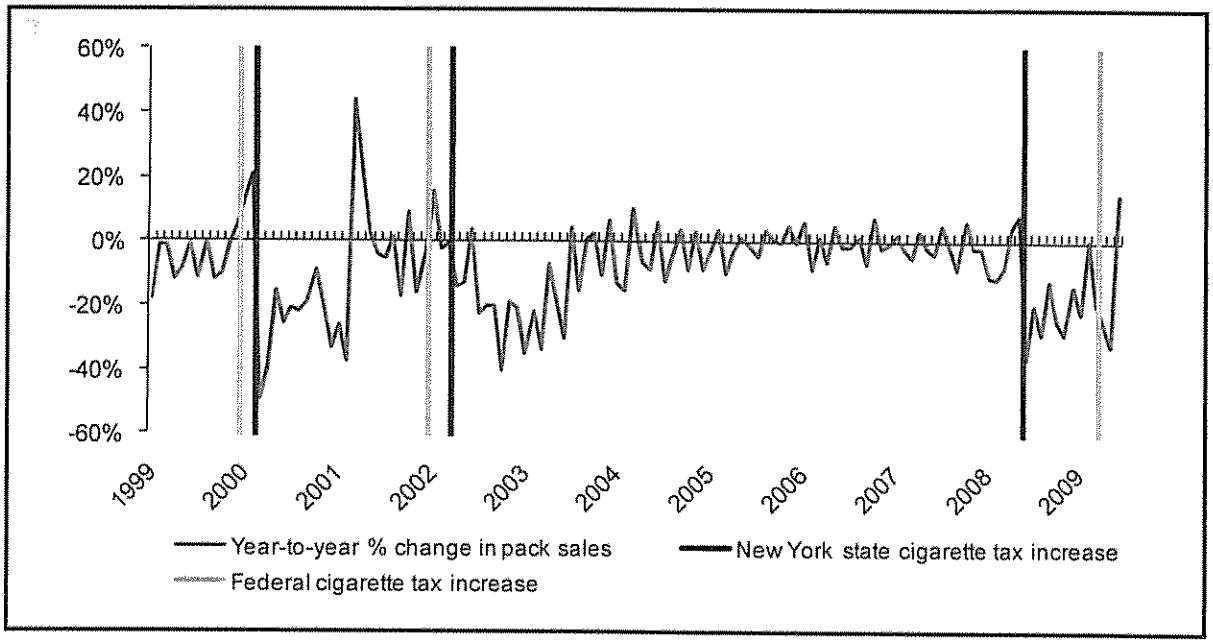


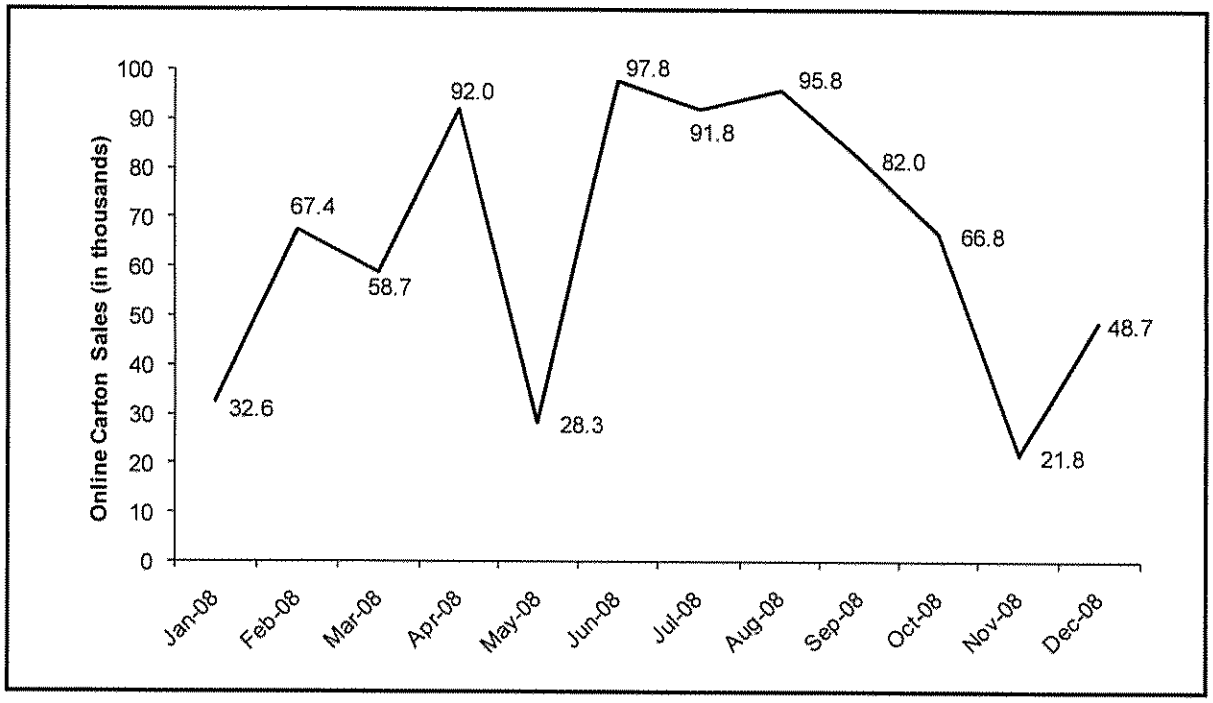
Exhibit 3-11. Year-Over-Year Percentage Change in Monthly Tax-Paid Cigarette Sales in New York State, Orzechowski and Walker, January 1999–June 2009



A similar pattern appears to be emerging following the June 2008 tax increase. In the 12 months following this latest increase, monthly cigarette sales were an average of 18% lower compared with the same period 1 year earlier. The relatively large federal tax increase of $0.61 per pack that occurred in April 2009 will eventually also serve to drive sales downward.

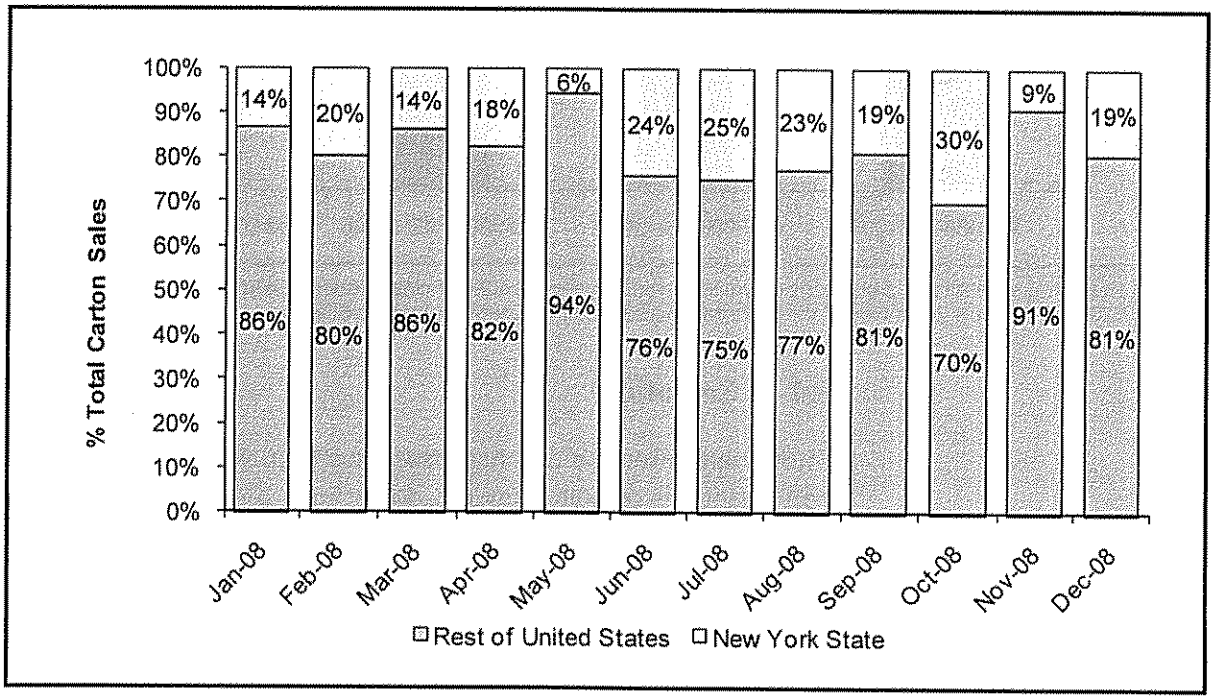
According to comScore e-commerce data, New York State residents purchased approximately 783,000 cigarette cartons online in 2008, with the highest volume of sales reported in June 2008 (Exhibit 3-12). This equates to more than 7.8 million packs of cigarettes sold online in 2008, for a total excise tax revenue loss to the state of approximately $21.45 million.

Exhibit 3-12. Estimated Number of Cigarette Cartons (in thousands) Purchased Online by New Yorkers, comScore Internet Panel, January–December 2008



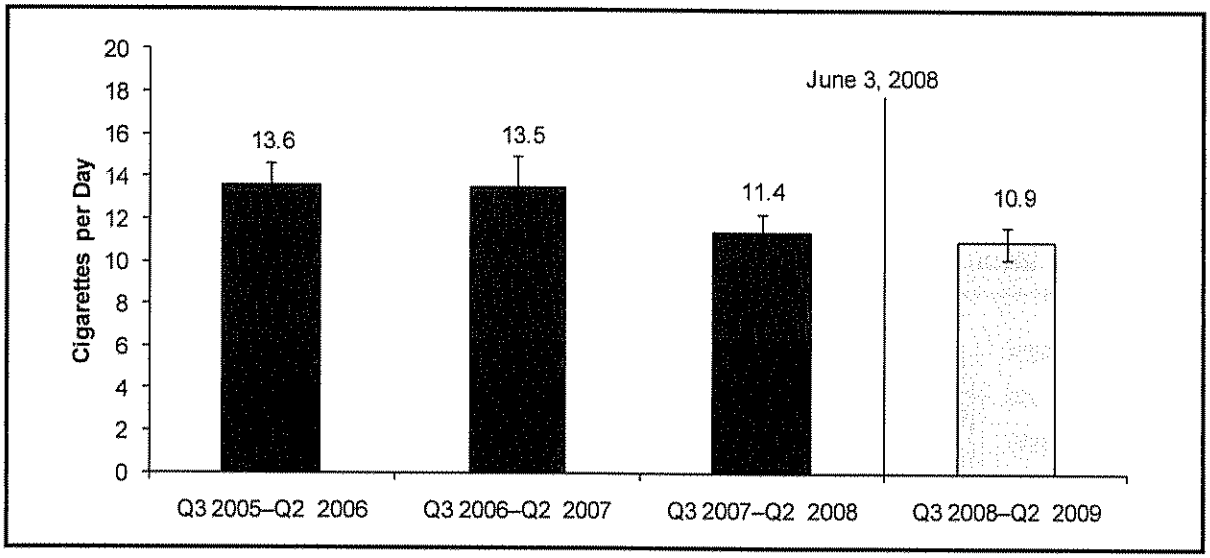
New Yorkers purchased approximately 18% of all cartons sold online in 2008, according to comScore (Exhibit 3-13). The percentage of cartons purchased by New Yorkers increased after the June 2008 tax increase, from 14% in January through May to 21% in June through December.

Exhibit 3-13. Percentage of Estimated Online Cigarette Carton Sales in New York State and the Rest of the United States, comScore Internet Panel, January–December 2008



Daily cigarette consumption by New York smokers was virtually unchanged after the tax increase, falling to 10.9 cigarettes per day from 11.4 the year after the tax increase (Exhibit 3-14).

Exhibit 3-14. Average Number of Cigarettes Smoked Per Day by Current Smokers, NY-ATS Q3 2005–Q2 2009



Notes: There is a statistically significant downward trend in the number of cigarettes smoked per day from Q3 2005 to Q2 2009. The June 2008 New York State tax increase is indicated by a vertical line.

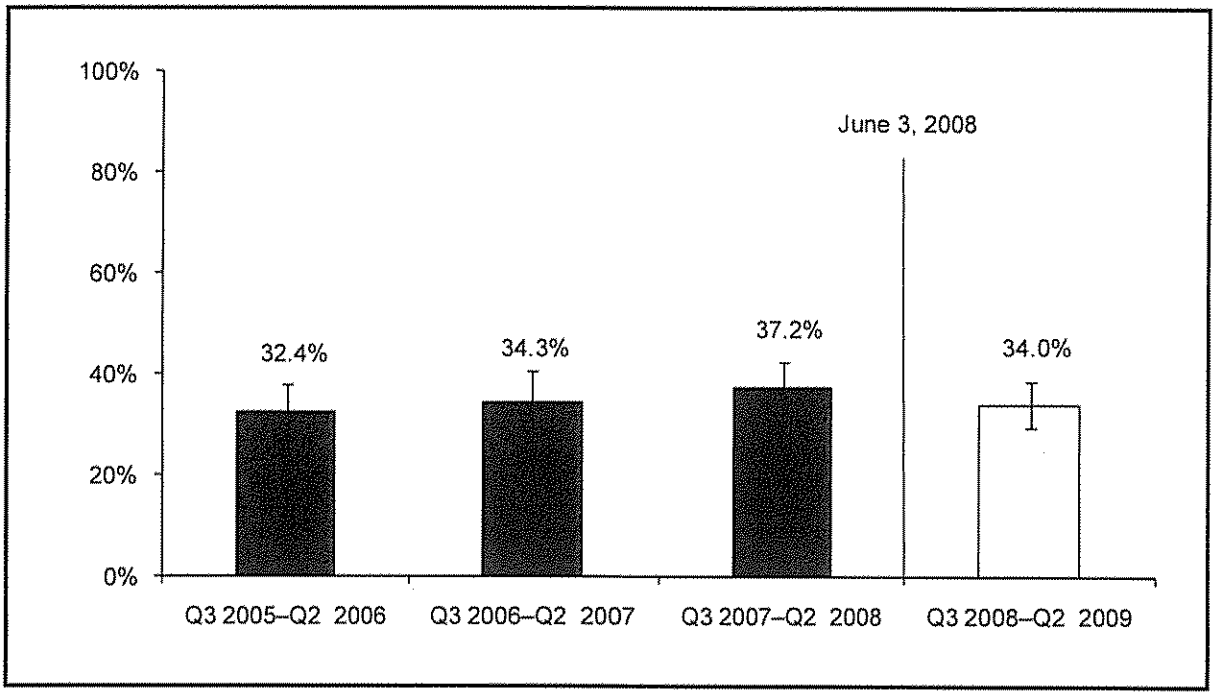
3.4 Cessation

In the year after the tax increase, 34.0% of New York smokers had intentions to quit smoking, down from 37.2% of smokers in the year before the tax increase (Exhibit 3-15). The proportion of smokers who made a quit attempt in the past 12 months decreased to 56.5% from 58.4% over the same time period (Exhibit 3-16).

Exhibit 3-17 shows the monthly call volume to the New York State Smokers' Quitline. As a visual aid, dashed vertical lines mark the month of January in each year. The trend in call volume is slightly upward, with an average volume of just over 19,000 calls per month between January 2006 and June 2009. The heaviest call volumes occur in January and February which typically see twice as many calls as the average month, as smokers attempt to keep New Year's resolutions to quit smoking.

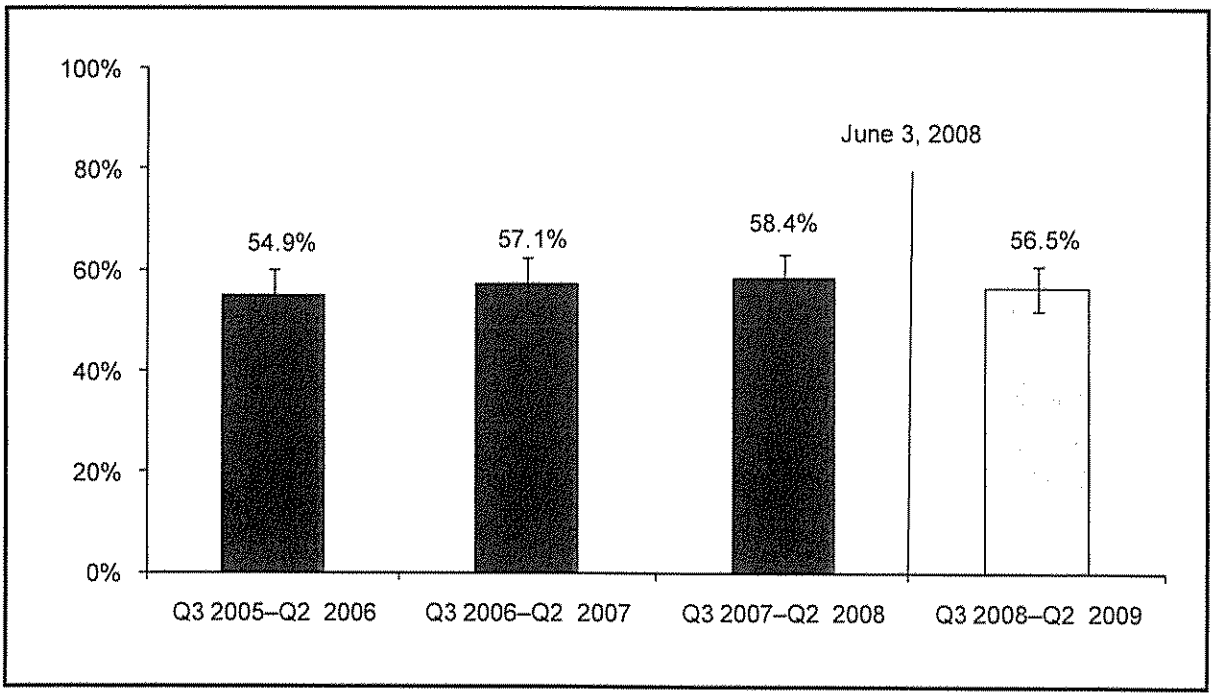
Exhibit 3-18 shows the year-over-year percentage change in monthly Quitline call volume from January 2007 through June 2009. The June 2008 and April 2009 tax increases are denoted by vertical lines along the timeline. Neither tax increase appears to have any notable effect on the number of calls to the Quitline.

Exhibit 3-15. Percentage of Adult Smokers Who Intend to Make a Quit Attempt in the Next 30 Days, NY-ATS Q3 2005–Q2 2009



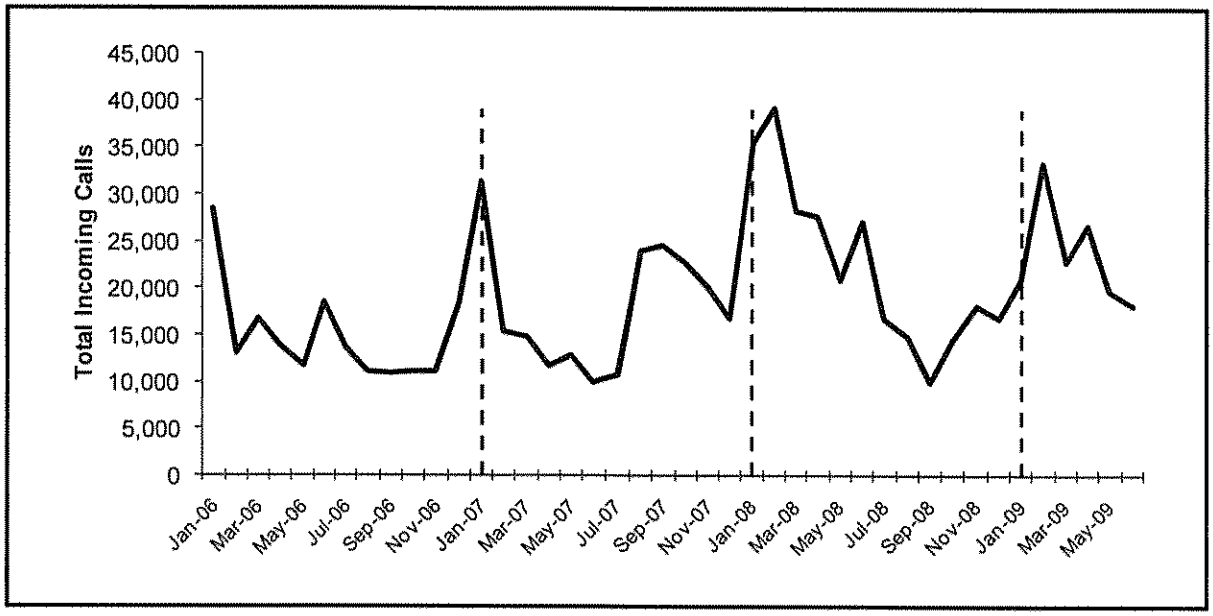
Note: The June 2008 New York State tax increase is indicated by a vertical line.

Exhibit 3-16. Percentage of Adult Smokers Who Made a Quit Attempt in the Past 12 Months, NY-ATS Q3 2005–Q2 2009



Note: The June 2008 New York State tax increase is indicated by a vertical line.

Exhibit 3-17. Number of Calls Per Month to the New York State Smokers' Quitline, January 2006–June 2009



Note: Vertical lines indicate the month of January.

Exhibit 3-18. Year-Over-Year Percentage Change in Monthly Calls to the New York State Smokers' Quitline, January 2007–June 2009

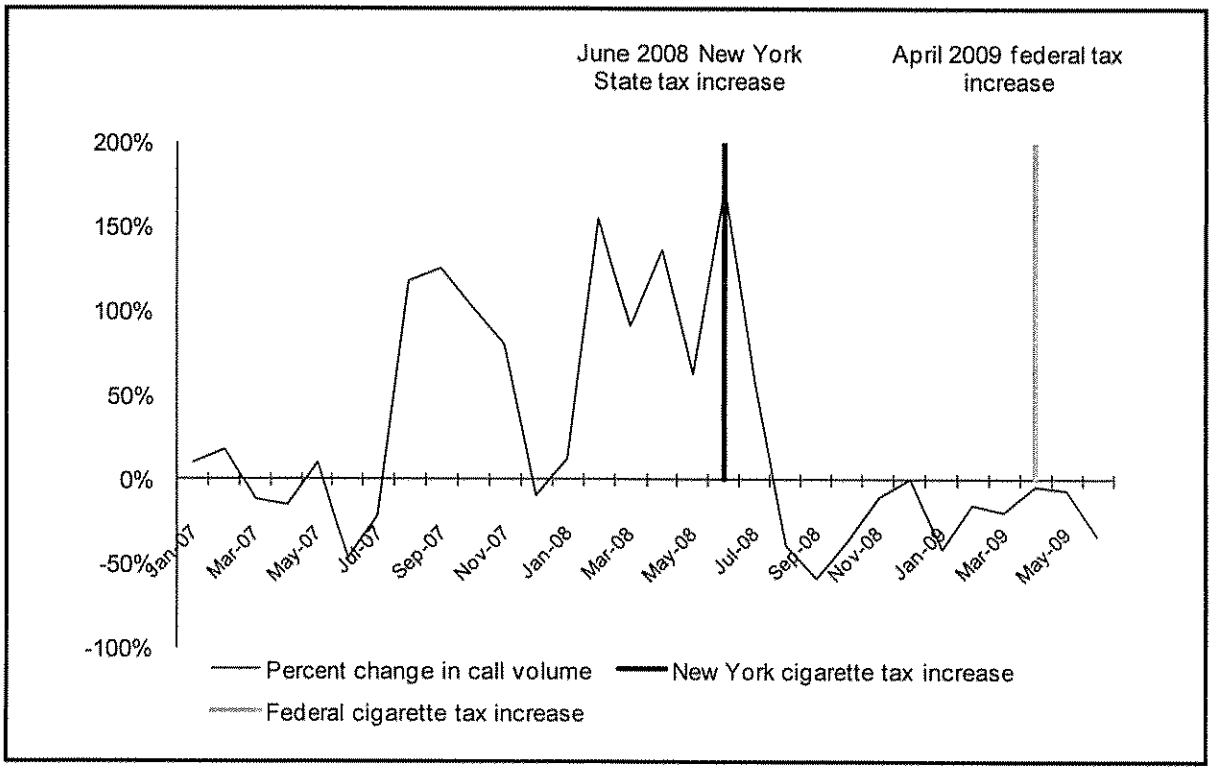
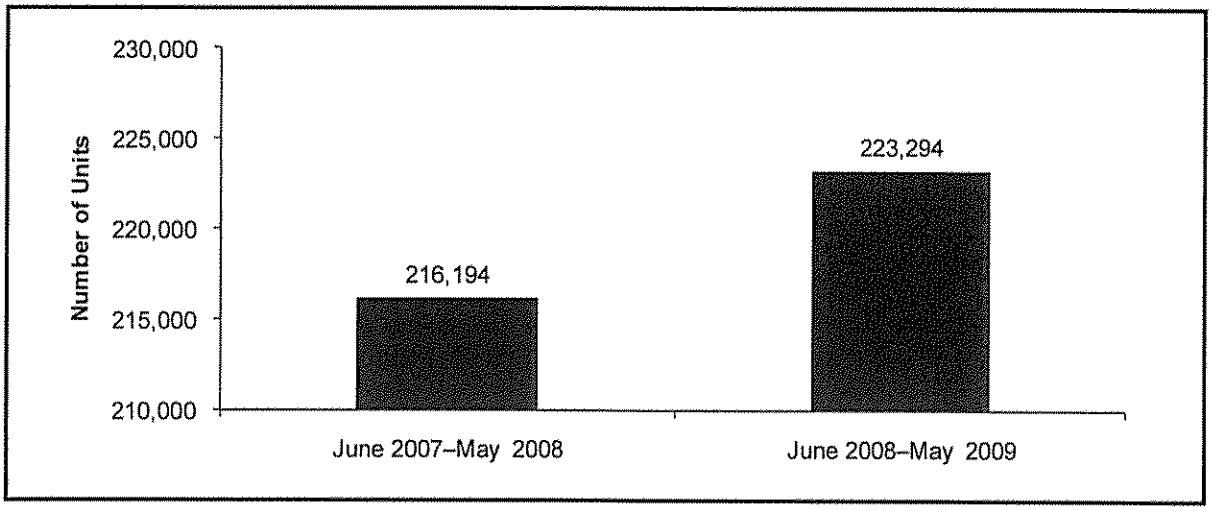


Exhibit 3-19 shows that 216,194 units of nicotine replacement therapy were shipped by the Quitline in the year before the tax increase. In the year after the tax increase, that number rose by 3.3% to 223,294 units.

Exhibit 3-19. Number of Units of Nicotine Replacement Therapy Shipped by the New York State Smokers' Quitline, June 2007–May 2009



4. Summary and Conclusions

The June 2008 $1.25 tax increase made New York the state with the highest cigarette tax in the nation at the time. This report examines the impact of the tax increase on cigarette prices; purchasing behaviors, including Internet shopping; cigarette sales; and cessation.

In general, since the June 2008 tax increase, cigarette prices have increased significantly, even for smokers who report purchasing from low-taxed sources, and a majority of New York smokers are concerned about the rising cost of cigarettes. A majority of smokers also report purchasing from low-tax sources, with significant increases in the percentage who purchase from Indian reservations and the Internet. Cigarette tax evasion costs the state approximately $500 million in revenue every year, and the top three Internet cigarette vendors are located on Indian reservations in western New York. Annual tax-paid cigarette sales are approximately 22.8% lower compared with the year before the tax increase, but self-reported cigarette consumption, intentions to quit smoking, and quit attempts have not changed significantly.

These findings indicate that during the 1 year after the June 2008 tax increase, smokers in New York felt the effects of the higher tax. Rather than making more quit attempts or smoking less, however, many found ways to obtain lower cost cigarettes by shopping online or on Indian reservations.

On July 1, 2010, New York's cigarette excise tax was increased by an additional $1.60 per pack with taxes on other tobacco products increasing in subsequent months. In addition, 2010–2011 New York State budget revenue projections included approximately $250 million in cigarette taxes collected through the sale of tobacco products on Indian reservations to non-tribal members. Finally, the July 2010 implementation of the federal Prevent All Cigarette Trafficking Act should effectively eliminate the sale of untaxed tobacco products over the Internet. Based on the findings of this report, it is clear that enforcing these new policies to reduce tax evasion is critical for New York to realize the full public health benefits of the 2008 and 2010 tobacco tax increases.

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Support for removal of point-of-purchase tobacco advertising and displays: findings from the International Tobacco Control (ITC) Canada survey

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Received 20 July 2011
Accepted 7 September 2011

ABSTRACT

Background Although most countries now have at least some restrictions on tobacco marketing, the tobacco industry meet these restrictions by re-allocating expenditure to unregulated channels, such as at point-of-purchase.

Methods Longitudinal data from 10 Canadian provinces in the International Tobacco Control Survey was analysed to examine adult smokers' support for a ban on tobacco advertising and displays in stores and whether this support is associated with noticing either advertising or displays in stores, and quit intentions, over time. In total, there were 4580 respondents in wave 5 (October 2006 to February 2007), wave 6 (September 2007 to February 2008) and wave 7 (October 2008 to June 2009). The surveys were conducted before, during and in some cases after the implementation of display bans in most Canadian provinces and territories.

Results Smokers in all provinces showed strong support for a ban on tobacco displays over the study period. Levels of support for an advertising and display ban were comparable between Canadian provinces over time, irrespective of whether they had been banned or not. Noticing tobacco displays and signs in-store was demonstrably less likely to predict support for displays (OR=0.73, p=0.005) and advertising (OR=0.78, p=0.02) ban, respectively. Smokers intending to quit were more likely to support advertising and display bans over time.

Conclusion This study serves as a timely reminder that the implementation of tobacco control measures, such as the removal of tobacco displays, appear to sustain support among smokers, those most likely to oppose such measures.

INTRODUCTION

For decades, tobacco marketing has been used to portray tobacco use in a favourable light, normalise smoking, underplay the associated health risks and ultimately undermine tobacco control efforts.[1 2] The Framework Convention on Tobacco Control,[3] currently with 172 signatories covering almost 90% of the global population, obligates member parties to introduce comprehensive bans on tobacco marketing. The need for bans to be comprehensive is based on evidence that the tobacco industry adeptly exploits unregulated channels, such as at point-of-purchase (POP), to maintain and even increase consumption.[4 5]

POP marketing includes advertising as well as displays of tobacco products on, behind and above the service counter. Displays in particular increase exposure to tobacco products and normalise tobacco use, especially for young people.[4 6 7] They also provide powerful cues to smoke[8 9] and stimulate impulse purchases among adult smokers, recent quitters and those intending to quit.[8 10–13] The effectiveness of displays at POP helps explain why the tobacco industry have increased marketing expenditure within the retail environment, especially when other marketing channels have been closed off to them.[5 14]

The tobacco industry vehemently opposes the removal of POP advertising and particularly product displays, presumably as they are aware of their importance as marketing tools.[8 13] As displays remain one of the few viable means for promoting tobacco products, understanding the level of support for their removal among smokers, the group most likely to be opposed to such restrictions, and whether support is associated with quit intentions can help inform tobacco control policy. To date, however, research assessing smokers' support for the removal of tobacco advertising and displays within shops, and intention to quit, remains scarce, whether in countries that have banned displays or are yet to do so.[13–15]

In Canada, although the Tobacco Act 1997 banned various forms of tobacco marketing, in-store advertising such as portrayals of signs that indicate the availability of tobacco products and their prices were permitted.[16] In accordance with the regulations, tobacco products or accessories that display a tobacco-related brand may be allowed at retail outlets. Nonetheless, since 2002, several provinces and territories have passed laws requiring the removal of tobacco displays and associated advertising, despite strong opposition from the tobacco and retail industries predicting that the move to 'out of sight' tobacco sales would drive retailers out of business, a finding not substantiated by the evidence.[17]

Research in Ireland showed that at a population level, support for a display ban increased over a 9-month period before and after implementing the policy.[14] This study, and other research, indicates smokers to be supportive of display bans

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because these displays are considered to have promotional appeal[18] that may provide visual cues to would-be starters and recent quitters.[8 18] A recent cross-sectional study found that four times as many smokers were supportive of a ban on displays than were unsupportive (49% vs 12%).[5] No research, however, has empirically examined, over a longer time period, whether the introduction of a display ban is associated with an increase in support or whether support is associated with quitting behaviour, as we have seen for smoke-free policies. We extend existing research by examining whether adult smokers' support for the removal of tobacco advertising and displays in stores has increased between 2006 and 2009 in 10 Canadian provinces, where they have been removed before, during and after the study period.

This paper addresses three research questions: (1) What was the impact of the ban on tobacco displays in several Canadian provinces on smokers' support for such a ban over time? (2) Did noticing tobacco displays and signs in stores predict support for a ban on advertising and displays over time? and (3) What are the associations between intentions to quit and support for a ban on advertising and displays at POP?

METHODS

Data and analytic sample

The International Tobacco Control Four Country Survey is a quasi-experimental longitudinal telephone survey conducted annually with nationally representative samples of adult smokers aged 18 years or older in Canada, the USA, the UK and Australia. The survey is designed to evaluate the psychosocial and behavioural impact of key national-level tobacco policies in these four countries over time.

Participants are recruited by geographically stratified probability sampling, with telephone numbers selected at random in each country. Eligible households are identified by asking a household informant the number of adult smokers within the household, with smokers defined as having smoked >100 cigarettes in their life and at least once in the past 30 days. Where there was more than one eligible respondent, the next birthday method was used to select the target respondent in that household.[20] In order to maintain a sample size of at least 2000 within each country, replenishment is used each year to replace those lost to attrition, using random sampling from the same sampling frame. A full description of the methodology and sampling procedure can be found elsewhere.[19 21]

This study presents data from wave 5 (October 2006 to February 2007), wave 6 (September 2007 to February 2008) and wave 7 (October 2008 to June 2009). We used all available respondents that participated at one or more of the three waves. A total of 4580 respondents comprising only smokers from 10 Canada provinces were used for this study. We focus exclusively on Canada and do not include Australia, the UK or the USA, given that only in Canada had some provinces and territories actually banned the display of tobacco products during the study period. All Australian states and territories have now passed legislation to move tobacco out of sight in general retail stores by January 2012, and the Scottish and English governments plan to do likewise in large shops and supermarkets by April 2012.

The implementation of the ban on tobacco displays in the 10 Canadian provinces occurred before, during and after the study period. Consequently, the 10 provinces were categorised into five zones to reflect provinces that had fully implemented a display ban prior to (zone 1), during (zones 2, 3 and 4) and after (zone 5) the study period (table 1). This permitted comparisons of provinces that had banned in-store displays and advertising before and during the study period (classified as the treatment groups), with provinces that had not banned the display of tobacco at POP (classified as the control groups). Three Canadian territories (Yukon, Nunavut and Northwest Territories) were not included in the analysis because they have an average of 35 000 people (each territory has 0.1% of the total population of Canada).

Table 1 Implementation dates of bans on the display of tobacco at point-of-purchase in Canadian Provinces and Territories

Jurisdiction	Date of implementation	Zone	Period
Manitoba	1 January 2004	1	Pre
Nunavut	1 February 2004	1	Pre
Saskatchewan	1 January 2005*	1	Pre
Prince Edward Island	1 June 2006	1	Pre
Wave 5	2006/2007		
Northwest Territories	21 January 2007	2	Mid
Nova Scotia	31 March 2007	2	Mid
Wave 6	2007/2008		
British Columbia	31 March 2008	3	Mid
Ontario	31 May 2008	3	Mid
Quebec	31 May 2008	3	Mid
Alberta	1 July 2008	3	Mid
New Brunswick	1 January 2009	4	Mid
Yukon	15 May 2009	4	Mid
Wave 7	2008/2009		
Newfoundland and Labrador	1 January 2010	5	Post

NB: Three Canadian territories (Nunavut, Yukon, and Northwest Territories) were excluded in the analysis because of small population size.
*Saskatchewan legislation banned retail displays of tobacco in 2002, but this was declared invalid because of a challenge by the tobacco industry. However, the Supreme Court of Canada unanimously upheld the constitutionality of the legislation in January 2005.

The study was approved by the Institutional Review Board or Research Ethics Board at the University of Stirling (Scotland), the Open University (UK), University of Waterloo (Canada), Roswell Park Cancer Institute (USA), University of Illinois, Chicago (USA), and The Cancer Council Victoria (Australia).

MEASURES

Outcome measures: support for bans on POP advertising and displays

Two items were employed to measure support for a ban on POP advertising and displays: "Do you support complete bans on tobacco advertisements inside shops and stores?" and "Do you support complete bans on displays of cigarettes inside shops and stores?" Both were measured on a 3-point scale with the response options 'A lot', 'Somewhat' and 'Not at all'. For the Generalised Estimating Equations (GEE) analyses, this 3-point scale was dichotomised to give: *support for complete bans* (A lot, Somewhat) vs *does not support complete bans* (Not at all).

Intention to quit

A 4-point scale that measured readiness to quit[22 23] was dichotomised to compare smokers with any intention to quit and those without.

Covariates

Covariates included were: zones (between Canadian zones comparisons), wave (5* vs 6 vs 7), gender (male* vs female), ethnicity (Caucasian vs other*), age (18–24 vs 25–39 vs 40–54 vs 55+*), income (low vs moderate vs high*) and education (low vs moderate vs high*), where * indicates the baseline or reference level. Consistent with Borland *et al*'s[24] study, a heaviness of smoking index combined responses about cigarettes per day and time to first cigarette (range 0–6). In addition, two interactions of main interest being zone × wave and education × income were considered.

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Respondents were also asked two specific questions about their awareness of tobacco displays and signs in stores or shops: "In the last month, have you seen cigarette packages being displayed, including on shelves or on the counter?" and "In the last month, have you seen any signs or pictures or other things like clocks with cigarette brands or logos inside shops or stores?" Response to both was dichotomised as 'yes' (coded as 1) or 'no' (coded as 0).

SURVEY WEIGHTS

Cross-sectional survey weights were computed for respondents using reciprocals of inclusion probabilities. Departures from proportional allocation to geographic strata over time were adjusted for and calibrated to sum to numbers of smokers in age–sex groups. Hence, respondents are weighted to be representative of the adult smoker population in each province. Respondents that completed the follow-up surveys (ie, waves 6 and 7) had their baseline weights (wave 5) adjusted for attrition.[24] All analyses described in this paper are weighted.

DATA ANALYSIS

Analyses were conducted using SAS 9.2, a statistical software. GEE[25–27] were used to examine whether smokers' support for removal of advertising and displays at POP changed over time (waves 5, 6 and 7). GEE models were assessed via binomial variations and the logit link to determine whether the observed changes in policy support over time were greater in Canadian provinces with display bans than they were in those without bans. This approach accounted for the correlated nature of data within subjects across waves and permitted the assessment of the population averaged over the study period without requiring individuals to be present at each wave. All GEE models were specified via the exchangeable within-group correlation structure.

The observed changes in policy support were evaluated by testing the zone × wave interaction effect in the various GEE models. Coefficients of covariates of interest (predictor variables) such as noticing tobacco displays and signs in stores and key demographics in the models were exponentiated to estimate the OR of policy support. For each coefficient, the p values and associated 95% CIs for the ORs are estimated via SEs.

RESULTS

Support for a ban on POP advertising and displays in the five Canadian zones

Policy support was greatest in zones 1 and 2 where there was early adoption of the display bans across the three waves, and lowest in zone 5 which was a late adopter, with just over half of smokers expressing support at each wave. Level of support for a display ban was fairly consistent between zones at wave 5, but relatively dispersed by wave 7 (see figure 1).

Similarly, support for a complete advertising ban was higher in zone 2 across the three waves and comparable in the remaining four zones as shown in table 2. Over two-thirds of smokers from zones 1 to 3 reported support for a ban on advertising at each wave. Additionally, level of support for a ban on advertising at POP was relatively consistent at wave 5 between zones but quite dispersed by wave 7 (figure 2).

Support for bans on advertising and displays in the five Canadian zones and their associations with intention to quit over time

Table 3 presents weighted GEE models for smokers who support advertising and display bans over time and the relationship this support has with quit intentions. Drawing from these results, the overall zone × wave interaction effect (not shown in table 3) indicated that support for a ban on displays was comparable across five Canadian zones over time ($p>0.05$). Similarly, between-zone comparisons showed that support among smokers in Canada was comparable over the last three waves ($p>0.05$). However, smokers in Canada who intend to quit smoking were 2.32 times more likely to support a display ban over time ($p<0.0001$). Smokers who noticed tobacco displays in stores were less supportive of a display ban over time (OR=0.73, p=0.005).

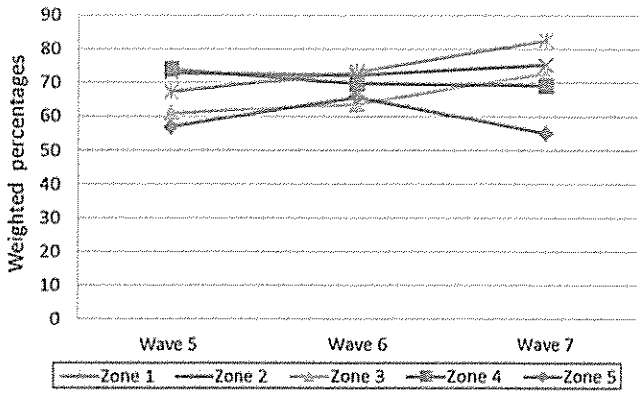

Figure 1 Support for a ban on point-of-purchase tobacco displays by waves and zones.

Comparisons also showed that the overall zone × wave interaction across the five Canadian zones showed no overall difference among these jurisdictions in the levels of support for tobacco advertising ban over the three waves. Likewise, between-zone comparisons showed that support for a ban on advertising was comparable over the study period ($p>0.05$). Comparisons with quit intentions revealed that smokers intending to quit smoking in Canada were 2.11 times more supportive of a ban on advertising than those who did not intend to quit. Smokers who noticed tobacco advertising in stores were less likely to support a ban on advertising (OR=0.78, p=0.02).

DISCUSSION

Although denied the use of traditional marketing channels, the tobacco industry continues to use the retail environment to

Table 2 Support for a ban on point-of-purchase display and advertising (weighted frequencies by waves and zones)

	Wave 5 (%)	Wave 6 (%)	Wave 7 (%)
Zone 1			
Support display ban	99 (67.2)	121 (73.2)	96 (82.5)
Support ad ban	99 (68.0)	114 (68.6)	91 (75.7)
Zone 2			
Support display ban	46 (72.9)	58 (72.2)	57 (75.3)
Support ad ban	49 (75.0)	58 (75.1)	64 (85.7)
Zone 3			
Support display ban	881 (61.0)	858 (63.6)	836 (72.8)
Support ad ban	986 (68.0)	945 (70.8)	848 (72.8)
Zone 4			
Support display ban	34 (74.0)	25 (69.7)	23 (69.1)
Support ad ban	32 (69.3)	25 (60.7)	24 (67.3)
Zone 5			
Support display ban	23 (56.9)	35 (65.7)	22 (55.0)
Support ad ban	27 (69.5)	38 (76.4)	22 (53.5)

Zone 1, Saskatchewan, Manitoba and Prince Edward Island; zone 2, Nova Scotia; zone 3, Quebec, Ontario, Alberta and British Columbia; zone 4, New Brunswick; zone 5, Newfoundland and Labrador.

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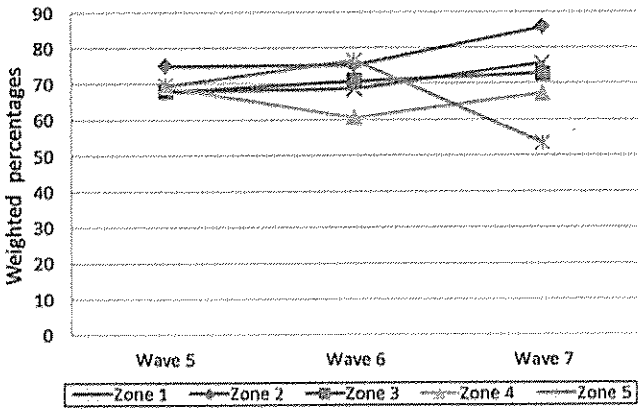

Figure 2 Support for a ban on point-of-purchase tobacco advertising by waves and zones.

market their goods.[5 8] We investigated adult smokers' support for a complete ban on tobacco advertising and displays at POP across 10 Canadian provinces and how this relates to their intention to quit over time.

It was found that smokers in Canada had high levels of support for the removal of displays over the study period. This support, among those most likely to oppose such measures, has been found in respect to support for other tobacco control policies such as tobacco advertising and promotion bans,[28 29] pictorial warning labels[30] and smoke-free public places.[31] The findings demonstrate the need for comprehensive bans on tobacco marketing, as included in Article 13 of the Framework Convention on Tobacco Control.[32]

Support was found to be greatest among smokers in Canadian provinces who were exposed to the policy at baseline, for example, at second follow-up, more than three-quarters of smokers in Saskatchewan, Manitoba and Prince Edward Island were supportive of a display ban compared with just over half of smokers in Newfoundland and Labrador, the only province not to ban displays until after the study period. There was, however, no significant difference in levels of support for a display ban across the 10 provinces and over the study period. It is possible that the comparable levels of support is indicative of the diffusion effect[33–36] of the display ban (as a consequence of public campaign, lawsuit and debate surrounding its removal) from provinces such as Saskatchewan, Manitoba and Prince Edwards Island, to those which had either a partial ban or no ban. Further research would be needed to confirm this, but past research has found diffusion of policy support for smoke-free legislation across geographically dispersed smokers.[33 34 36] We found no significant difference in reported levels of support for a ban on advertising at POP across the 10 provinces either.

Smokers in Canadian provinces who noticed tobacco displays and signs in stores were less likely to support a ban on advertising and displays. That smokers exposed to in-store tobacco promotion were less supportive of the ban suggests that the, perhaps reassuring, presence of these visual cues weakens support. Smokers who had intentions to quit smoking were supportive of a ban on tobacco advertising and displays. This support may, in part, be a consequence of not having to be exposed to attractive visual cues to smoke within the retail environment, with displays found to stimulate impulse purchase among those trying to quit.[8]

Despite the use of a longitudinal design, our study is not without limitations. Respondents are lost to attrition at follow-up, which can potentially skew findings. As the analyses were performed via weighted GEE,[25 26] which allows these models to use all observations across the three waves, the potential effects of respondents lost to follow-up are minimised. There is also the possibility of differential bias between zones, as a result of the demand characteristics of the survey, which may have prompted socially desirable responding or may be influenced by personal experience or media coverage of policy implementation. Another potential limitation is the possibility of experiment-wise error as a result of the number of between-zone comparisons, that is, the likelihood of falsely rejecting the null hypothesis as a result of multiple comparisons. Finally, the no in-zone change in level of policy support over time may be due to lack of earlier data as well as the short study period.

In many countries, tobacco marketing at POP is one of the few remaining avenues for the tobacco industry to promote their products. Tobacco displays act as a potent marketing tool,[5 12 13] which normalise smoking and allow the tobacco industry to communicate with non-smokers, ex-smokers and established smokers.[12 37 38] That most smokers are supportive of banning the visible display of tobacco products in the retail environment, as they are with other tobacco control policies, should help persuade policy makers in other jurisdictions about the need to remove POP displays. Future research should assess the longer term impact of a display ban on smokers' support and

Table 3 GEE models* for support for a ban on POP display and advertising across the three waves and association with quit intentions and noticing tobacco displays and signs in stores

	POP display ban		POP advertising ban	
	OR (95% CI)	p Value	OR (95% CI)	p Value
Gender				
Female versus male	1.07 (0.09 to 1.27)	0.44	1.17 (0.98 to 1.39)	0.08
Age, years				
18–25 vs 55+	0.86 (0.61 to 1.21)	0.39	0.93 (0.65 to 1.33)	0.69
25–39 vs 55+	0.95 (0.75 to 1.20)	0.66	0.94 (0.73 to 1.22)	0.63
40–54 vs 55+	1.06 (0.85 to 1.30)	0.62	0.95 (0.77 to 1.87)	0.68
Quit intentions	2.32 (1.94 to 2.77)	<0.0001	2.11 (1.76 to 2.54)	<0.0001
Noticed display/signs	0.73† (0.59 to 0.91)	0.005	0.78‡ (0.64 to 0.95)	0.015

The overall wave (time) and zone effect and their interaction and also between-zone comparisons for POP display and advertising ban (all not shown in table) were not significant ($p>0.05$). Design variable for wave (time) was coded: wave 5 (0, 0), wave 6 (1, 0) and wave 7 (0, 1).
*Each model is adjusted for age, sex, quit intentions, awareness of cigarette displays and signs in stores and shops as well as income, education, heaviness of smoking index and ethnicity, but these are not shown as they were not significant.
†Noticing tobacco signs in stores.
‡Noticing tobacco displays in stores.
POP, point-of-purchase.

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What this paper adds

- The tobacco industry is known to respond to restrictions on marketing by exploiting unregulated channels, such as at point-of-purchase.
- This paper shows that levels of support for a display ban at point-of-purchase were high and comparable across all 10 provinces in Canada, irrespective of whether tobacco displays within shops had been banned in each of these provinces.
- Support was lowest, however, in Newfoundland and Labrador, the only province not to introduce a ban on displays during the study period. Smokers intending to quit were more likely to support advertising and display bans over time.

if this support is linked to intention to quit, especially as a decline in exposure to displays at retail environment is anticipated to impact upon smoking cues and behaviour.

Funding The research was funded by grants from the US National Cancer Institute/NIH (from the Roswell Park Transdisciplinary Tobacco Use Research Center (TTURC), P50 CA111236 and from R01 CA100362), the Canadian Institutes for Health Research (57897), Robert Wood Johnson Foundation (045734), the Australian National Health and Medical Research Council (265903), Cancer Research UK (C312/A3726), the Australian Commonwealth Department of Health and Ageing, the Centre for Behavioural Research and Program Evaluation of the National Cancer Institute of Canada/Canadian Cancer Society and the Canadian Tobacco Control Research Initiative.

Competing interests None.

Ethics approval The study was approved by the Institutional Review Board or Research Ethics Board at the University of Stirling (Scotland), the Open University (UK), University of Waterloo (Canada), Roswell Park Cancer Institute (US), University of Illinois, Chicago (US), and The Cancer Council Victoria (Australia).

Contributors All authors included on this paper have fulfilled the criteria of authorship, ie, have contributed to the conception and design, acquisition of data analysis or interpretation of data as well as drafting or revising this article. Moreover, there is no one else who fulfils these criteria who has not been included as an author.

Provenance and peer review Not commissioned; externally peer reviewed.

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HEALTH EDUCATION RESEARCH

Vol.24 no.4 2009
Pages 721–733
Advance Access publication 13 March 2009

The influence of tobacco marketing on adolescent smoking intentions via normative beliefs

Abraham Brown* and Crawford Moodie

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Abstract

Using cross-sectional data from three waves of the Youth Tobacco Policy Study, which examines the impact of the UK's Tobacco Advertising and Promotion Act (TAPA) on adolescent smoking behaviour, we examined normative pathways between tobacco marketing awareness and smoking intentions. The sample comprised 1121 adolescents in Wave 2 (pre-ban), 1123 in Wave 3 (mid-ban) and 1159 in Wave 4 (post-ban). Structural equation modelling was used to assess the direct effect of tobacco advertising and promotion on intentions at each wave, and also the indirect effect, mediated through normative influences. Pre-ban, higher levels of awareness of advertising and promotion were independently associated with higher levels of perceived sibling approval which, in turn, was positively related to intentions. Independent paths from perceived prevalence and benefits fully mediated the effects of advertising and promotion awareness on intentions mid- and post-ban. Advertising awareness indirectly affected intentions via the interaction between perceived prevalence and benefits pre-ban, whereas the indirect effect on intentions of advertising and promotion awareness was mediated by the interaction of perceived prevalence and benefits mid-ban. Our findings indicate that policy measures such as the TAPA can significantly reduce adolescents' smoking intentions by signifying smoking to be less normative and socially unacceptable.

Introduction

The rekindling of interest in social norms is partly attributable to the increasing application of public health approaches to a plethora of health risk behaviours [1]. As social norms act as influential moderators in the norm–behaviour relationship [2], normative information can be used as a tool for altering behaviours [3]. However, despite the recent tendency to adopt social norms marketing campaigns to address behaviours ranging from conservation [4] to reducing HIV [5], mixed results have been found [4]. This may be due to the tendency of normative marketing to only focus on descriptive norms [6], without considering injunctive norms [7] or other potential moderating variables [8].

Descriptive norms, or perceived prevalence, are beliefs about what most people in ones' social group do [9]. Higher levels of perceived prevalence of smoking, which are most commonly derived from exposure to peer or family smokers [10] and the media [11], are known to increase both smoking intentions and uptake among teenagers [12]. However, focussing exclusively on descriptive norms may be insufficient to elicit behaviour change. Rimal and Real [9] have addressed this by developing the Theory of Normative Social Behaviour (TNSB), a model assessing descriptive norms and moderators of descriptive norms (injunctive norms, outcome expectations and group identity) on intentions. Multifaceted models such as the

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doi:10.1093/her/cyp007

TNSB, allowing the delineation of factors that moderate the influence of descriptive norms on behaviour, are necessary given the multidimensional nature of normative influences. The TNSB was developed using a survey examining normative influences on intentions to consume alcohol among incoming college students. Of the 2000 surveys distributed, 1352 (67.6%) were returned, representing 19% of the total first year population [9]. It was found that each mechanism independently predicted intentions with the model explaining 63% of the variance. The strength of the interaction between descriptive norms and group identity, however, was not significant, only explaining 5% of the variance. Indeed, it has been subsequently reported that the group identity moderator requires further conceptual clarification, [13] and other research, investigating the relationship between the Theory of Planned Behaviour [14] and intentions, has also failed to find support for the moderating role of group identity [15].

In contrast to the poor performance of group identity within the TNSB, Rimal and Real [9] found that outcome expectancies (perceived benefits and anticipatory socialization) explained 48% of the variance, highlighting the importance of perceived benefits and its moderating effect with perceived prevalence, on intentions. Perceived benefits are therefore central to the TNSB, and indeed Social Learning Theory [16] and the Theory of Reasoned Action [17], increasing the likelihood that individuals will engage in a particular behaviour. Tobacco marketers are cognizant of the power of perceived benefits and present tobacco use as a solution for adolescents' insecurities about their image, appearance and popularity [18].

As perceived benefits and descriptive norms are separate normative measures, the influence of perceived benefits on behaviour is not indicative of the influence of descriptive norms. However, when perceived benefits interact with descriptive norms, the extent of influence on behaviour becomes stronger [9]. So, engaging in a specific behaviour such as smoking becomes more attractive when individuals perceive this behaviour to be both prevalent and holding benefits.

Injunctive norms are the third moderating variable within the TNSB, known to moderate the relationship between descriptive norms and behavioural intentions, thus helping determine the acceptability of behaviour [19]. Descriptive and injunctive norms appear to have a monotonic relationship, where the influence of descriptive norms on intentions is heightened when injunctive norms are also strong and weakened when they are weak [20]. Research suggests that the relationship between injunctive norms (measured as approval) and behaviour (specifically student gambling) varies with reference group [21]. Approval from proximal reference groups, e.g. peers and family, was positively associated with gambling frequency and expenditure, whereas approval from distal groups, e.g. students, was not. Similar findings have been obtained in earlier gambling research [22], as it has for adolescents' use of alcohol, cigarettes and marijuana [23]. It is important therefore to assess approval by proximal reference groups rather than distal groups [24] because smoking (and approval) among peers, siblings and parents consistently predict smoking initiation [25].

Researchers have attempted to extend the purview of the TNSB by assessing other moderators of descriptive norms such as group orientation and peer communication [13]. Our study focusses instead on the impact that a policy measure (an advertising and promotions ban) has on intentions via a similar, but not identical, model. Specifically, we investigate the impact of advertising and promotion awareness on intentions via descriptive norms and two moderators (perceived benefits and injunctive norms), but without the third moderator in the TNSB, group identity, given problems with its measurement and conceptualization [9]. This allows us to examine, from a theoretical perspective, whether a policy change at the collective (societal) level appears to affect normative influences at the individual level.

Collective and perceived norms are conceptually distinct although a change at societal level would likely have an impact at the individual level. For example, comprehensive tobacco control measures aimed at making non-smoking the norm at the collective level may filter down to the individual level, helping rectify adolescent's misperceptions of

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smoking prevalence and increasing pressure to conform to this non-smoking norm. Information regarding descriptive and injunctive norms at the collective level can be obtained for the former via observing media depictions of trends surrounding an issue [26] and from observing or hearing about policy changes that proscribe or promote certain behaviours for the latter. In the current climate, where tobacco control in the UK is the most stringent in Europe [27], strong disapproval cues from authority figures concerning smoking are evident.

Pivotal to the UK's tobacco control strategy is the Tobacco Advertising and Promotion Act (TAPA), implemented between February 2003 and July 2005, prohibiting most forms of tobacco marketing. Specifically, between February and July 2003 the TAPA banned advertising on billboards, cinemas and in print media, as well as prohibiting direct mail and on-pack promotions and domestic tobacco sponsorship. In December 2004, restrictions were placed on point-of-sale advertising (limiting the size of advertising in-store to A5) and finally a ban on brand sharing and international sponsorship came into effect in July 2005. The TAPA is intended to reduce tobacco consumption and might additionally convey disapproval cues about smoking and is important given the dose–response relationship between adolescent tobacco marketing awareness and smoking uptake [28]. Aside from the direct influence tobacco marketing has on smoking intentions, it also has an indirect influence, as knowledge of peers' tobacco use mediates decisions on future smoking [29]. Evidence suggests that tobacco companies target youngsters with positive lifestyle images and covert messages [30], which possibly shape and reflect social norms [31]. Indeed, research suggests that tobacco marketing bans significantly lower smoking intentions [32], perhaps by communicating non-smoking norms among peers. The International Agency of Research on Cancer provides a model for evaluating tobacco control policies, in which policy measures are mediated by normative beliefs [33].

To date, research assessing the mechanisms underlying the indirect effect of tobacco marketing on smoking intentions, mediated through normative influences, has considered the mass media in isolation [34], ignoring other forms of tobacco marketing such as advertising and promotions. This study, using a model similar to the TNSB, investigates: (i) the effect of tobacco advertising and promotion awareness on smoking intentions before, during and after the TAPA, through the effect of perceived prevalence, approval and benefits and (ii) the indirect effects of tobacco advertising and promotion awareness on intentions, via the moderation of perceived prevalence by benefits. To the extent that these normative influences mediate the relationship between tobacco marketing awareness and intentions, the mediation of perceived prevalence, hypothetically, is heightened by perceived benefits in these normative mechanisms. From the preceding discussion, the following hypotheses are proposed:

- P1: Higher awareness of promotions (H1a) and advertising (H1b) will positively affect perceived prevalence and in turn intentions (H2a).
- P2: Higher awareness of promotions (H1c) and advertising (H1d) will positively affect perceived approval and in turn intentions (H2b).
- P3: Higher awareness of promotions will positively affect perceived benefits (H1e) and moderation of perceived prevalence by benefits (H1f) and both perceived benefits and moderation of perceived prevalence by benefits will, in turn, independently affect intentions (H2c and H2d, respectively).
- P4: Higher awareness of advertising will positively affect perceived benefits (H1g) and moderation of perceived prevalence by benefits (H1h) and each of these will independently affect intentions (H2e and H2f, respectively).
- P5: Higher awareness of promotions (H2e) and advertising (H2f) will positively affect intentions.

Methods

Design

Three waves of the Youth Tobacco Policy Study (YTPS) were used to examine the impact of the

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TAPA. The first wave was conducted in Summer 1999 (three and a half years pre-ban), the second in Summer 2002 (6 months prior to the main advertising ban and 9 months prior to the main promotion ban) and the third in Summer 2004 [13 months after the promotion ban and 16 months after the advertising ban, but 6 months before point of purchase (POP) restrictions]. The fourth wave was conducted in Summer 2006 (12 months after the final phase of the ban on international sponsorship, 18 months after POP restrictions, 37 months after the promotion ban and 40 months after the advertising ban). This study uses data from Waves 2 to 4. The fieldwork comprised face-to-face interviews conducted in-home, by professional interviewers, accompanied by a self-completion questionnaire. Parental permission and participant consent were secured prior to each interview. The study was approved by the Ethics Committee at the University of Stirling.

Sample

A cross-sectional sample of 11- to 16-year olds across the UK was employed at each wave. Random location quota sampling involved random selection of electoral wards stratified by Government Office Region and ACORN classification (a geodemographic classification system describing demographic and lifestyle profiles of small geographic areas) to ensure coverage of a range of geographic areas and socio-demographic backgrounds [35]. Within each of the 92 selected wards, a quota sample, balanced across gender and age, was obtained. A total of 1121 adolescents participated in Wave 2 (W2), 1123 in Wave 3 (W3) and 1159 in Wave 4 (W4).

As a guide to the ward boundary, interviewers were supplied with a list of the streets and specific addresses which were within their ward. Interviewers approached households within their ward, seeking respondents who met the quota requirements and who lived there all or most of the time. A gap of at least four doors was left between achieved interviews. Within blocks of flats, a maximum of two interviews were permitted on any one landing. No more than one interview per household was permitted. In households where more than one person met the quota requirements, the person whose birthday was closest to the date of interview was selected.

The final stage of sampling had to rely on non-probability sampling due to the absence of reliable and accessible sampling frames for 11- to16-year olds. As a result of this, interviewers had limited discretion over the selection of participants however. While they had a ward area to work within, the very specific age group being sought meant that they sometimes had difficulty in finding eligible respondents. In some cases, the ward area was exhausted before the quota of 15 interviews was obtained. Where this occurred, the interviewers were instructed to gradually work outwards of the ward boundary to a maximum radius. Nevertheless, despite the reliance on quota selection for the final stage of sampling, we believe that the samples obtained can still be generalized to the UK adolescent population. To support this point, smoking prevalence in the YTPS (not assessed in this paper) across the three waves is very similar to that of a large national sample, drawn from schools, in comparable years. Among 11- to 15-year olds in our surveys, the proportion of regular smokers was 9%, 10% and 9%, respectively, in 2002, 2004 and 2006 compared with estimates of 10%, 9% and 9% obtained from a large school-based sample of 11- to 15-year olds in respective years [36].

Measures

Intentions

Intentions to smoke: Measured with the item 'Which of these best describes whether or not you think you will be smoking cigarettes when you are 18 years old?' with four response categories; *when I'm 18*, I definitely will not be smoking, I probably will not be smoking, I probably will be smoking and I definitely will be smoking.

Descriptive norms

Perceived prevalence: Measured via three items; 'How many 11- (13 and 15 for subsequent items) year olds do you think smoke at least one cigarette

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a week?' This was measured on a seven-point scale: none, very few, a few, about half, most, almost all and all. Alpha was 0.83, 0.83 and 0.84, respectively, for the three waves.

Injunctive norms

Older sibling approval: Measured via one item, with a score of 1 for 'In general, my older brothers/sisters approve of smoking' and a score of 5 for 'In general, my older brothers/sisters disapprove of smoking'. Only respondents with older siblings were included in the analysis. The number and percentage of respondents with older siblings for each of the three waves were 659 (58.6%) for Wave 2, 685 (61%) for Wave 3 and 679 (58.6%) for Wave 4.

Outcome expectancies

Perceived benefits: Five items relating to stress relief, relaxation, weight control, attractiveness and image, all measured on a five-point scale. Alpha was 0.60, 0.59 and 0.58 for the three waves.

Policy measures

Tobacco marketing awareness: Seventeen items were employed to assess awareness of cigarette advertising and promotions. It should be noted that although all the items assess cigarette advertising and promotion, the terms cigarette and tobacco advertising are used synonymously, consistent with past research employing youth populations [37, 38], given that tobacco use by young people is largely confined to cigarettes. All 17 items had dichotomous responses (Yes/No), with the items highlighted in bold employed in the final model (see Table I). Confirmatory factor analysis revealed that the initial measurement was unsatisfactory. As five indicators measuring awareness of promotion had very low r^2 (<0.10), these were deleted in each wave, and a revised measurement model, with 12 items, was tested and provided good model fit. Alpha was 0.62, .062 and 0.59 for promotion and 0.60, 0.58 and 0.59 for advertising for the three waves. Despite Cronbach alphas suggesting that reliabilities might be low among these constructs as well as perceived benefits, analysis of convergent reliabilities and average variance extracted showed that these constructs are appropriate for structural equation modelling (SEM).

Data analysis

SEM with Analysis of Moment Structures (AMOS) was utilized to analyse the hypothesized model. SEM permits modelling with a set of relations among constructs and allows for simultaneous estimation of all hypothesized paths and also estimation of mediation or indirect effects [39].

As normality of each observed variable is a prerequisite for maximum likelihood estimation (MLE) in SEM, the skewness and kurtoses of indicators with four or more categories across the three waves were computed. Normality among these variables was found to be acceptable excluding three variables whose critical ratios exceeded the cut off point of ±1.96 [40, 41]. Appropriate transformation (square root and logarithm) employed did not correct normality for these variables. Hence, the original variables were used on account of the reasonably large sample size used across the three waves [42, 43]. The dichotomous variables were also considered appropriate for MLE in SEM as the split was <90:10.

A test for linearity using analysis of variance between outcome and predictor variables also indicated that across the three waves there was a significant linear relationship between these variables ($P < 0.05$). The correlation matrix showed that correlations among predictor variables were <0.80 and a collinearity diagnostics test also revealed the condition index to be <0.30, which indicates that there was no multicollinearity [44]. Regarding outliers, univariate and bivariate assessment of variables revealed no outliers across the three waves.

Model fit was evaluated using comparative fit index (CFI), Tucker Lewis index (TLI), incremental fit index (IFI) and root mean square error of approximation (RMSEA) [39, 45]. Values >0.90 on the CFI, TLI and IFI and <0.06 on the RMSEA indicate good fit [39]. Chi square is interpreted as the test of the difference between the hypothesized model and

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Table I. *Measures of specific forms of tobacco marketing*

Advertising	
1	Adverts for cigarettes on large posters or billboards in the street
2	Adverts for cigarettes in newspapers or magazines
3	Signs or posters about cigarettes in shops or on shopfronts:
	On shop windows
	On shop doors
	On cigarette display units inside shops
	On clocks inside shops
	On staff aprons or overalls
	On signing mats inside shops
	Some other signs or poster about cigarettes (in shops or on shopfronts)
Promotions	
4	Free trial cigarettes being given out or offers to send away for free cigarettes
5	Free gifts from the shop keeper when people buy cigarettes
6	Free gifts when people save coupons or tokens from inside cigarette packs
7	Free gifts when people save parts of cigarette packs
8	Free gifts showing cigarette brand logos being given out at events (sports/festivals/concerts)
9	Special price offers for cigarettes
10	Promotional mail, from cigarette companies, being delivered to people's homes
11	Clothing or other items with cigarette brand names or logos on them
12	Competitions or prize draws linked to cigarettes
13	Famous people, in films or on TV, with a particular make or brand of cigarettes
14	New pack design or size
15	Internet sites promoting cigarettes or smoking (do NOT include anti-smoking sites)
16	E-mail messages or mobile phone text messages promoting cigarettes or smoking (do NOT include anti-smoking messages)
17	Leaflets, notes or information inserted in cigarette packs

the models identified, with smaller values indicating better fit [39, 45].

As the results obtained from the analyses are only meaningful against the statistical model specified, model specification is crucial within SEM [39]. The first step in SEM with latent variables is to define a measurement model specifying the pattern of relationships between the observed variables and the latent variables [45]. Prior to testing the structural models, the viability of our proposed model was established using confirmatory factor analysis [46]. Having confirmed the overall fit of the measurement model, the validity of the structural models for each wave (Waves 2, 3, and 4) was established separately, and subsequently, invariance tests were performed using multigroup analyses to examine the consistency of the model across waves [47]. Following findings that the models are significantly different across waves, all further analyses are considered independently for each wave.

Results

Table II shows the descriptive statistics of adolescents by age and gender for the three waves. The means, standard deviations, Cronbach's alphas, convergent reliabilities and average variance extracted of constructs are shown in Table III. Results of the hypothesized SEM for these models are presented in Table IV.

Reliability and validity

To test the measurement models for each wave, confirmatory factor analysis (CFA) with MLE method was conducted [45]. The W2 model revealed good fit (χ^2_{165}=429.35, $P < 0.001$, CFI = 0.92, IFI = 0.92, TLI = 0.90, RMSEA = 0.038) in accordance with the usual conventions [48]. All regression paths from constructs to indicators were significant ($P < 0.001$). Convergent reliability (CR) and average variance extracted (AVE) were

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Table II. *Descriptive statistics of adolescents' gender by age across three waves*

Variable gender						
Age (years)	Males			Females		
	Wave 2	Wave 3	Wave 4	Wave 2	Wave 3	Wave 4
11	97 (18%)	87 (16%)	104 (17%)	93 (16%)	97 (17%)	91 (16%)
12	90 (17%)	94 (17%)	111 (18%)	92 (16%)	86 (15%	96 (17%)
13	110 (20%)	97 (18%)	103 (17%)	117 (20%)	110 (19%)	96 (17%)
14	89 (16%)	98 (18%)	93 (15%)	99 (17%)	99 (17%)	94 (17%)
15	95 (18%)	85 (15%)	102 (17%)	107 (18%)	93 (16%)	92 (17%)
16	59 (11%)	88 (16%)	91 (15%)	73 (13%)	87 (15%)	85 (15%)
Total sample	540 (42%)	549 (49%)	604 (52%)	581 (58%)	572 (51%)	554 (48%)

Discrepancy in sample sizes of waves three and four is on account of missing data.

Table III. *Properties of measurement scales*

Constructs	Mean (SD)			Alpha			Convergent reliability (average variance extracted)		
	Wave 2	Wave 3	Wave 4	Wave 2	Wave 3	Wave 4	Wave 2	Wave 3	Wave 4
Prevalence	3.65 (1.17)	3.38 (1.06)	3.26 (1.08)	0.83	0.83	0.84	0.74 (0.55)	0.71 (0.56)	0.88 (0.71)
Benefits	2.40 (0.28)	2.36 (0.27)	2.33 (0.34)	0.60	0.59	0.58	0.71 (0.56)	0.70 (0.57)	0.77 (0.59)
Promotion	1.14 (0.01)	1.01 (0.05)	1.07 (0.04)	0.62	0.62	0.59	0.73 (0.55)	0.74 (0.57)	0.75 (0.52)
Advertising	1.57 (0.03)	1.43 (0.02)	1.30 (0.02)	0.60	0.58	0.59	0.74 (0.64)	0.70 (0.51)	0.75 (0.62)
Approval	3.54 (1.40)	2.61 (1.47)	3.56 (1.53)						
Intention	1.50 (0.78)	1.21 (0.45)	1.52 (0.79)						

assessed to check construct reliabilities [49]. As Table III shows, the findings provide support for CR and AVE since the values obtained exceed the recommended levels of 0.7 for CR and 0.5 for AVE [49].

The W3 model provided good fit when assessed via CFA (χ^2_{165}=385.57, $P < 0.001$, CFI = 0.93, IFI = 0.93, TLI = 0.91, RMSEA = 0.035) with all paths significant ($P < .001$) and AVE and CR >0.5 and 0.7, respectively. The W4 model also provided a good fit (χ^2_{165}=362.44, $P < 0.001$, CFI = 0.93, IFI = 0.93, TLI = 0.91, RMSEA = 0.032). All paths were significant ($P < 0.001$) and both AVE and CR were >0.5 and 0.7, respectively (see Table III).

Invariance test

Multigroup analysis was used to examine the invariance of structural models simultaneously across the three waves [50]. All path coefficients were constrained to be identical for the three waves and then compared with an unconstrained model. Results of a chi-squared difference test ($\Delta\chi^2_{58}$= 265.77, $P < 0.01$) indicated that the unconstrained model fit the data significantly better. This revealed that there are significant differences across the three waves. Following this, an invariance test employed to examine all path coefficients between groups (i.e. Waves 2 and 3, Waves 2 and 4 and Waves 3 and 4) showed further significant differences between each group. Results of a chi-squared difference test for each group (Waves 2 and 3; $\Delta\chi^2_{29}$=74.36, $P < 0.001$; Waves 2 and 4; $\Delta\chi^2_{29}$=178.28, $P < 0.01$; and Waves 3 and 4; $\Delta\chi^2_{29}$=164.03, $P < 0.001$) indicated that the unconstrained models fit the data significantly better. Lastly, a test of invariance employed to examine structural paths between groups (i.e. Waves 2 and 4; and Waves 3 and 4) showed that the unconstrained models for each group fit the data significantly

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Table IV. *Analysis of tobacco advertising and promotion effects on intentions, via perceived prevalence, approval and benefits of smoking*

Model Fit	χ^2	d.f.	CFI	TLI	IFI	RMSEA
Wave 2	584.58	219	0.91	0.86	0.89	0.039
Wave 3	514.32	219	0.92	0.89	0.92	0.035
Wave 4	531.23	219	0.91	0.88	0.91	0.035

		Complete sample (with moderation effects)					
		Wave 2		Wave 3		Wave 4	
HYPO	PATHS	β	CR	β	CR	β	CR
H1a	Promo → Prevalence	0.15	1.89	0.67**	3.19	0.59***	4.81
H1b	Advert → Prevalence	−0.05	−0.58	0.53*	2.57	0.44***	3.78
H1c	Promo → Approval	0.39***	3.46	1.73***	3.87	0.68***	4.66
H1d	Advert → Approval	0.29**	2.69	1.65***	3.85	0.55***	3.91
H1e	Promo → Benefits	0.48***	3.78	1.17***	3.58	1.19***	4.82
H1f	Promo → Prev × Ben	0.09	1.09	0.54*	2.41	0.29*	2.54
H1g	Advert → Benefits	0.30**	2.65	1.11***	3.95	1.13***	4.67
H1h	Advert → Prev × Ben	0.22*	2.50	0.58**	2.60	0.33**	2.79
H2a	Prevalence → Intentions	0.19***	5.86	0.12**	3.27	0.12**	3.12
H2b	Approval → Intentions	0.14***	3.30	0.03	0.32	0.08	1.59
H2c	Benefits → Intentions	0.38***	6.67	0.50**	3.25	0.42***	4.05
H2d	Prev × Ben → Intentions	0.07*	2.19	0.15*	3.66	−0.02	−0.48
H2e	Promo → Intentions	−0.04	−0.47	0.09	0.11	0.34	1.27
H2f	Advert → Intentions	−0.16	−1.72	−0.03	−0.04	0.15	0.59
R^2		0.24		0.36		0.39	

***$P < 0.001$, **$P < 0.01$, *$P < 0.05$.

better than the constrained models (Waves 2 and 4; $\Delta\chi^2_{14}$=43.64, $P < 0.001$; Waves 3 and 4; $\Delta\chi^2_{14}$= 77.87, $P < 0.001$]. However, results of chi-squared test for structural paths between Waves 2 and 3 revealed no significant difference ($\Delta\chi^2_{14}$=9.94, $P > 0.05$). Hence, although there were significant differences between the structural paths of Waves 2 and 4 and also between Waves 3 and 4, no significant difference was found between Waves 2 and 3. All further analyses are therefore conducted independently for each wave.

Hypothesis testing via SEM

SEM analysis, conducted with three models, considered the mediation and moderation of norm-related variables as a result of the influence of awareness of tobacco advertising and promotion on smoking intentions. Table IV provides the path loadings, critical ratios and P values. All path loadings from latent constructs to indicators were significant ($P < 0.001$). The W2 model fully supported 9 out of 14 hypotheses; H1c, H1d, H1e, H1g, H1h, H2a, H2b, H2c and H2d. The independent paths from awareness of advertising and promotions to intentions were fully mediated by perceived approval and perceived benefits. Only the path from advertising to intentions was mediated by the perceived prevalence × benefits interaction. Perceived prevalence affected intentions but had no association with advertising and promotion. The independent paths from awareness of advertising and promotions to intentions were not supported. For this model, the variance captured in intention was 24%, with the model indicating good fit (χ^2_{219}=584.58, $P < 0.001$, CFI = 0.91, IFI = 0.89, TLI = 0.86, RMSEA = 0.039).

To determine associations after the TAPA, W3 and W4 models were examined. The W3 model

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supported 11 of the 14 hypotheses; H1a, H1b, H1c, H1d, H1e, H1f, H1g, H1h, H2a, H2c and H2d. The independent paths from awareness of advertising and promotions to intentions were fully mediated by perceived prevalence, perceived benefits and the moderation of perceived prevalence by benefits. The loadings from advertising and promotion to perceived approval were also supported but did not affect intentions. The direct paths from advertising and promotions to intentions were not supported. For the W3 model, the variance captured in intention was 36%, with the model indicating good fit (χ^2_{219}=514.32, $P < 0.001$, CFI = 0.92, IFI = 0.92, TLI = 0.89, RMSEA = 0.035).

The W4 model supported 10 out of 14 hypotheses; H1a, H1b, H1c, H1d, H1e, H1f, H1g, H1h, H2a and H2c. Similar to the W3 model, the paths from promotions and advertising to intentions were fully mediated by perceived prevalence and perceived benefits although not the perceived prevalence × benefits interaction. The paths from advertising and promotions were related to approval and interaction effects of prevalence and benefits; however, these did not affect intentions. Comparable with previous models, advertising and promotions had no direct association with intentions. For the W4 model, the variance captured in intention was 39%, with the model providing good fit (χ^2_{219}=531.23, $P < 0.001$, CFI = 0.91, IFI = 0.91, TLI = 0.88, RMSEA = 0.035). Overall, the findings suggest that awareness of advertising and promotions have decreased between Waves 2 and 4, i.e. pre- and post-ban.

Discussion

Despite evidence attesting that adolescents' normative influences are influenced by tobacco marketing [51], the processes and the extent of these influences on smoking behaviours are not well documented [52]. Our aim was to develop a conceptual model and provide empirical evidence that (i) adolescents' normative influences mediate the association of tobacco marketing with intentions to smoke and (ii) the influence of tobacco marketing on intentions is mediated via the interaction of perceived benefits with perceived prevalence.

The W2 model shows higher levels of awareness of both tobacco advertising and promotions to be independently associated with higher levels of perceived sibling approval and, in turn, intentions. This is consistent with earlier research demonstrating that injunctive norms influence behaviour if salient at the time [23]. As the TAPA had not been implemented, greater exposure to tobacco advertising and promotions may have strengthened adolescents' perceived sibling approval of smoking, in turn increasing smoking intentions. The findings revealed higher awareness of advertising and promotions to be independently associated with higher perceived benefits and, in turn, intentions. To the extent that perceived benefits can be thought of as beliefs that guide behaviours [53], greater exposure to tobacco marketing will likely heighten these beliefs given that tobacco advertising continues to highlight smoking as a solution for adolescents' insecurities [21, 22].

Importantly, advertising awareness indirectly affected intentions via the interaction between perceived prevalence and benefits, rather than through the independent mediation of only perceived prevalence. This suggests that greater awareness of tobacco advertising (in print, billboards, shops) amplifies perception of prevalence through the moderation of perceived prevalence by perceived benefits, which in turn affects intentions. This finding justifies the inclusion of potential moderating variables to increase the variance explained in a normative model. We also found that perception of prevalence was independently related to intentions at W2, indicating that adolescents are likely to construe their own smoking intentions as normative if they exaggerate perceptions of peer smoking prevalence [8].

The W3 and W4 models revealed that perceived prevalence fully mediated the independent paths from advertising and promotion awareness to smoking intentions. As these models were obtained after the main advertising and promotion bans, perceptions of prevalence derived from tobacco marketing awareness might have reduced, thus reducing

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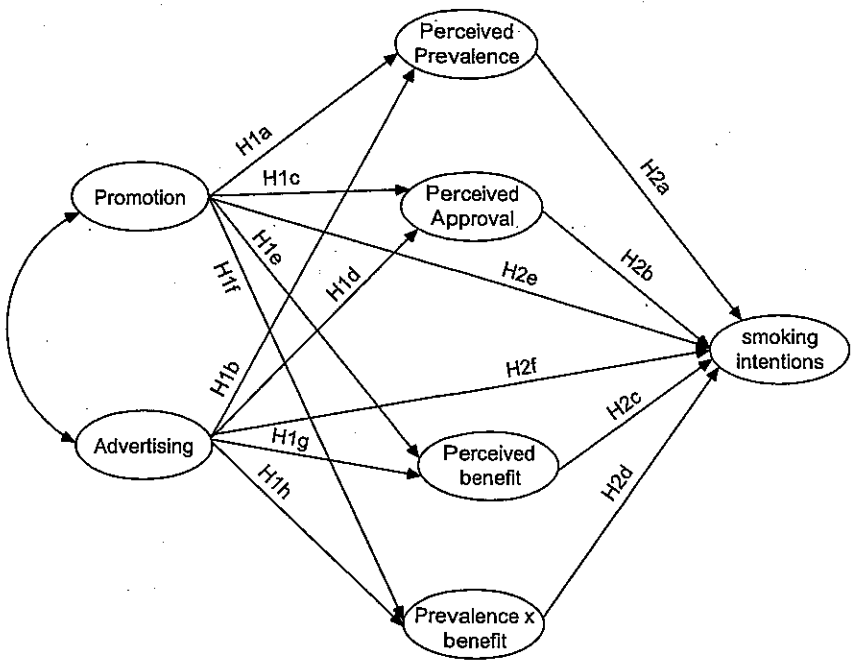

Fig. 1. Hypothesized model.

smoking intentions. The findings support this assertion as relatively smaller estimates of perceived prevalence were reported at W4 compared with W3, indicative of the indirect pathway of the TAPA on smoking intentions.

The W3 and W4 models were consistent regarding the mediation of perceived benefits on the influence of advertising and promotion awareness on intentions. Similar estimates were obtained for these two models, yet the W2 model yielded lower estimates, showing an increase in perceived benefits post-ban. Although in the opposite direction to that hypothesized, the failure to eliminate, rather than just restrict, POP provides a plausible explanation given that it is known that partial advertising bans are less effective than comprehensive advertising bans [54]. Globally, the industry response to advertising bans has been dramatic increases in expenditure at POP [51], with our findings suggesting that the same may have also happened in the UK. In support of this, an ongoing study, starting pre-ban, which examines the presence of tobacco marketing through a number of sources (print media, smokers panel and retail observation) has revealed that many tobacco marketing channels have been practically eliminated in the UK, except POP (C. Moodie *et al.* unpublished manuscript). Increased presence of tobacco products in retail outlets at W3, after advertising and promotions were banned but before POP was regulated, might convey to youth that tobacco use is desirable and socially acceptable. Even after the POP regulations came into effect, prior to W4, it only involved minimal restrictions on POP advertising and did not cover product display. Our findings affirm the need for a comprehensive tobacco marketing ban, one eliminating POP once and for all.

The role of the moderating and mediating effect was also demonstrated at W3 as the indirect effect of tobacco marketing on intentions was positively affected through the interaction of perceived prevalence and benefits. This highlights the emphasis placed on POP by the tobacco industry during the partial ban and thereby affecting perceived benefits which also moderately enhanced perceptions of prevalence and consequently influenced smoking intentions.

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Interestingly at W3 and W4, the TAPA reduced perceived sibling approval of smoking, yet approval did not affect intentions. Conversely, all three models showed no direct relation between advertising and promotion awareness and smoking intentions, highlighting that the relationship between tobacco marketing awareness and intentions is mostly indirect. The variance explained in intentions increased from 24% in W2 to 36% in W3 and 39% at W4. Thus, the tobacco marketing ban improved the predictability of the W3 and W4 models as intentions to smoke decreased significantly mid-ban and this continued post-ban.

A number of limitations may have impacted upon the findings, e.g. cross-sectional research does not permit causality. The use of a longitudinal design would have been preferable although the YTPS still provides a long-term monitor of adolescent tobacco marketing awareness and smoking intentions. A probable drawback is that variation in smoking status might affect intention. Nonetheless, as the TAPA impact both smokers and non-smokers' normative beliefs and intentions to smoke, our study focussed on assessing the influence of the TAPA on the entire youth population's intentions via normative beliefs. This seemed appropriate given the fairly small sample size and small number of smokers.

The use of a single intention item, asking about behaviour at age 18, as opposed to multiple items, may have impacted upon the findings. Intention realization, especially if some time in the horizon, will be mitigated by other factors and must be maintained over time to have predictive validity [55]. This also partly explains what has been alluded to intention–behaviour gap, i.e. the failure for intentions to predict behaviours, which can be the result of intention or behaviour type, the properties of intentions or alternatively due to cognitive and personality variables [56]. Nevertheless, intentions still remain a reasonable proxy for actual behaviour [9]. Likewise, assessment of 'liking' to advertising and 'image' advertising may have increased the predictive strength of our findings.

Another limitation is the failure to examine other normative constructs such as ego involvement [26] and peer communication [16], to improve variance on intentions. Peer communication, in particular, is a mechanism for the propagation of normative information, irrespective of its accuracy. In respect to the policy measure we examined, having information on peer communication would have helped provide a more thorough understanding of the moderating role that tobacco marketing has on young people's normative beliefs via peer communication.

There is a paucity of research examining the impact of tobacco marketing awareness on adolescents' smoking intentions via normative influences, with our findings showing that theoretical normative frameworks, such as the TNSB, can be expanded to examine distal influences. Future research assessing the impact of pro-smoking and anti-smoking advertising as explanatory media constructs on intentions would be of value.

Funding

Cancer Research UK

Acknowledgements

We thank Susan Anderson and Kathryn Angus for managing the fieldwork and all the interviewers who conducted the fieldwork. We also thank Anne Marie MacKintosh and Prof. Gerard Hastings for their help in this paper and our late colleague Dr Lynn MacFadyen for her contribution to the development and design of this study.

Conflict of interest statement

None declared.

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Received on July 8, 2008; accepted on January 14, 2009

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The effect of retail cigarette pack displays on unplanned purchases: results from immediate postpurchase interviews

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Received 30 September 2008
Accepted 23 February 2009
Published Online First 4 March 2009

ABSTRACT

Objective: To assess the influence of point-of-sale (POS) cigarette displays on unplanned purchases.

Methods: Intercept interviews were conducted with customers observed purchasing cigarettes from retail outlets featuring POS cigarette displays. Measures included intention to purchase cigarettes prior to entering the store, unprompted and prompted salience of POS tobacco displays, urge to buy cigarettes as a result of seeing the POS display, brand switching and support for a ban on POS cigarette displays.

Results: In total, 206 daily smokers aged 18–76 years (90 male, 116 female) were interviewed. Unplanned cigarette purchases were made by 22% of participants. POS displays influenced nearly four times as many unplanned purchases as planned purchases (47% vs 12%, $p<0.01$). Brand switching was reported among 5% of participants, half of whom were influenced by POS displays. Four times as many smokers were supportive of a ban on POS tobacco displays than unsupportive (49% vs 12%), and 28% agreed that such a ban would make it easier to quit.

Conclusions: POS tobacco displays act as a form of advertising even in the absence of advertising materials. They stimulate unplanned cigarette purchases, play an important role in brand selection and tempt smokers trying to quit. This justifies removing POS tobacco displays from line of sight—something that very few smokers in our sample would object to.

In Western Australia, tobacco advertising bans have existed for television and radio since 1976 and for newspapers, magazines, billboards, posters and sponsorship since 1992. Limited point-of-sale (POS) advertising at checkout counters remained one of the last avenues for legitimate tobacco advertising in the State until this too was banned in 2006. The display of tobacco products is still permitted, but restricted to one example of each product and a total maximum display area of 1 m^2. Similar bans are currently in force in other Australian jurisdictions in Victoria and the Northern Territory.

Although the current Western Australian legislation is restrictive, there is an argument to be made that any display of tobacco products is a form of advertising and hence current restrictions remain inadequate. Indeed, current regulations permit the display of 150 cigarette packets to form "power walls".[1] By definition, partial POS display restrictions such as those in force in Western Australia, Victoria and the Northern Territory are likely to only partially ameliorate possible effects on tobacco purchases. Several other jurisdictions around the world, such as Iceland, Thailand and most provinces in Canada, have gone a step further and ban any visible display of tobacco products on shop floors. In these jurisdictions tobacco products are required to be stored out of sight either within closed draws or under the counter. Similar bans are being planned in New Zealand, Ireland, England and Wales, and in the Australian jurisdictions of New South Wales, Tasmania and the Australian Capital Territory.

Advertising industry data from the US suggests POS displays increase tobacco sales by 12% to 28%.[2 3] However, these data are not freely available and are cited from a secondary source,[4] and hence are difficult to independently verify. Perhaps more convincing is that the tobacco industry demonstrably fears bans on POS displays and has mounted unsuccessful legal challenges to such restrictions in Iceland and Canada.[5]

The tobacco industry argues that POS displays merely encourage brand switching among current smokers and do not recruit new smokers, nor increase overall consumption.[6] A 2006 telephone survey of Australian smokers suggested smokers very rarely make use of POS displays in deciding which brand to purchase, with only 3.8% claiming sometimes and 1.0% to always use POS displays to decide which brand of cigarettes to purchase.[7] By contrast, a 2008 survey suggested 25% of Australian smokers at least sometimes decide to buy cigarettes on impulse as a result of seeing POS tobacco displays, and that 34% of recent quitters and 38% of smokers who had attempted to quit in the past 12 months had to fight the urge to purchase cigarettes when seeing a POS tobacco display.[8] These data provide a compelling case that POS tobacco displays increase unplanned purchases among current smokers and increase temptation to those trying to quit. However, both surveys used telephone interviews to gather retrospective data from smokers over the past 12 months.[7 8] A limitation of this method is that when smokers are asked to recall previous purchase experiences the limits of autobiographical memory reduce accuracy and introduce biases.[9] Memory loss usually occurs very quickly unless an individual makes an explicit attempt to memorise an event. Unusual or vivid experiences can be recalled with much greater ease and accuracy than "everyday" events such as a smoker's routine purchase of cigarettes.[9] To minimise this memory loss, we chose to conduct POS interviews with individuals immediately after they made cigarette purchases.

Tobacco Control 2009;18:218–221. doi:10.1136/tc.2008.027870

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The possibility that smokers might still make inaccurate self-attributions about the influences on their purchasing behaviours meant ideally we would have compared the self-attributions of smokers who made tobacco purchases from retailers with versus without POS displays. However, we were unable to locate any tobacco retailers within Western Australia who voluntarily keep tobacco products out of sight. As such all intercept interviews were conducted outside of retailers with POS tobacco displays.

METHODS

Ethics approval was obtained for this study from the Curtin University Human Research Ethics Committee. A structured questionnaire was devised to assess the role of POS tobacco displays in purchase decisions. Open-ended questions were designed to elicit spontaneous mention of the POS tobacco displays before specific prompting about the displays. The questionnaire protocol was piloted via a convenience sample of 10 smokers observed purchasing cigarettes from a supermarket with POS tobacco display, resulting in minor changes.

To obtain a broad social representation of respondents, supermarkets in two major shopping centres were identified in suburbs from the highest and lowest quartiles of the socioeconomic strata of the metropolitan area of Perth, Western Australia, as determined by the 2006 Socioeconomic Index for Areas (SEIFA).[10] Supermarkets were selected because they account for a greater proportion of tobacco sales within Australia (51%) than all other retailer types combined.[11]

Researchers visited each supermarket and observed individuals purchasing cigarettes at the tobacco counter. All customers observed purchasing tobacco products were immediately approached after leaving the supermarket and asked to participate in a brief survey on "health issues". Of 344 individuals approached, 206 agreed to participate, representing a response rate of 60%. Each interview was of approximately 5-min duration.

RESULTS

Participants

The 206 participants were 90 men (44%) and 116 women (56%) recruited from supermarkets in both shopping centres in approximately equal numbers (n = 100 vs 106). Participants had an average age of 37 years (range 18–76 years). All were current daily smokers of cigarettes (consumption range 1–30 cigarettes per day). On the occasion of the interview they had purchased an average of 1.2 packets of cigarettes (range 1–7) each containing a median of 25 cigarettes (range 20–50). Participants aged less than 25 years (n = 51) purchased fewer cigarettes ($\bar{x} = 25$) than their older counterparts ($\bar{x} = 30$) ($t(203) = 3.144$ $p<0.01$).

Unplanned purchase

When participants were asked "Did you plan to purchase cigarettes before entering this store?", 45 (22%) indicated that they had not. A total of 31 participants (15%) made unplanned purchases after being reminded of running out of cigarettes while in store, 13 (6%) said they purchased the cigarettes on a whim and 1 was unable to articulate why she had made the purchase.

A comparison of the demographics of unplanned versus planned purchasers suggested no significant differences by sex or SEIFA but a difference between younger and older adults that approached significance (p = 0.072) (see table 1).

All participants were then asked "What, if anything, did you see in the store that prompted you to purchase those cigarettes?". In total, 16 participants (8%) spontaneously mentioned the POS display, 1 mentioned "the bottle shop", another mentioned a sign for the supermarket and another was prompted by seeing another customer purchasing cigarettes. The remainder (n = 187, 91%) indicated that nothing in the store had prompted them.

Participants were then asked "Did the cigarette pack display encourage you in any way to purchase cigarettes in this instance?". A total of 40 participants (19%), including the 16 that had previously spontaneously mentioned the POS display, responded "yes". No significant differences were observed by sex, age or SEIFA but the proportion of participants influenced by POS displays was greater among unplanned purchasers compared to planned purchasers (47% vs 12%, $\chi^2(1) = 27.323$ $p<0.001$).

Brand switching

Participants were asked "Are the cigarettes you just purchased your usual brand?". In all, 11 participants (5%) stated they had not purchased their usual brand. However for only one of these was the purchase unplanned. When asked "What prompted you to try this brand?", five said they were trying a different brand on the recommendation of another person, including the single unplanned purchaser, and six said they wanted to "try something different" or "felt like a change". None spontaneously mentioned the POS displays as a prompt to switch brands.

When asked "Did the cigarettes packets on display prompt you to purchase that particular brand?", all six who wanted to "try something different" or "felt like a change" responded "yes". When asked to elaborate, all six indicated that they studied the cigarette products on display before selecting the packaging most appealing to them (eg, "I knew I wanted something different so I looked at the display for different options" and "I looked at the display and picked the one I liked the look of").

Support for ban on POS tobacco displays

Participants were asked "How supportive or unsupportive would you be of legislation requiring shops to remove cigarette packs from display?". Over four times as many participants were supportive (n = 102, 49%) than unsupportive (n = 24, 12%), but a substantial proportion were ambivalent (n = 80, 39%). When asked, supportive participants were in favour because "whatever helps people quit is worthwhile" (n = 31), "it might help stop impulse buys" (n = 16), "it might stop first time buyers" (n = 29) and "out of sight is out of mind" (n = 14). Those unsupportive were so because they felt they "have a right to see what's available" (n = 15) and that "it wouldn't make any difference" (n = 14). No significant differences were observed by sex, age or SEIFA.

All participants were then asked "Do you agree or disagree that removing cigarette packs from view in stores would make it personally easier for you to quit smoking?". A majority of participants (49%) disagreed but a not insubstantial proportion (28%) agreed. No significant differences were observed by sex, age or SEIFA, but those who had made an unplanned purchase were significantly more likely to agree compared to those who made a planned purchase (59% vs 29%; $\chi^2(1) = 11.455$ $p<0.01$).

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Table 1 Demographic characteristics of participants making unplanned purchases and being influenced by point-of-sale (POS) tobacco displays

	Cigarette purchase				POS display			
	Planned	Unplanned	χ^2	p Value	No influence	Influence	χ^2	p Value
Sex:								
Male	73 (81%)	17 (19%)	0.818	0.366	74 (82%)	16 (18%)	0.275	0.600
Female	88 (76%)	28 (24%)			92 (79%)	24 (21%)		
Total	161 (78%)	45 (22%)			166 (81%)	40 (19%)		
Age:								
18–24	36 (69%)	16 (31%)	3.245	0.072	40 (77%)	12 (23%)	0.595	0.440
25+	125 (81%)	29 (19%)			126 (82%)	28 (18%)		
Total	161 (78%)	45 (22%)			166 (81%)	40 (19%)		
Socioeconomic status quartiles:								
First	53 (77%)	16 (23%)	0.723	0.868	55 (80%)	14 (20%)	1.177	0.758
Second	47 (80%)	12 (20%)			50 (85%)	9 (15%)		
Third	44 (77%)	13 (23%)			45 (79%)	12 (21%)		
Fourth	17 (85%)	4 (19%)			16 (76%)	5 (24%)		
Total	161 (78%)	45 (22%)			166 (81%)	40 (19%)		

DISCUSSION

Just over a fifth of participants reported making an unplanned tobacco purchase on the occasion of interview. Most (68%) did not make an impulse purchase per se, but rather were prompted that they were running low on cigarettes while in store. Although only around half of unplanned purchasers made self-attributions that they were influenced by the POS tobacco display, they suggested such nearly four times more frequently compared to planned purchasers. Hence, POS tobacco displays clearly play a significant role in increasing unplanned, and therefore total, purchases of cigarettes.

In total, 10% of our sample reported being influenced by POS tobacco displays to make unplanned cigarette purchases. This is lower than the 25% of telephone survey respondents who suggested they had been influenced "at least sometimes" in the last 12 months to make an unplanned purchase as a result of seeing a POS tobacco display.[8] However this would be expected given our sample was reporting on a single occasion and the previous survey respondents were recalling any instance over the past year. If anything, our results suggest instances of POS tobacco displays influencing unplanned purchases may be more frequent than previously realised. Our 10% figure is also lower than the previously reported 12% to 28% increase in tobacco sales generated by POS tobacco displays in the (less regulated) US market.[4] Bearing in mind the potential limitations of the 12% to 28% estimate, it should be stressed that our data were collected only in supermarkets, and in a jurisdiction where tobacco advertising at POS is banned and the size of tobacco displays is heavily restricted. In jurisdictions where POS tobacco advertising and tobacco display sizes are less regulated (such as in the US), the influence of POS displays on unplanned tobacco purchases could well be greater. This matter would be clarified by replicating the present study in jurisdictions with fewer or no POS tobacco display restrictions.

Unplanned purchasers were likely to be of either sex and from all socio-economic strata, but somewhat younger. This is consistent with the near-significant age difference ($p = 0.068$) reported in the 2008 retrospective telephone survey of the influence of POS displays on unplanned tobacco purchases.[8] It is possible that POS tobacco displays have a somewhat greater effect on younger smokers because they are less established in their brand loyalties. Although not strictly evidence within the criteria of Bayesian inferential statistics, these data are at least consistent with previous experimental research highlighting that younger people are particularly impressionable with regards to POS tobacco displays.[12 13]

Our data confirm POS tobacco displays are an important factor with regards to brand switching. In this respect, POS tobacco displays still clearly act as a form of advertising in Western Australia; a jurisdiction where all forms of tobacco advertising are ostensibly banned. Moreover, a not insubstantial proportion of our smokers (28%) thought the removal of cigarette displays from stores would make it easier for them to quit, replicating the 31% of Australian smokers who have previously claimed the same.[8]

In addition to previous data that suggest POS tobacco displays increase brand awareness among children and youth and help "normalise" the product,[12 13] our data provide further reasons why tobacco products should be removed from sight within stores. Although our sample is modest, the data also suggest that legislating such a ban is likely to result in minimal, if any, voter backlash, with 88% of our sample being supportive, or at least ambivalent, towards a complete ban on POS cigarette displays. The main objection of those few smokers opposed to removing POS tobacco displays is that it would infringe upon their "right" to choose between tobacco brands. As is the case in some Canadian jurisdictions, customers could be provided a catalogue of the available tobacco products upon request and their "right" would therefore be preserved.

What this paper adds

- Currently, there is limited data of the effect on adult smokers of point-of-sale tobacco product displays when advertising materials are not present. The best data we have to date is from Wakefield *et al*,[8] who reported that of a telephone survey of Australian smokers, 25% had at least sometimes made an unplanned purchase of cigarettes in the past 12 months as a result of seeing point-of-sale tobacco product displays.
- The results from our immediate postpurchase interviews provide the clearest evidence yet that point-of-sale tobacco product displays have a strong influence on unplanned purchases—even if unaccompanied by advertising materials. Policies to remove tobacco products from line of sight are highly likely to impact on unplanned purchases.

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Funding: This research was supported by a Curtin Business School Area of Research Excellence (AORE) Grant. The Centre for Behavioural Research in Cancer Control is supported by funding from the Cancer Council WA. OBJC is part-funded by the Health Promotion Foundation of WA (Healthway) through a Tobacco Control Research Fellowship.

Competing interests: None.

Ethics approval: Ethics approval was given by the Curtin University Ethics Committee.

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Tobacco Control Lessons Learned: The Impact of State and Local Policies

Frank Chaloupka, PhD

January 2010

Research Paper Series, No. 38

ImpacTeen is part of the ***Bridging the Gap Initiative***: Research Informing Practice and Policy for Healthy Youth Behavior, supported by The Robert Wood Johnson Foundation and administered by the University of Illinois at Chicago.

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Tobacco control lessons learned: The impact of state and local policies.

January 2010

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Acknowledgements
The author gratefully acknowledges financial support for this project from the Robert Wood Johnson Foundation, American Legacy Foundation and JSI Research & Training Institute, Inc. The author would also like to thank Gary Giovino, Lyndon Haviland, and Carol Rougvie for their helpful comments.

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I. Introduction

Much of the progress in reducing tobacco use in the United States over the past few decades can be attributed to the adoption and strengthening of tobacco control policies at the state and local levels. Inflation-adjusted cigarette taxes have more than tripled since the early 1980s, and significant taxes have been adopted in several localities. On average, federal, state, and local cigarette taxes currently add over one dollar – much more in some localities - to the price of a pack of cigarettes. Several states earmark a portion of the revenues generated from these taxes to fund comprehensive state tobacco control programs that aim to prevent smoking initiation and encourage smoking cessation; others use the payments they receive from tobacco companies as part of the Master Settlement Agreement (MSA) to fund these programs. Every state and thousands of communities now restrict smoking in at least some public places, with a growing number banning smoking in virtually all indoor public places, including restaurants, bars and worksites. In response to federal legislation, all states have implemented policies prohibiting the sale of tobacco products to minors, with many states and communities adopting policies that go well beyond the mandated minimum.

Not surprisingly, tobacco companies and related organizations have argued against many of these policies, often making false or overstated claims about the adverse economic impact of higher tobacco taxes, stronger smoke-free air policies, and others. Cigarette company marketing spending has gone up considerably over the past thirty years, despite increasing constraints, with some evidence that at least some of the marketing aims to offset the effects of strong tobacco control policies. However, greater awareness of the health consequences from tobacco use and exposure to tobacco smoke, a growing evidence base on the effectiveness of various policy and

other interventions in reducing tobacco use, and well-organized coalitions advocating for stronger state and local policies have been effective in overcoming the industry's arguments.

This chapter describes the evolution of key tobacco control policies over the past several decades and reviews the evidence base on the effectiveness of these policies in reducing tobacco use and the public health consequences it causes. Key policies include tobacco taxation, smoke-free air policies, policies targeting youth, and limits on tobacco company marketing; while state and local policies are the focus of the chapter, relevant federal policies in each area will be briefly described. Policies covered in other chapters, such as state litigation against tobacco companies, anti-smoking advertising and other countermarketing, and cessation support will not be reviewed below. Finally, arguments raised in opposition to stronger tobacco control policies are discussed, along with the evidence on the validity of these arguments.

II. Tobacco Taxation

Cigarettes and other tobacco products are taxed in various ways by federal, state, and local governments. Historically, revenue generation was the primary motivation for these taxes. In recent years, however, growing evidence on the impact of higher tobacco taxes and prices on youth and adult tobacco use has led to increased interest in using tobacco taxation to reduce tobacco use and its consequences. This section reviews the recent history of these taxes, their relationship to price, and evidence on the impact of price on tobacco use, both generally and in key populations.

Federal Tobacco Taxation

The federal government has applied excise taxes to tobacco products in the U.S. since the late 18th century; these taxes rose and fell over time depending on the government's revenue needs, often rising during wartime and falling during peace and prosperity. The federal cigarette

excise tax was set at eight cents per pack in November 1951 and remained at that level until it was doubled in January 1983 as part of deficit reduction legislation. Since then, the tax has risen modestly, most recently increasing from 34 to 39 cents per pack in January 2003. Given the infrequent and typically small increases in the federal cigarette tax since 1951, the current tax amounts to about sixty percent of the inflation adjusted value of the 1951 tax.

In addition to cigarettes, federal excise taxes are applied to most other tobacco products, including cigars, pipe tobacco, chewing tobacco, snuff, and roll-your-own tobacco (with a separate tax on rolling papers). These taxes generally account for a lower share of retail price than the federal cigarette tax. Like the cigarette tax, federal excise taxes on other tobacco products have been raised infrequently and modestly over time.

In general, federal tobacco taxes appear to be largely motivated by the revenue generating potential of these taxes. While the public health benefits of higher federal tobacco taxes have been raised in debates over increases these taxes, the small, infrequent increases of the past 25 years have generally been adopted as part of budget deficit legislation (e.g. the Tax Equity and Fiscal Responsibility Act of 1982 that doubled the tax effective January 1983 and the Omnibus Budget Reconciliation Act of 1990 that included four cent increases in 1991 and 1993) or to provide funding for new programs (e.g. the January 2003, five-cent per pack increase that funded an expansion of the State Children's Health Insurance Program).

State Tobacco Taxation

All states apply an excise tax on cigarettes. Iowa, in 1921, was the first to adopt a state cigarette excise tax; not surprisingly, one of the major tobacco growing and manufacturing states - North Carolina - was the last (in 1969). Similarly, most states impose excise taxes on other tobacco products and the sales tax in most states is applied to tobacco products (usually to the

price inclusive of excise taxes). There is considerable variation across states in these taxes, as well as within most states over time. As of July 2007, the simple average of cigarette excise taxes in the 50 states and DC was just over $1.07 per pack, with taxes as high as $2.575 per pack in New Jersey. As might be expected, given tobacco's historical and economic importance, cigarette taxes in the six major tobacco growing and/or manufacturing states (Kentucky, North Carolina, Virginia, South Carolina, Georgia and Tennessee) are low, ranging from seven cents per pack in South Carolina to 67 cents per pack in Tennessee – an average of less than 30 percent of the average cigarette tax in other states.

State tobacco taxes have increased considerably over the past 25 years, with the inflation adjusted average state tax more than tripling between 1982 and mid-2007. Nearly all states, even most major tobacco states, have increased their cigarette excise tax in recent years, with multiple increases in several states. Politicians from both parties have supported cigarette and other tobacco product excise tax increases, often pointing to the health benefits of the reduced tobacco use that result from the higher taxes. Similarly, public support for these taxes tends to be high, particularly when the new revenues generated from the tax increase are earmarked for comprehensive tobacco control and other public health programs.

The first evidence of states using higher taxes to reduce tobacco use and improve public health comes from the numerous state cigarette tax increases following the dissemination of early evidence on the health consequences of smoking in the mid-1950s and 1960s. From 1950 through 1954, there were a total of 14 state cigarette excise tax increases (and one reduction), and average taxes in tobacco-growing/manufacturing were only slightly below those in other states (USDHHS, 2000). As information spread about the health consequences of smoking, many states raised their cigarette taxes, some multiple times; from 1955 through 1971, over ten

states per year, on average, raised their tax. Not surprisingly, major tobacco growing and manufacturing states were least likely to do so; indeed, Virginia and Kentucky lowered their taxes. By the end of fiscal year 1971, the average tax in the six major tobacco growing and manufacturing states was less than 60 percent of that in other states.

Concerns about interstate cigarette smuggling in response to differences in state excise taxes deterred states from continuing to raise taxes over the next decade. Beginning in 1982, however, states again began raising taxes, in part because of the need for revenues caused by the significant economic slowdown of the early 1980s and in part a response to the 1982 legislation doubling the federal cigarette tax. However, it also seems likely that at least some of these tax increases were a response to the early economic research (described below) demonstrating that higher cigarette taxes reduced smoking, particularly among youth and young adults (Lewit and Coate, 1981; Lewit, Coate, and Grossman, 1982). Further interest in raising state taxes to discourage tobacco use was almost certainly stimulated by subsequent studies describing the impact of the 1983 federal tax increase on smoking and health, concluding that this increase would prevent over 100,000 deaths caused by smoking (e.g. Warner, 1986; Harris, 1987).

This emerging evidence on the effectiveness of state cigarette taxes in reducing smoking and improving public health inspired a renewed interest in using tax increases to discourage tobacco use. In 1988, California led this next wave of state cigarette tax increases with a voter initiative - Proposition 99, the Tobacco Tax and Health Protection Act - which increased the state's cigarette excise tax by 25 cents per pack (the then largest single increase in a state cigarette tax) as well as raised other tobacco product taxes. Voters of the state went further and earmarked a portion of the revenues generated from these taxes to fund a comprehensive tobacco control program, dedicating 25 percent of the new revenues to this program. Massachusetts

voters did the same in 1992, approving Question 1 which raised the state cigarette tax by 25 cents per pack, increased other tobacco product taxes, and recommended that part of the new revenues generated by the tax be used to fund a comprehensive tobacco control program. Since then, a number of other states have raised their tobacco taxes and used the revenues from these taxes to fund comprehensive programs, with the public health benefits of these tax increases and, if not the most, motive for these tax increases in nearly every state.

Local Tobacco Taxes

Hundreds of communities also tax tobacco products, with most applying relatively small taxes to cigarettes and, in some cases, other tobacco products. In recent years, however, a few cities and counties have adopted significant local cigarette taxes. In 2002, New York city's cigarette tax was increased from 8 cents per pack to $1.50 per pack, with the public health impact of the higher tax the primary rationale for this unprecedented rise. More recently, Cook County Illinois raised its cigarette tax to $1.00 per pack, followed a year later by an increase to $2.00 per pack, while Chicago's cigarette tax rose to 68 cents per pack. When state and federal taxes are added, smokers buying cigarettes in Chicago pay $4.05 per pack in excise taxes alone – the highest in the country. Unlike the local tax in New York City, these tax increases appear to have been largely motivated by the revenues that would be generated from the higher taxes.

Tobacco Taxes and Tobacco Product Prices

Recent, sizable increases in state and local cigarette taxes have contributed to a significant increase in inflation adjusted cigarette prices over the past decade. While many factors influence cigarette and other tobacco product prices, several studies demonstrate that cigarette tax increases result in comparable (and at times larger) increases in cigarette prices.

Figure One illustrates the clear relationship between state cigarette taxes and state-level, average cigarette prices.

[Figure One about here]

Likewise, the settlements of state and local lawsuits brought against tobacco companies have raised cigarette prices. The pass through of costs resulting from settlements of lawsuits with Mississippi, Florida, Texas, and Minnesota in 1997 and 1998 accounted for most, if not all, of the over 25 cents per pack increase in wholesale prices during this period. The MSA which settled remaining lawsuits resulted in an immediate 45 cent per pack increase in prices.

Figure Two illustrates the significant increase in cigarette prices over the past decade, largely resulting from the increases in state cigarette excise taxes and the pass through of settlement costs. Between 1997 and 2003, inflation adjusted cigarette prices increased by about 75 percent.

[Figure Two about here]

Tobacco Taxes, Prices, and Overall Tobacco Use

Perhaps the most fundamental principle of economics is that of the "downward sloping demand curve" which states that as the price of a product rises, the consumption of that product falls. For many years, the conventional wisdom was that addictive products like cigarettes might be an exception to this basic principle. Over the past few decades, well over one hundred studies for the US, various states, and other high-income countries have clearly and consistently demonstrated that higher cigarette and other tobacco product prices reduce tobacco use. These reductions in use result from increased cessation among current tobacco users, reduced initiation among youth, less relapse among former users, and reductions in the amount consumed by those who continue to consume.

The inverse relationship between cigarette prices and cigarette consumption in the US is illustrated in Figure Three. Due to the lack of change in federal and state cigarette taxes in the 1970s and early 1980s, along with the high inflation of that period, inflation adjusted (real) cigarette prices were falling and US cigarette consumption was rising. Beginning with the doubling of the federal cigarette excise tax in 1983, and followed by industry price increases around the time of the federal tax increase and a number of subsequent state cigarette tax increases, inflation adjusted cigarette prices began to rise and cigarette consumption declined. These trends continued until 1993 and what has come to be known as "Marlboro Friday." In April 1993, Philip Morris implemented a variety of promotions for Marlboro that lowered price by about 25 percent; these price reductions were quickly matched by other companies and spread to other brands. The downward trend in cigarette consumption was halted by the price cuts and consumption remained flat for the next few years as inflation adjusted prices remained steady. More recently, as prices rose rapidly due to numerous state tax increases and the pass through of settlement costs, US cigarette consumption has declined sharply.

[Figure Three about here]

Economists use the "price elasticity of demand" to quantify the impact of a change in price on a change in consumption. Formally, the price elasticity of demand is defined as the percent change in consumption that results from a one percent increase in price. While the many studies of cigarette demand produce a wide range of estimates for the price elasticity of demand, most of the estimates fall in the narrow range from -0.25 to -0.5, implying that a ten percent increase in cigarette prices reduces overall cigarette consumption by between 2.5 and five percent (U.S. Department of Health and Human Services (USDHHS), 2000; Chaloupka, et al., 2000; Gallet and List, 2003).

While there are fewer studies for other tobacco products, the findings from these studies are similarly consistent in showing that higher taxes and prices for these products are effective in reducing their use (USDHHS, 2000; Chaloupka, et al., 2000). In addition, these studies indicate that tobacco products are substitutes for one another, implying, for example, that if the price of cigarettes increases relative to the price of smokeless tobacco products, some of the reductions in cigarette smoking that result would be partially offset by increases in smokeless tobacco consumption (e.g. Ohsfeldt, Boyle and Capilouto, 1999). Similarly, a few recent studies show that increases in cigarette prices lead to changes in brands among cigarette smokers, including switching from premium to discount brands (e.g. Tauras, Peck and Chaloupka, 2006) and switching to longer and/or cigarettes higher measured tar and nicotine (e.g. Evans and Farrelly, 1998).

The experiences from US states that have adopted significant increases in cigarette taxes, as well as those from a variety of high income countries where cigarette prices are well above prices in the US and where taxes account for a much higher share of cigarette prices suggest that these estimates apply over a wide range of prices and that additional increases in taxes and prices would cause further reductions in cigarette smoking. Recent studies that account for the addictive nature of cigarette smoking find that the effects of price are about twice as large in the long run, as addicted smokers fully adjust over time to permanent changes in price (Chaloupka, 1991; Becker, Grossman and Murphy, 1994; Chaloupka, Tauras and Grossman, 2000).

Taxes, Prices, and Adult Prevalence and Cessation

A growing number of studies based on individual-level survey data attempt to disentangle the effects of taxes and prices on prevalence and consumption. These studies generally find that about half of the drop in overall cigarette consumption that results from an increase in price

results from a decline in the prevalence of smoking, with the remainder accounted for by reductions in the number of cigarettes consumed by continuing smokers (e.g. Hu, et al., 1995; Farrelly, et al., 2001). Estimates from most of these studies indicate that a ten percent increase in price reduces adult smoking prevalence by between one and 2.5 percent. The relationship between cigarette prices and adult smoking prevalence is illustrated in Figure Four. As with cigarette consumption, the downward trend in adult prevalence was halted in the mid-1990s following the Marlboro Friday price cuts and was resumed later in the decade as taxes and prices rose. More recently, as cigarette prices have held steady, the downward trend in prevalence has flattened out.

Given that nearly all smoking initiation occurs during adolescence (USDHHS, 1994), changes in adult prevalence result from increased cessation among adult smokers. Early studies of the relationship between cigarette prices and smoking cessation based on retrospective, cross-sectional data found that higher prices reduced the duration of smoking and increased the likelihood of quitting (Douglas and Hariharan, 1994; Douglas, 1998). More recent studies based on longitudinal data that directly assesses cessation behavior conclude that higher cigarette prices increase the likelihood that a smoker will try to quit smoking. Tauras and Chaloupka (2001), for example, estimate that a ten percent increase in cigarette prices raises the probability of a quit attempt among young adult smokers by between six and nine percent. In a subsequent study that accounted for unsuccessful quit attempts, Tauras (2004) estimates that a ten percent price increase increases the likelihood of a successful quit attempt by about 3.5 percent. Figure Five illustrates the simple association between cigarette prices and cessation; consistent with the findings from more rigorous empirical studies, there is a higher percentage of former smokers in states with higher cigarettes prices.

[Figure Five about here]

Recent research on the demand for cessation pharmacotherapies produces consistent findings. Tauras and his colleagues (2003, 2005), for example, find that higher cigarette prices increase sales of nicotine replacement products.

Taxes, Prices and Youth and Young Adult Tobacco Use

Economic theory suggests several reasons for prices having a greater impact on youth smoking than on adult smoking (Chaloupka, 2003; Chaloupka, et al., 2000). These include:

- the lower disposable income of the typical youth, implying that changes in the prices of any of the products they consume will have a greater impact on consumption of these products;
- the greater importance of peer behavior among youth, implying that price-induced changes in the smoking behavior of some youth will lead to changes in the smoking behavior of other youth;
- the shorter smoking histories of younger smokers, suggesting that they may be less addicted and able to respond more quickly to changes in prices;
- the greater relative importance to youth of short term costs (e.g. monetary prices) versus long term costs (e.g. health consequences), given their greater propensity to discount the future; and
- other channels through which price indirectly influences youth smoking (e.g. through parental smoking).

Early research on youth smoking based on cross-sectional survey data confirmed these predictions. In the first studies of the impact of price on youth, young adult, and adult smoking, Lewit and his colleagues (1981, 1982), found that smoking among teens was about three times

more responsive to price than was smoking among adults, with young adults about twice as responsive as older adults. While some studies do not find differences in the effects of price on smoking among different age groups (e.g. Wasserman, et al., 1991), most studies have confirmed that price has a greater impact on smoking among younger person than on smoking among older persons. For example, Harris and Chan (1999) estimated that a ten percent price increase would reduce smoking by about ten percent among 15 through 17 year olds, almost eight percent among 18 through 20 year olds, between six and seven percent among 21 through 26 year olds, and just over three percent among 27 through 29 year olds. Similarly, a small number of studies have examined the impact of smokeless tobacco taxes on youth smokeless tobacco use, concluding that higher taxes are effective in reducing the prevalence and frequency of youth use of these products (e.g. Chaloupka, Tauras and Grossman, 1997; Tauras, et al., 2007).

The relationship between cigarette prices and youth smoking are illustrated in Figures Six and Seven showing cigarette prices and youth smoking rates over time and across states, respectively. As with cigarette sales and adult prevalence, youth smoking is higher when prices are lower and lower when prices are higher. The rise in youth smoking in the mid-1990s, is in part explained by the Marlboro Friday price cuts of 1993; Gruber and Zinman (2001), for example, estimate that over one-quarter of the increase was caused by the reductions in prices for Marlboro and other leading brands.

[Figure Six about here]

[Figure Seven about here]

A few recent studies have explored the direct and indirect influences of price on youth smoking that are suggested by economic theory (Chaloupka, 2003). For example, Powell and her colleagues (2005) find that more than one-third of the overall impact of price on youth

smoking is the result of the indirect effects of price on peer smoking. That is, as some youth are deterred from smoking by higher prices, other youth are less likely to smoke because fewer of their peers smoke. Similarly, Powell and Chaloupka (2005) find that about one-fifth of the overall impact of price on youth smoking is accounted for by the effects of price on parental smoking.

More recent research has focused on the role of cigarette prices in the youth smoking uptake process. The Surgeon General (USDHHS, 1994) describes uptake as moving through several stages, including experimentation, regular smoking, and addiction. A few recent studies using cross-sectional data find that prices have relatively little impact on the early stages of smoking uptake, but have a much greater impact on moving from experimentation into regular smoking and, eventually, addiction (e.g. Gruber and Zinman, 2001; Liang and Chaloupka (2002), Emery et al. 2001, Ross, et al., 2006). This is consistent with the observation that most youth at early stages of smoking uptake smoke few cigarettes and typically get their cigarettes from social sources, while those smoking more regularly are more likely to buy their own cigarettes and, as a result, be more directly influenced by price.

This finding is generally confirmed by studies using longitudinal data on youth (for an exception, see DeCicca, et al., 2002). For example, Tauras and his colleagues (2001) use the Monitoring the Future longitudinal data on youth smoking, with baseline data collected from eighth and tenth graders in the early 1990s to examine the impact of cigarette price on smoking initiation. These data are ideal given the multiple cohorts (six) they include and the many changes in cigarette prices (up and down) in the 1990s. Tauras and his colleagues estimate that a ten percent price increase reduces the probability of any smoking initiation (including experimentation) by one to three percent, but that this price increase reduces the probabilities of

initiating daily smoking and heavy daily smoking (half pack or more per day) by eight to 12 percent and ten to 14 percent, respectively. Tauras (2005) finds similar effects in his more recent research on the effects of price on smoking escalation among young adults, concluding that higher cigarette taxes and prices are most effective in keeping young adults from moving from less than daily smoking into daily and heavy daily smoking.

Differences in the Effects of Taxes and Prices by Socioeconomic Status

Economic theory predicts that the effects of price on consumption will be larger among lower income consumers than among higher income consumers, all else the same. A few studies have examined differences in price responsiveness based on differences in income and related characteristics (e.g. education and socioeconomic class), generally concluding that smoking among persons in lower socioeconomic groups will respond more to changes in cigarette prices than will smoking among those in higher socioeconomic groups. Farrelly and his colleagues (2001), for example, estimate that smoking among persons in US households below the median income level was about four times more responsive to changes in cigarette prices than was smoking among those in higher income households. Similarly, Chaloupka (1991) found that smoking among less educated persons was more sensitive to price than was smoking among more educated persons, while Townsend and her colleagues (1994) found that smoking among persons in the lowest socioeconomic classes in the UK was highly responsive to price, while smoking among those in the highest socioeconomic classes was much less affected by price. Emerging evidence from low and middle-income countries produces similar findings, with smoking in the lowest income countries more influenced by price than smoking in higher income countries (Ross and Chaloupka, 2006).

Taxes, Prices, and the Health Consequences of Smoking

A few studies have examined the impact of cigarette taxes and prices on some of the health consequences of smoking. In the earliest of these, Moore (1996) used annual state-level data on death rates from diseases caused by smoking (e.g. lung and other cancers, heart disease and other cardiovascular disease) and concluded that higher cigarette taxes would lead to significant reductions in the premature deaths caused by smoking. He estimated that a ten percent increase in cigarette taxes would reduce smoking-attributable deaths by over 5,000 each year. Given the significant health consequences of smoking during pregnancy, several researchers have focused on the effects of price on smoking among pregnant women and the resulting impact on birth outcomes. These studies generally find that smoking by pregnant women is highly sensitive to price, attributing this to the fact that many pregnant smokers are already motivated to quit by their pregnancy and price increases provide further motivation. Ringel and Evans (2001), for example, estimate that a ten percent increase in cigarette prices reduces the prevalence of smoking among pregnant women by seven percent, while Colman and his colleagues (2003) estimate that this price increase raises the probability of quitting during pregnancy by ten percent. Evans and Ringel (1999) use their estimates of the impact of price on smoking among pregnant women and the evidence on the effects of price on birth outcomes to predict that a $1.10 federal tax increase proposed in the late 1990s would have reduced the probability of a low birth-weight birth by approximately five percent.

Earmarked Tobacco Taxes and Other Tobacco Control Program Funding

As noted above, several state have increased cigarette and other tobacco product taxes at least in part because of the public health benefits of the reduced tobacco use that results from them. Beginning with California, many went further by earmarking some of the revenues generated from these taxes to fund comprehensive tobacco control programs. More recently, a

number of states have allocated some of the payments they receive from tobacco companies under the MSA or other settlements to fund tobacco control efforts.

In addition to state funding for tobacco control, a variety of national programs that provide funding to states have been implemented since the early 1990s. These include: coalition-based efforts such as the National Cancer Institute's American Stop Smoking Intervention Study (ASSIST) that funded 17 states from 1993 to 1999 and the Robert Wood Johnson Foundation's SmokeLess States program which funded nearly all states at some point between 1994 and 2005; state health-department based programs such as the CDC's Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT) program that funded the non-ASSIST states (except for California) in the 1990s in its successor, the National Tobacco Control Program that has funded all states since the end of the ASSIST and IMPACT programs; and other efforts funded by the Substance Abuse and Mental Health Services Foundation, the American Legacy Foundation, and others.

Based largely on the experiences in the first few states to fund comprehensive programs, CDC developed its *Best Practices for Comprehensive Tobacco Control Programs* in 1999. These programs support a variety of activities, including community and school-based prevention and cessation programs, counter-marketing campaigns, Quitlines and other cessation support, efforts to enforce state and local tobacco control policies, and surveillance and evaluation. More details on some of the key activities included in these programs and the impact of these activities on tobacco use and its consequences are provided in other chapters contained in this volume. In addition to outlining the key components of a comprehensive program, CDC provided estimates of the funding levels needed to support a comprehensive program (lower and upper estimates) for all states.

As with state tobacco taxes, there is considerable variation both across states and within states over time in the level of funding that has been provided for these programs (American Heart Association, et al., 2006). This is illustrated in Figure Eight which shows the level of state funding relative to CDC's 1999 estimate of the minimum needed for a comprehensive program in each state. While a few states have sustained funding for several years at or close to the CDC's minimum estimated level, most states have fallen well short. Even in states where these programs have been demonstrated to reduce tobacco use and its consequences (e.g. Florida and Massachusetts), funding has been cut sharply in response to budgetary pressures. Figure Nine illustrates the trend in recent state allocations to comprehensive tobacco control programs relative to the minimum estimates developed by CDC, adjusted over time for inflation and population growth. As seen in the figure, funding peaked at about 42 percent of the CDC minimum in state fiscal years 2001 and 2002, but fell to just over half that level by fiscal year 2006.

[Figure Nine about here]

A few recent studies assess the impact of state funding for tobacco control efforts on youth and adult smoking behavior. Farrelly and his colleagues (2003) find that increased funding for these programs is effective in reducing overall cigarette consumption and estimate that if states, starting in 1994, had funded at the minimum levels recommended by CDC, the rate of decline in cigarette consumption from 1994 through 2000 would have been doubled. Tauras and his colleagues (2005) reach similar conclusions for youth smoking prevalence. They find that youth smoking prevalence is significantly lower in states that provide more funding for comprehensive tobacco control programs, and estimate that youth prevalence would have been

between 3.3 and 13.5 percent lower in the 1990s had states funded programs at the CDC recommended minimum during this period.

III. Smoke-Free Air Policies

State and local governments have restricted smoking in a variety of places for a number of years. The earliest of these policies typically limited smoking in limited venues (e.g. theaters or food preparation areas) and were intended to prevent fires or food contamination. As evidence emerged about the health consequences of smoking, including limited evidence on the consequences of exposure of non-smokers to tobacco smoke first reported by the Surgeon General in his 1972 report (US Department of Health, Education, and Welfare (USDHEW), 1972), new policies were adopted with the intent of protecting non-smokers. The earliest of these state policies was the 1973 law in Arizona which limited smoking in a number of places. In 1974, Connecticut became the first state to restrict smoking in restaurants, while Minnesota, in 1975, became the first to do so in private worksites. In 1977, Berkeley California adopted the first local restrictions on smoking in restaurants and other public places. Over the next few years, a growing number of state and local governments adopted increasingly strong restrictions.

Given the success of Berkeley's local ordinance and the adoption of comparable ordinances in other California communities, legislative efforts were undertaken and ballot initiatives proposed that would enact statewide restrictions on smoking. Somewhat surprisingly, given that it has been at the forefront of other tobacco control efforts (e.g. higher taxes and funding for comprehensive tobacco control programs), California voters twice rejected ballot initiatives (for Proposition 5 in 1978 and for Proposition 10 in 1980) and the legislature rejected similar measures. The failure at the state level led to increased momentum for strong local

policies, resulting in the adoption of ordinances restricting smoking in San Francisco, Los Angeles, Sacramento, San Diego and many other California communities in the early 1980s.

The success at the local level in California and the lack of action (or adoption of relatively weak policies) at the state level led to similar local efforts across the United States. These "grassroots" efforts were supported by a variety of organizations, including Americans for Nonsmokers' Rights, the Group Against Smoking Pollution, the American Lung Association, the American Heart Association, and the American Cancer Society. Efforts to mobilize support for local ordinances included intensive public education efforts and the ordinances that resulted typically went as far in restricting smoking as public sentiment allowed (USDHHS, 2006). In some states, the spread of local ordinances led to the enactment of state policies limiting smoking; in some states, however, these state policies included provisions pre-empting communities from adoption ordinances that imposed more extensive restrictions than contained in the state policy.

Momentum for these policies increased significantly with the release of the 1986 Surgeon General's report *The Health Consequences of Involuntary Smoking*, which concluded that exposure to tobacco smoke caused diseases, including lung cancer, and that children of smoking parents were at increased risk of respiratory diseases (USDHHS, 1986). In addition, the report found that simple separation of smokers and nonsmokers might reduce, but did not eliminate, the risks from exposure. This report prompted new federal regulations banning smoking on domestic flights of two hours or less and, eventually, virtually all domestic flights (in 1990) and on all international flights departing from or arriving in the US (in 2000). Similarly, it spurred state and local government to strengthen existing policies and to adopt new policies, including

complete bans on smoking in some venues (e.g. health care facilities). In addition, it led numerous private companies to adopt policies governing smoking in their workplaces.

As evidence grew about the health consequences of exposure to tobacco smoke, state and local policies became stronger and stronger. The 1997 release of the California Environmental Protection Agency's report on the health consequences of exposure (California EPA, 1997) was followed in 1998 by California's law banning smoking in bars without separately ventilated smoking areas. In 2002, New York City made history by banning smoking in bars, restaurants, and virtually all other workplaces beginning in July 2003, while Florida voters overwhelmingly supported a ballot initiative that, with some exceptions (most notably bars), did the same. By 2003, every state and thousands of localities had adopted policies limiting or banning smoking in a variety of locales. The growth in and strengthening of these state policies is illustrated in Figure Ten.

[Figure Ten about here]

Most recently, the 2006 Surgeon General's report *The Health Consequences of Involuntary Exposure to Tobacco Smoke* (USDHHS, 2006) stimulated further action, leading a growing number of states and communities to adopt comprehensive bans on cigarette smoking in virtually all public places and private worksites, as well as some outdoor spaces (e.g. sports stadiums and public parks). As of mid-2007, 23 states, Washington DC, and hundreds of communities have adopted comprehensive smoke-free air policies banning smoking in some combination of restaurants, bars, and/or private worksites, while similar measures are pending in a number of other jurisdictions (American Nonsmokers' Rights Foundation (ANRF), 2007). The growth in these comprehensive policies since 1990 is illustrated in Figure Eleven.

[Figure 11 about here]

These comprehensive state policies (including those scheduled to take effect in the future), along with comparable local policies, currently apply to well over half of the US population. Further limits on smoking are being considered, including extending the policies to a wide variety of outdoor spaces and prohibiting smoking in private cars when children are present. In addition, as awareness of the health consequences of exposure to tobacco smoke grew and as public and private policies were implemented and strengthened, a growing number of households, including those of smokers, have adopted rules governing smoking in the home. By 2002, about two-thirds of US households had smoke-free home rules in place (USDHHS, 2006).

In general, research suggests that these policies are self-enforcing and that compliance is high within a short time after their implementation (e.g. Jacobson and Wasserman, 1997, 1999; Borland, et al., 2006). As a result, these policies are highly effective in reducing non-smokers' exposure to tobacco smoke (Task Force on Community Preventive Services, 2001, 2005; USDHHS, 2006). Somewhat surprisingly perhaps, most smokers residing in communities where smoking is banned in restaurants indicate that they support such bans (Borland, et al., 2006). For example, in one recent survey, 83 percent of Irish smokers indicated that the comprehensive smoking ban implemented in Ireland in March 2004 was a good or very good policy (Fong, et al., 2006).

In addition to protecting non-smokers from exposure to tobacco smoke, these policies are effective in reducing cigarette smoking, both by encouraging adult smokers to quit smoking and preventing youth from initiating smoking. These reductions result, in part, from the strengthening of social norms against smoking that follows the adoption of these policies, as well as from limiting opportunities for smoking and raising the "costs" of smoking (e.g. the inconvenience of or discomfort associated with smoking outdoors). Comprehensive reviews of

the research evidence on the impact of smoke-free workplace policies by the National Cancer Institute (2000), the Task Force on Community Preventive Services (2001, 2005) and the Surgeon General (USDHHS, 2006) find that these policies are effective in inducing some smokers to quit smoking and in reducing the number of cigarettes consumed by some smokers who continue to smoke.

Likewise, among youth and young adults, these policies are associated with stronger perceptions of the risks from smoking and lower perceived smoking prevalence among adults. These factors and the increased "costs" of smoking associated with the policies help explain the consistent findings from a growing number of studies showing that comprehensive smoke-free air policies are effective in reducing youth smoking prevalence, initiation, and uptake (Task Force on Community Preventive Services, 2005; USDHHS, 2006).

The associations between state smoke-free air policies and adult and youth smoking prevalence are illustrated in Figures Twelve and Thirteen, respectively. While these simple graphs do not control for the other factors that affect smoking prevalence, or for the potential reverse causality between prevalence and state policies, they are consistent with the extensive and growing body of research that does take these into account. Both figures use an index developed by the ImpacTeen project reflecting the number of places covered by state smoke-free air policies and the extent of the restrictions on these places (ranging from no restrictions to a complete ban).

[Figure Twelve about here]

[Figure Thirteen about here]

IV. Policies Limiting Youth Access to Tobacco Products

State and local policies aggressively targeting youth access to tobacco are a relatively recent phenomenon. While some policies had been in place since the late 19th century, and most states had such policies by 1990, compliance with these policies was quite low. A widely cited 1990 report by the Office of the Inspector General found that while 44 states prohibited the sale of cigarettes to minors, there was almost no enforcement of these policies and, as a result, minors could easily purchase cigarettes. In response to this report and some evidence on the effectiveness of strong, well-enforced and highly complied with local policies (e.g. Jason, et al., 1991), as well as the success of the 1984 federal policy requiring states to raise the minimum legal purchase age for alcoholic beverages to 21 years, the 1992 federal Synar amendment was adopted, requiring that states adopt policies addressing the sale of tobacco products to minors (persons under 18 years of age) and that they demonstrate compliance with these policies. The compliance standards that were eventually set by regulation were not overly restrictive, requiring states to conduct periodic compliance checks and to show that fewer than 20 percent of tobacco retailers violated the state policies. States that failed to meet this standard would lose a portion of their federal block grant funding.

In response to the Synar amendment, states adopted a variety of new policies and strengthened existing policies governing youth access to tobacco products. The growth over time in these policies is illustrated in Figure Fourteen. The "score" in this figure reflects the average of state scores for their policies governing youth access to tobacco products, accounting for state pre-emption of stronger local policies, with higher scores reflecting more comprehensive policies (as described in Alciati, et al., 1998). Unlike the smoke-free air policies discussed above, compliance with these policies required substantial enforcement efforts (Jacobson and Wasserman, 1997).

[Figure Fourteen about here]

A similar emphasis on limiting the sale of tobacco products to youth was included in the 1996 Food and Drug Administration's (FDA) *Regulations Restricting the Sale and Distribution of Cigarettes and Smokeless Tobacco to Protect Children and Adolescents*. The FDA rules called for aggressive enforcement of underage sales policies, requiring vendors to check photo identification from anyone under 27 years of age. With funding from FDA, a national compliance check program was implemented. However, this came to an end when the US Supreme Court ruled in 2000 that the FDA did not have the authority to regulate tobacco products or their sale.

As a result of these efforts, non-compliance among tobacco product vendors fell over time. By 2005, nearly all states met the standard set by the Synar amendment; only Kansas (38 percent violation rate) and the District of Columbia (20.5 percent violation rate) were below this threshold and the median non-compliance rate was 11.5 percent (Substance Abuse and Mental Health Services Administration (SAMHSA), 2006b).

The focus on tobacco product vendors prompted some backlash among retailers who felt unfairly singled out and pushed for policies that would hold youth accountable for attempting to purchase tobacco products (Lantz, et al., 2000). Despite opposition to these policies from many in the tobacco control community, many state and local governments adopted policies that targeted the purchase, possession, and/or use of tobacco products by minors (Wakefield and Giovino, 2003). By 2005, 45 states had adopted policies targeting at least one of the three "PPU" laws, with over one-third of states adopting all three. The growth in these policies at the state level is illustrated in Figure Fifteen.

[Figure Fifteen]

Despite the emphasis over the past decade on policies targeting minors' access to and/or possession and use of tobacco products, and on the enforcement of at least some of these policies, the evidence on their impact on youth tobacco use is mixed, at best (Task Force on Community Preventive Services, 2005; Levy, et al., 2004; Rigotti, 2001). In general, there is consistent evidence that policies targeting the sale of tobacco products to minors and their enforcement are effective in raising retailer compliance. However, the same is not the case for studies that look at the impact of these policies, and the enforcement of and compliance with these policies, on youth smoking. Some studies find that higher compliance rates are effective in reducing youth smoking (e.g. Ross, et al., 2006), while others find that there is no impact of the policies or their implementation on youth smoking behavior (e.g. Rigotti, et al., 1997).

As many have observed, even relatively high compliance rates imply that many retailers are non-compliant and remain a source of tobacco products for minors. Given recent compliance rates, for example, Chaloupka and his colleagues (in press) estimate that 24,000 tobacco retailers still sell to minors. In addition, as compliance rates have increased, youth have increasingly turned to other sources for cigarettes, including older friends and siblings, parents, and strangers (Fichtenberg and Glantx, 2002). Given this mixed evidence, it is not surprising that there appears to be little association between these policies and youth smoking prevalence, as illustrated in Figure Sixteen. This figure shows the simple associations between the index reflecting the state policies governing minors' access to tobacco products described above and state-level estimates of youth smoking prevalence.

[Figure Sixteen about here]

In contrast to the number of studies that have been done on the impact of the sales to minors policies, there have been virtually no published studies on the effects of the policies

targeting minors' purchase, possession and/or use, nor is there any evidence that these policies are being actively enforced (Wakefield and Giovino, 2003). Given this absence of evidence, Wakefield and Giovino (2003) provide several reasons for why these policies are unlikely to have a significant impact on youth smoking prevalence, including the difficulty of detecting violations, the diversion of attention from effective policies, and the reinforcing of the notion that tobacco use is an adult behavior. Figure Seventeen, which illustrates the simple association between the number of PPU policies at the state level and state-level youth smoking prevalence is consistent with these arguments. As seen in this figure, there appears to be no impact of these policies on youth smoking. Clearly, however, more rigorous research is needed to demonstrate what, if any, effects these policies have on youth smoking initiation and uptake.

[Figure Seventeen]

V. Policies Limiting Tobacco Company Marketing

In contrast to the considerable activity at the state and local levels over the past two decades on the policies discussed above, there have been relatively few efforts to limit tobacco company marketing activities, with most of these at the federal level. As described elsewhere in this volume, there is growing evidence that tobacco company marketing activities influence youth smoking initiation and uptake and can deter cessation among adult smokers. Efforts to regulate these marketing activities are constrained by the constitutional protection of free speech, although court decisions have made it clear that commercial speech is not as protected as other forms of speech (Slade, 2001).

At the federal level, the most significant constraint on tobacco industry marketing is the ban on cigarette advertising on television and radio, implemented in 1971 as a result of the Public Health Cigarette Smoking Act of 1969, and eventual extensions banning broadcast

advertising of other tobacco products. The FDA rules discussed above included a number of additional restrictions on outdoor and magazine advertising and distribution of tobacco company branded promotional items, but these provisions were never implemented given the Supreme Court's decision that FDA did not have regulatory authority over tobacco products.

State and local governments have adopted relatively few limits on tobacco company marketing practices. Of those that have been implemented, most address the placement or location of advertising (e.g. within a specified distance of schools or on public transit), while others address the placement of tobacco products within retail outlets (e.g. prohibiting self-service displays). Efforts to go further have been unsuccessful; for example, in 2001 the US Supreme Court struck down Massachusetts' policy which had effectively banned most outdoor advertising as a violation of the First Amendment.

The Master Settlement Agreement between the states and leading cigarette companies, however, did result in a variety of new restrictions on tobacco industry marketing that have been implemented in recent years. These include: a ban on billboard, transit, and most other outdoor advertising; limits on tobacco company brand name sponsorships; prohibition of the use of cartoon characters in advertising and on packaging; a ban on the distribution of branded merchandise; restrictions on sponsorship; targeting of minors; and more.

Despite the restrictions on marketing, cigarette company marketing expenditures have increased rapidly over the past decade, continuing an upward trend that began in the mid-1970s. Figure Eighteen illustrates the growth in inflation adjusted cigarette marketing expenditures per pack from 1975 through 2003, using the data reported annually by the Federal Trade Commission (FTC, 2005). This figure groups marketing expenditures into two basic categories – image-oriented (including print, outdoor, point-of-sale, sponsorships, and other image-related

advertising expenditures) and price-related (including coupons, promotional allowances, retail value added promotions, and other price-related promotional spending).

[Figure Eighteen about here]

As is clear from the figure, the restrictions on marketing contained in the MSA have done little to slow the growth of cigarette marketing. Per pack marketing expenditures adjusted for inflation more than doubled in the years immediately following the MSA. Researchers have shown that the MSA restrictions on various marketing activities led to increases in other marketing efforts. For example, Wakefield and her colleagues (2002) show that advertising and promotion at the point-of-sale increased sharply after the 1999 implementation of the MSA's ban on billboard advertising, while Pierce and Gilpin (2004) and Loomis and his colleagues (2006) document the significant rise in spending on retail value added promotions (e.g. buy-one-get-one-free promotions and gifts with cigarette purchases) and other price-related marketing following the MSA.

As illustrated in Figure Eighteen, increases in price-related marketing account for the growth in overall cigarette company marketing expenditures in recent years. This continues a trend that began in the early/mid-1980s; over time, the relative importance of image-oriented advertising in overall cigarette company marketing has gone down, while that of more price-oriented marketing has risen sharply. This shift in emphasis coincides with the early economic research on the effects of cigarette price on youth, young adult, and adult smoking discussed above (Chaloupka, 2004).

There is growing evidence that at least some of the tobacco company marketing activities reflect efforts to offset the impact of state and local tobacco control policies. Keeler and his colleagues, for example, find that cigarette companies price discriminate by state; that is, they

charge lower prices in states with stronger state and local tobacco control policies than in other states, all else constant. Similarly, Slater and her colleagues (2001) find that the use of point-of-sale promotions is greater in states with comprehensive tobacco control program funding, while Loomis and his colleagues observe more of these promotions in following the MSA as well as in response to state cigarette tax increases. Chaloupka and his colleagues (2002) provide evidence from internal tobacco company documents that confirms the increased use of various marketing strategies in order to dampen the effects of state cigarette tax increases.

These findings help explain the mixed results obtained from studies that have examined the impact of marketing restrictions on cigarette smoking. Early research on the effects of the broadcast advertising ban, for example, generally concluded that the net impact of the ban was to increase cigarette consumption since the effective anti-smoking ads that were being broadcast under the Federal Communication Commission's Fairness Doctrine in the years leading up to the ban were virtually eliminated as well (e.g. Schneider, et al., 1981). More recently, Keeler and his colleagues (2004) estimate that the increases in cigarette company marketing expenditures following the marketing restrictions and price increases resulting from the MSA offset as much as 57 percent of the decline in smoking caused by the MSA-induced price increases. Likewise, Pierce and his colleagues (2005) find that the increased use of price-reducing promotions partially offsets the impact of cigarette tax and price increases on youth smoking initiation.

Saffer (2000) nicely describes why these types of partial restrictions on cigarette company marketing are unlikely to be effective in reducing smoking, noting that bans on a few marketing activities will have little impact as cigarette companies shift spending from the banned activities to other marketing efforts. Saffer goes on to argue that marketing restrictions need to be comprehensive before they will produce significant declines in smoking. Saffer and

Chaloupka's (2000) analysis of advertising bans in OECD countries is consistent with this argument. They find that limited advertising bans – those that ban some types of advertising, but not others – have little or no impact on cigarette smoking, but estimate that comprehensive advertising bans can reduce overall cigarette consumption by as much as eight percent.

VI. Opposition to Tobacco Control Policies

Over the past few decades, the growing evidence on the health consequences of smoking and exposure to tobacco smoke, the addictive properties of nicotine, the extent of smoking uptake among youth, and the effectiveness of tobacco control policies has changed the focus of the debate over these policies. Tobacco companies and other opponents of these policies can no longer convincingly argue that cigarette smoking does not cause disease, that non-smokers are not harmed by exposure to tobacco smoke, or that these policies are ineffective in reducing smoking. Most arguments used in opposition to tobacco control policies in recent years have instead focused on the economic impact of these policies, including their effects on government revenues, businesses, and the poor, as well as their role in creating a black market in tobacco products. As with the earlier arguments that raised confusion about the effects of smoking on health, the arguments about the adverse economic impact of tobacco control policies are misleading, overstated, or false (Jha and Chaloupka, 1999, 2000; Warner, 2000). This section briefly reviews these arguments and the evidence on them.

Impact of Tobacco Control Policies on Revenues

One frequently made claim is that higher cigarette taxes and other tobacco control policies will lead to sharp reductions in governments' tobacco-related revenues (e.g. those from tobacco excise taxes and settlement payments). While there is some truth to this argument in the long run, it is clear that an increase in tobacco taxes will increase revenues in the short to

medium term, even when combined with other policies aimed at reducing tobacco use. As tobacco use falls over time, revenues will gradually decline, but it will be many years before they fall below their pre-tax-increase level.

With respect to the effects of cigarette tax increases on revenues, the relatively low share of cigarette taxes in cigarette prices (state taxes account for about one-fourth of price in recent years, on average) and the less than proportionate reduction in sales in response to a price increase (recall the estimates discussed above that consumption falls between 2.5 and five percent in response to a ten percent price increase) implies that a cigarette tax increase will lead to an increase in cigarette tax revenues. Farrelly and his colleagues (2003) confirmed this in their analysis of state cigarette tax increases in the 1990s. The found that every state increase in cigarette taxes of ten cents or more per pack resulted in increased revenues, despite the reductions in cigarette sales caused by the tax increase. The positive relationship between cigarette taxes and cigarette tax revenues is illustrated in Figure Nineteen which shows the inflation adjusted, average combined state and federal tax and tax revenues from 1975 through 2005.

[Figure Nineteen about here]

Over time, inflation will erode the value of the cigarette tax and related revenues, unless the tax is increased often enough to keep pace with inflation. Similarly, as cigarette smoking declines in response to other tobacco control efforts, revenues from the tax will also decline, unless the tax is increased periodically. Nevertheless, tax revenues will remain higher many years after a significant tax increase than they were before, even in the wake of a considerable decline in smoking. California may be the best example of this, given its tax increases in 1989 (from 10 to 35 cents), 1994 (from 35 to 37 cents), and 1999 (from 37 to 87 cents), its sustained

comprehensive tobacco control program funded by earmarked revenues from the 1989 tax increase, and its increasingly comprehensive smoke-free air policies. In the last full fiscal year before the 1989 tax increase, California's gross cigarette tax revenues were just over one-quarter of a billion dollars ($251.6 million); in the most recent fiscal year (FY06), California's gross cigarette tax revenues were over one billion dollars ($1.03). The four-fold increase in revenues occurred despite tax paid cigarette sales falling by more than half.

Impact of Tobacco Control Policies on Business

A second argument commonly used in opposition to stronger tobacco control policies is that these policies will reduce business activity and cause significant job losses. This argument is based on the notion that some involvement of a business with tobacco implies a dependence on tobacco (e.g. that retailers that sell tobacco products or advertising agencies that develop marketing campaigns are financially dependent on the continued use of these products). The reality is that very few tobacco-related jobs are actually dependent on tobacco (most notably tobacco growing and tobacco product manufacturing) and that the economic contribution from tobacco-dependent activities is very small, declining, and concentrated in a few states (Warner, 2000; Liang, et al., 2006).

While significant declines in tobacco use that result from higher taxes, stronger smoke-free air policies, and comprehensive tobacco control program efforts would lead to reductions in employment in and the economic contribution of the tobacco-dependent sectors of the economy, these losses would be more than offset by increased economic activity and employment in other sectors as the money once spent on tobacco is now spent on other goods and services. Warner and Fulton (1994) were the first to carefully study this issue in their analysis of the implications of declining tobacco use on the Michigan economy, a non-tobacco state. Using a sophisticated

macroeconomic simulation model, they looked at the employment and income effects of more rapid reductions in tobacco use in Michigan, assuming that the money no longer spent on tobacco products was spent on other goods and services following the existing consumer spending patterns in Michigan. Their estimates clearly showed that more rapid reductions in tobacco use in Michigan would have a net positive impact on the state's economy – increasing employment and raising incomes - as the money once spent on tobacco products was spent instead on goods and services more likely to be produced in Michigan. In a follow up study that used the same approach to look at the impact on the regional economies of the US, Warner and his colleagues (1996) found the same was true for every region but the tobacco growing/manufacturing region, where there would be modest job losses in response to an acceleration of the downward trend in tobacco use. Under a variety of scenarios, the net effect nationally was an overall increase in jobs.

A more narrowly focused version of this argument has been used in opposition to comprehensive smoke-free air policies. Opponents of these policies argue that bans on smoking in restaurants, bars, and other venues will lead smoking patrons to avoid these establishments or frequent them less often. Consequently, they argue, there will be reductions in business activity and employment, and some businesses will be forced to close in the sectors affected by the smoke-free policies. Over the past ten-plus years, there have been numerous studies that have looked at this issue, using data on sales tax revenues, employment, and/or business openings and closings in relevant sectors. The best of these studies include data before and after policies are implemented in communities, as well as from comparable communities that have not adopted similar policies. These studies consistently show that there is no negative economic impact, and often a small positive effect, of strong local smoke-free air policies on the businesses affected by

the policies (see Scollo, et al. (2003) and the 2006 Surgeon General's report (USDHHS, 2006) for comprehensive reviews of these studies). Proponents of this argument fail to account for the increased patronage of non-smokers that follows comprehensive smoke-free air policies and greatly overstate any declines from reduced patronage by smokers.

Impact of Tobacco Control Policies on the Poor

The argument that increased tobacco taxes will adversely impact on the poor frequently used in opposition to proposed tax increases and is based on the clear evidence that existing tobacco taxes are regressive (i.e. that those on lower incomes bear a disproportionate share of the tobacco tax burden) (USDHHS, 2000). The regressivity of existing tobacco taxes results, in part, from the greater concentration of smoking among the lowest income populations, one result of which is that these populations also bear a disproportionate share of the burden of disease caused by tobacco (Boback, et al., 2000; Murray, et al., 2006).

The regressivity of existing taxes, however, does not necessarily imply that tax increases are regressive as well. As discussed above, smoking among the lowest income/SES populations is most responsive to price, while smoking among the highest income/SES populations is least responsive (e.g. Farrelly, et al., 2001). Thus, a tax increase that raises cigarette prices will lead to the largest declines in smoking among the lowest income persons, and the burden of tax increase will fall more heavily on higher income consumers whose smoking behavior changes little in response to the tax increase.

It is true, however, that low income smokers who continue to smoke following a tax increase will be adversely affected. To the extent that the new revenues generated by tobacco tax increases are allocated to programs targeting the poor, including tobacco control programs, this concern is at least partially alleviated. For example, several states have earmarked new

tobacco tax revenues for programs that provide cessation products and counseling to low income smokers interested in quitting, while many focus on reducing income-related and other disparities in tobacco use and its consequences. Still others have dedicated new tobacco tax revenues to expansions of Medicaid and other public health programs or used these revenues to avoid cuts in these programs.

Tobacco Taxation and Black Markets

A final argument used in opposition to increased tobacco taxes is that the higher taxes will stimulate significant tax avoidance among smokers and create a black market in tobacco products, resulting in lost tax revenues and fewer public health benefits. While it is true that higher taxes do create greater incentives for tax avoidance and evasion, the extent of the problem has been significantly overstated. In a recent survey of US smokers, about six percent reported making their last cigarette purchase from a lower-tax or untaxed source, including stores on Native American reservations or military bases, Internet and other direct vendors, lower tax jurisdictions, duty free establishments, or street vendors (Hyland, et al., 2006). Others estimate that tax avoidance and evasion accounted for about one-eighth of total cigarette consumption in the early 2000s (Stehr, 2005). Even at these levels, increases in tobacco taxes are effective in reducing cigarette smoking, improving public health, and generating new revenues (Merriman, et al., 2000; Farrelly, et al., 2003).

Moreover, states have employed a variety of strategies in recent years that directly address tax avoidance and evasion and appear to be making progress in reducing the extent of these activities (Chaloupka, et al., in press). Led by Washington State, a growing number of states have used the federal Jenkins Act to obtain customer lists from Internet cigarette vendors, following up with efforts to collect taxes due from state residents buying from these vendors.

Many have adopted legislation that targets Internet and other direct sales, ranging from a complete ban on direct sales to state residents (in New York) to policies that prohibit delivery services from delivering tobacco products from vendors that are not licensed in the state or that are not in compliance with state policies governing direct shipments (in Maine). State Attorneys General have negotiated agreements with major shipping companies (including Federal Express, United Parcel Service, and DHL) that keep them from delivering tobacco products direct to US residents, as well as with major credit card companies and other services (including Visa, MasterCard, Discover, American Express and PayPal) that prohibit their use in buying cigarettes on-line. Similarly, many states have implemented policies that greatly reduce or eliminate the differentials between prices on and off Native American reservations. Some, for example, have negotiated compacts with tribes that impose "tribal taxes" equivalent to state taxes, with most or all of the resulting revenues remaining with the tribe. In an effort to address large scale cigarette smuggling, California adopted a new, high-tech, difficult to counterfeit tax stamp that could be quickly scanned by enforcement agents to determine whether or not taxes had been paid. Coupled with more aggressive enforcement, early experiences suggest that the new stamps have been quite effective in generating new revenue and curbing smuggling (Halper, 2005).

VII. Conclusions

Over the past few decades, many lessons have been learned about the effectiveness of various tobacco control policies in reducing tobacco use. The increased use of cigarette and other tobacco product taxes as a tobacco control tool at the federal, state, and local level, the increasing stringency and comprehensiveness of state and local policies limiting smoking in public places and private worksites, and greater funding for comprehensive tobacco control programs have proven to be highly effective in reducing tobacco use and its consequences.

Other policies, such as those targeting youth and limiting some tobacco company marketing efforts, have had less of an impact, but may be important symbolically.

Early adopters of these policies often took action in the absences of evidence on the impact of these policies. Committed and creative individuals and organizations took the lead in making the theoretical and logical arguments about the effects of higher taxes, strong restrictions on smoking, and other policies on tobacco use and public health. Because of their efforts, numerous natural experiments took place in state and local laboratories across the country, allowing researchers to develop the evidence-base we have today that clearly show the effectiveness of these policies in preventing youth from smoking, encouraging adults to quit smoking, and improving public health.

There is no guarantee, however, that the reductions in tobacco use that have resulted from the adoption and implementation of effective tobacco control policies in the past will be sustained in the future. Recent data on youth and adult cigarette prevalence, for example, suggest that the downward trends of the past decade have flattened and that prevalence may begin to rise in coming years (University of Michigan News Service, 2006; CDC, 2006a). While tobacco product taxes have risen significantly in recent years, failing to raise taxes further can result in inflation eroding the value of these tax increases and contribute to declines in inflation adjusted cigarette prices. As importantly, continued growth in tobacco company marketing activities that reduce the price of cigarettes can offset the impact of higher taxes. The decline in inflation adjusted cigarette over the past couple of years reflects, at least in part, the impact of these increased price promotions and is likely to be one of the major factors contributing to the halting of the declines in youth and adult prevalence. Similarly, the sharp reductions in funding for comprehensive tobacco control programs in many states over the past several years are

almost certainly playing a key part in the recent lack of progress in further reducing smoking prevalence. The impact of these trends has been at least partially offset by the adoption of comprehensive smoke-free air policies covering much of the US population, but further strengthening of these policies is going to be difficult and the benefits of more incremental changes are likely to be smaller than those resulting from the significant expansions that have taken place recently.

Continuing to act on the lessons that have been learned about the effectiveness of tobacco control policies is critical to sustaining the substantial progress that has been made as a result of these policies and in further reducing the death and disease caused by tobacco use.

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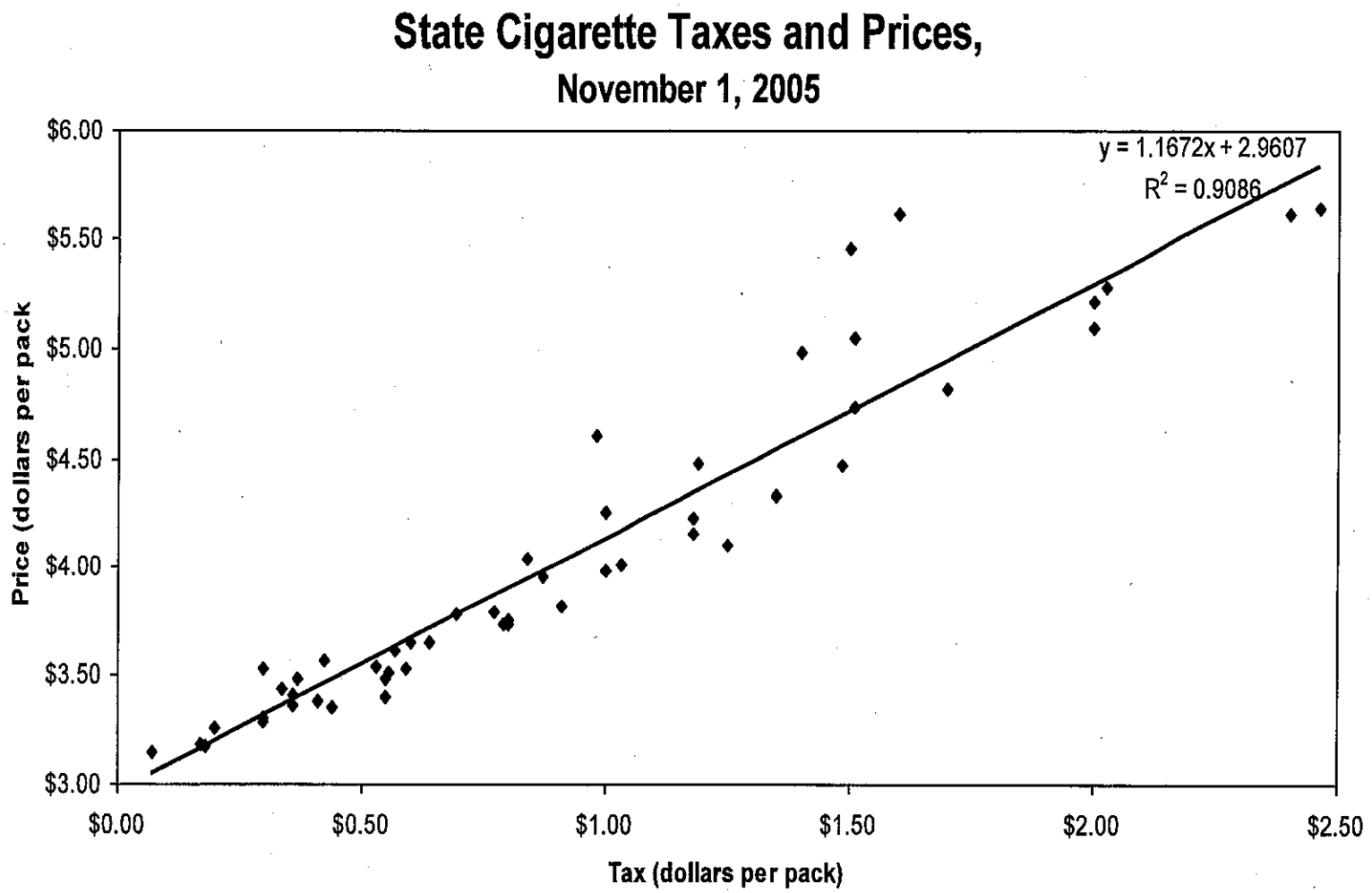
Figure One



Source: Orzechowski and Walker (2006) and authors' calculations.

Figure Two

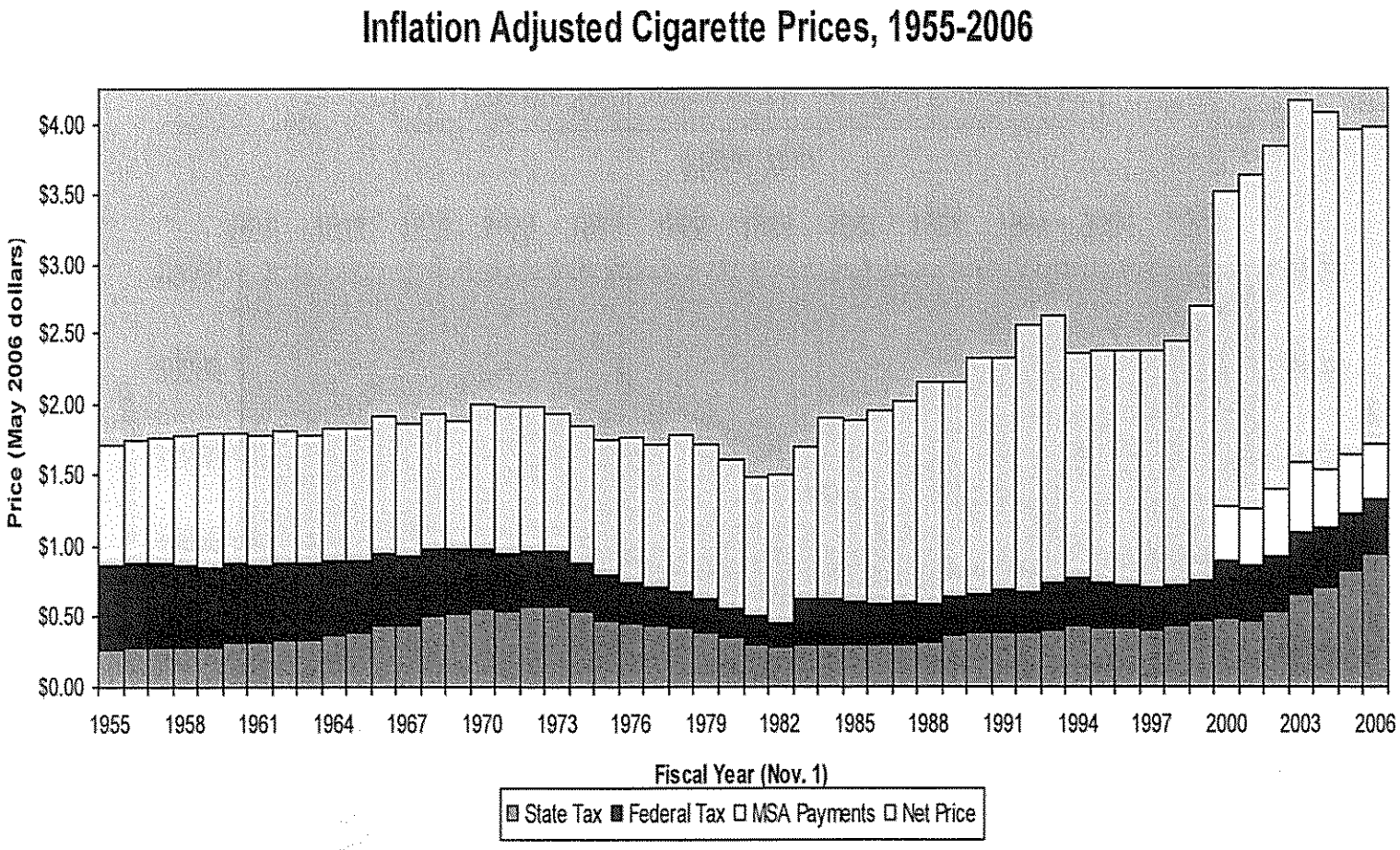


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Figure Three

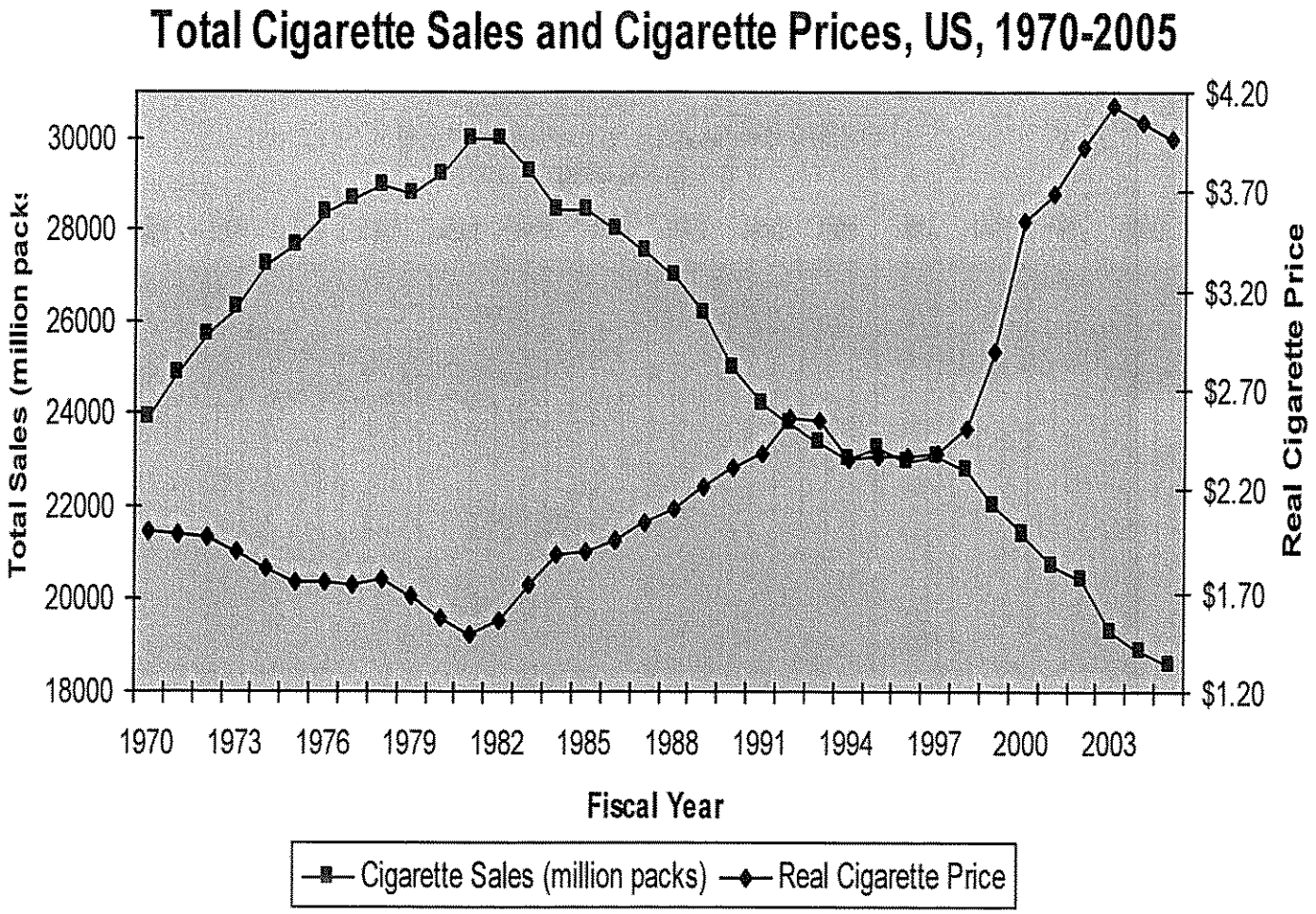

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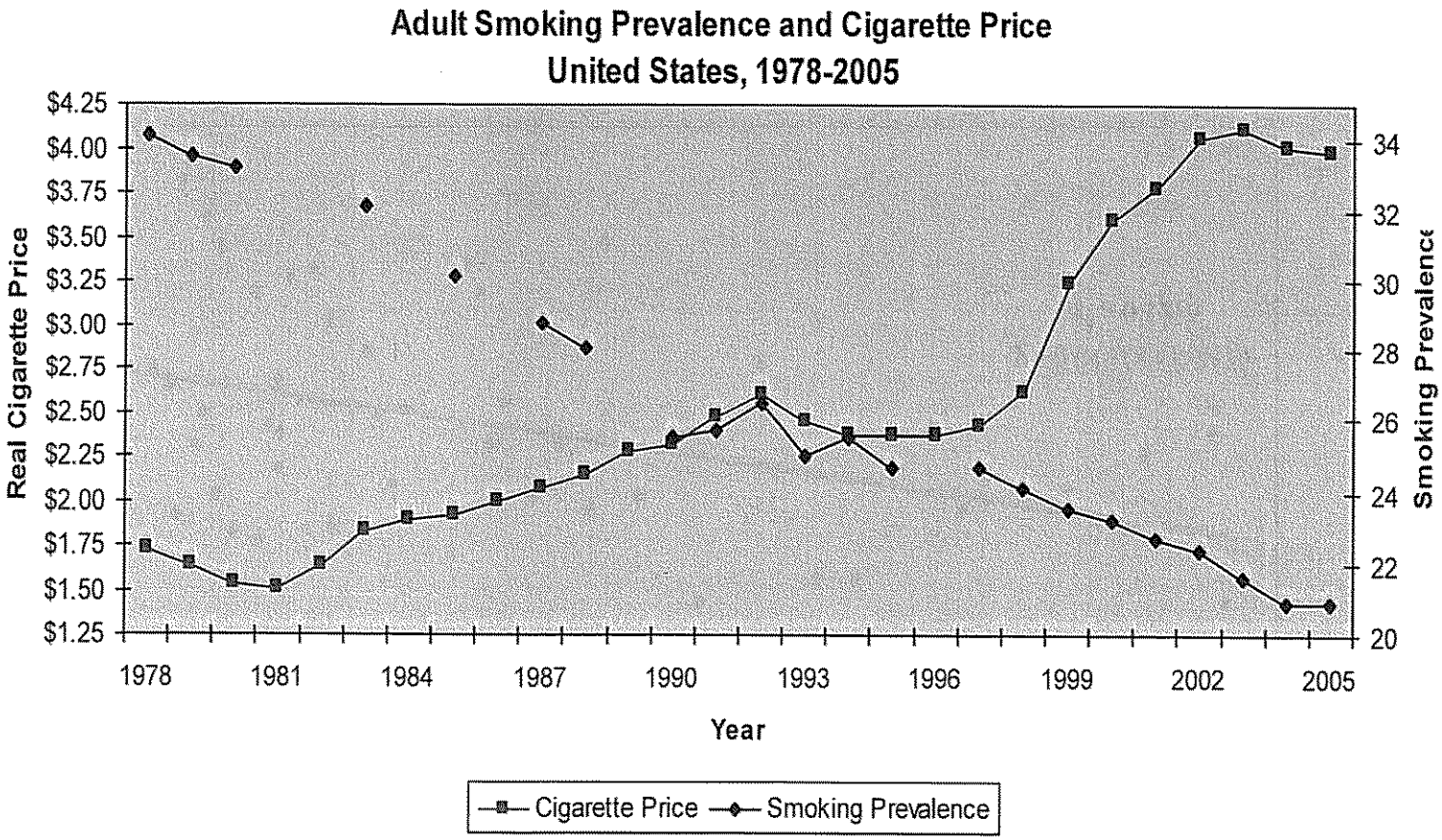
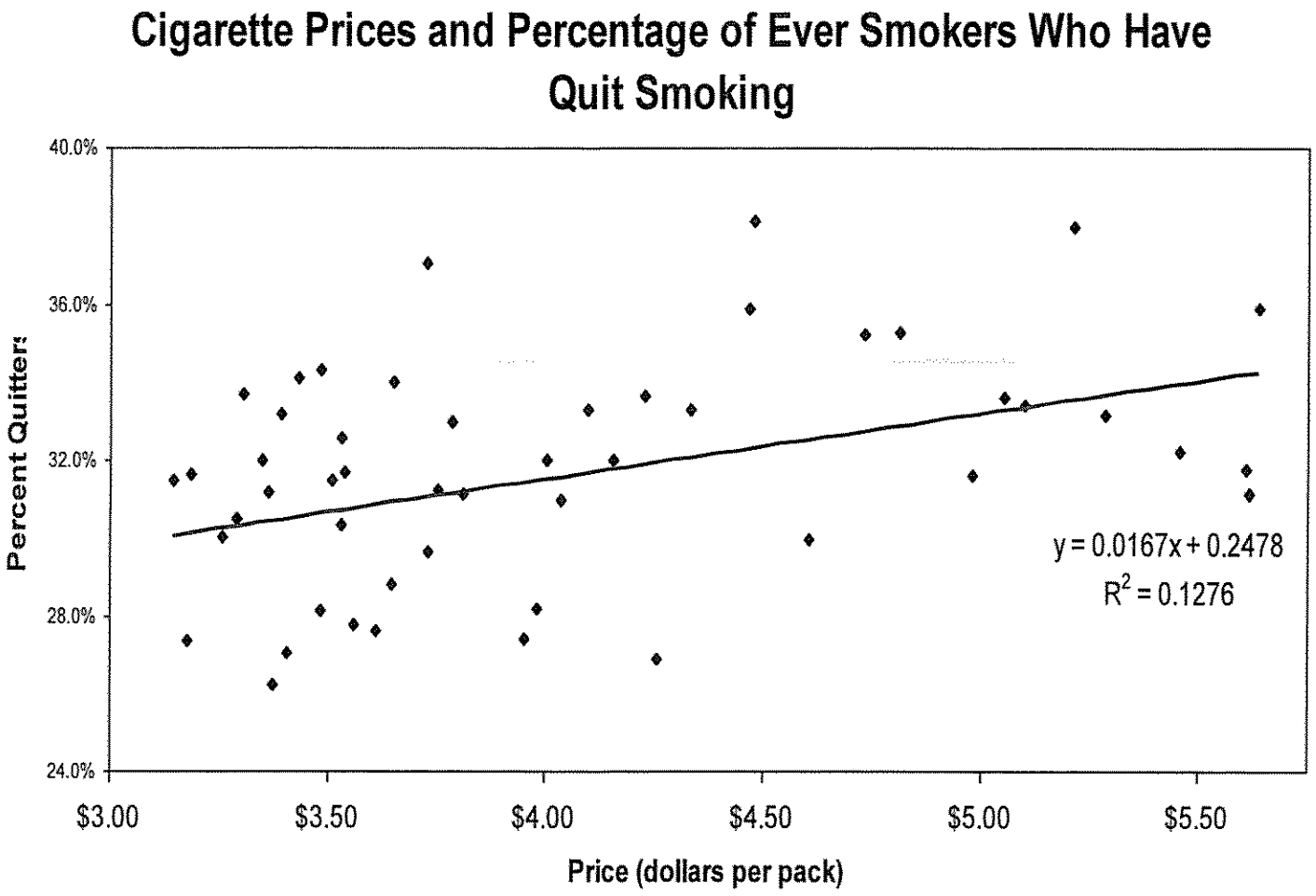
Figure Four



Sources: Centers for Disease Control and Prevention (2005, 2006a), Orzechowski and Walker (2006) and author's calculations.

Figure Five



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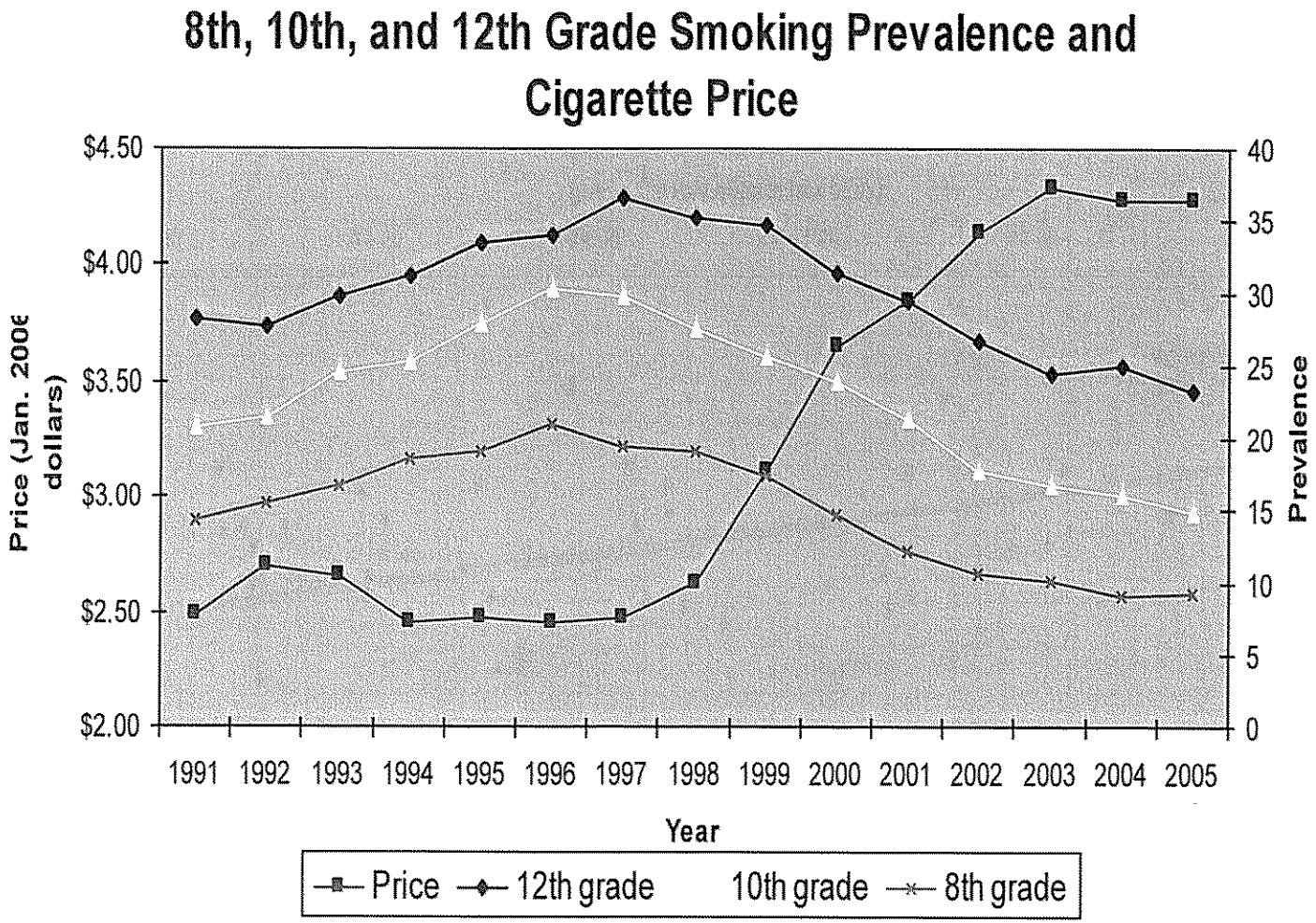
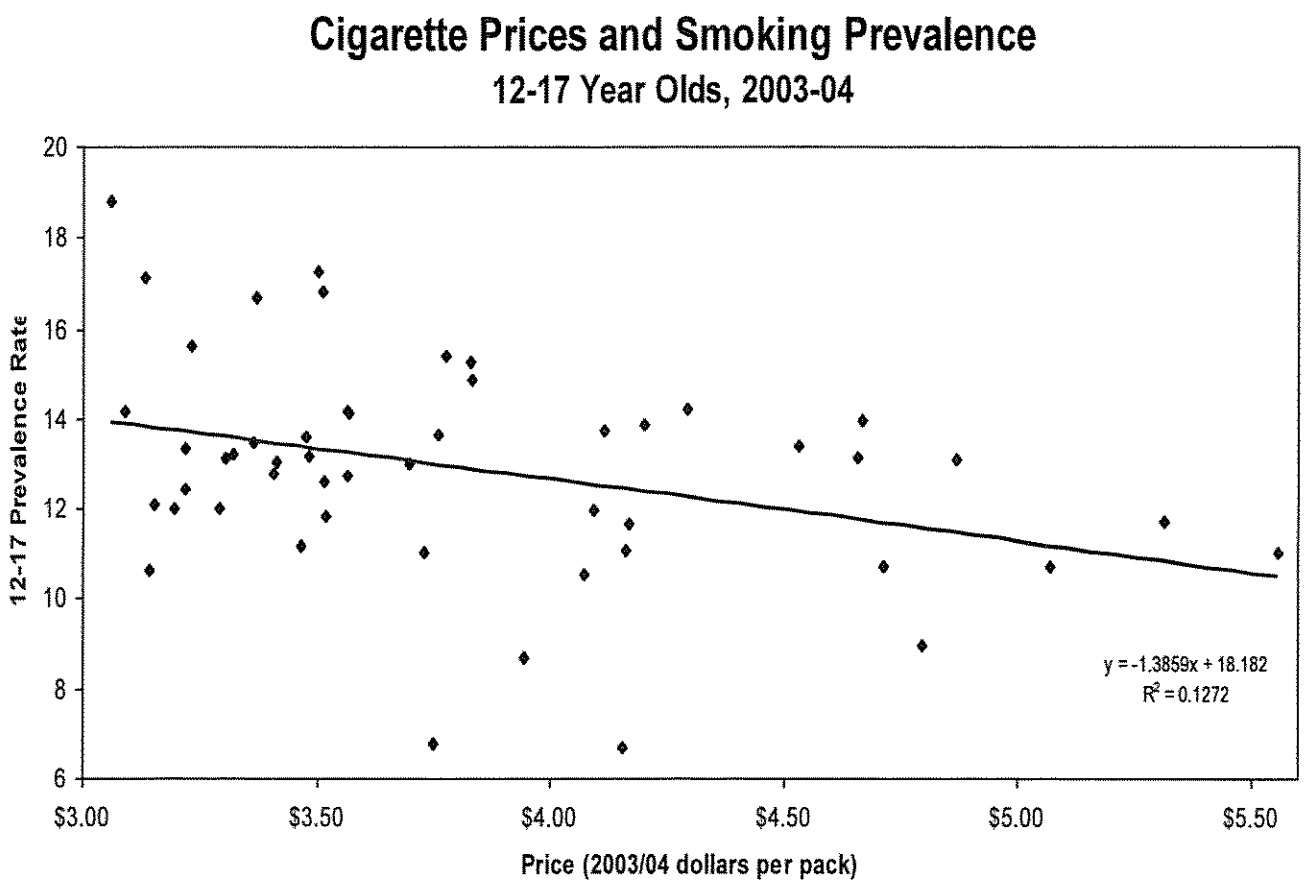


Source: University of Michigan News Service (2006), Orzechowski and Walker (2006) and author's calculations.

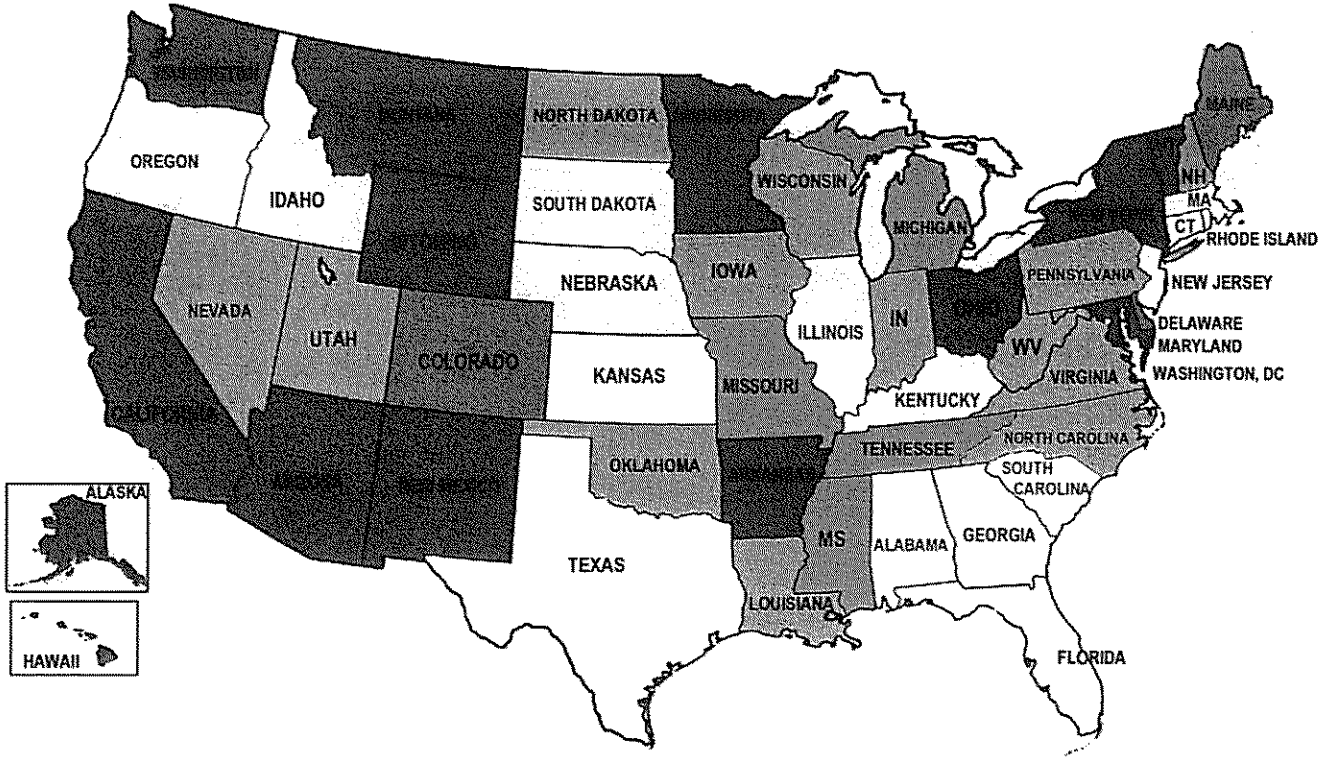
Figure Seven



Source: Substance Abuse and Mental Health Services Administration (2006a), Orzechowski and Walker (2006), and author's calculations.

Figure Eight

Funding for Tobacco Prevention, FY2007

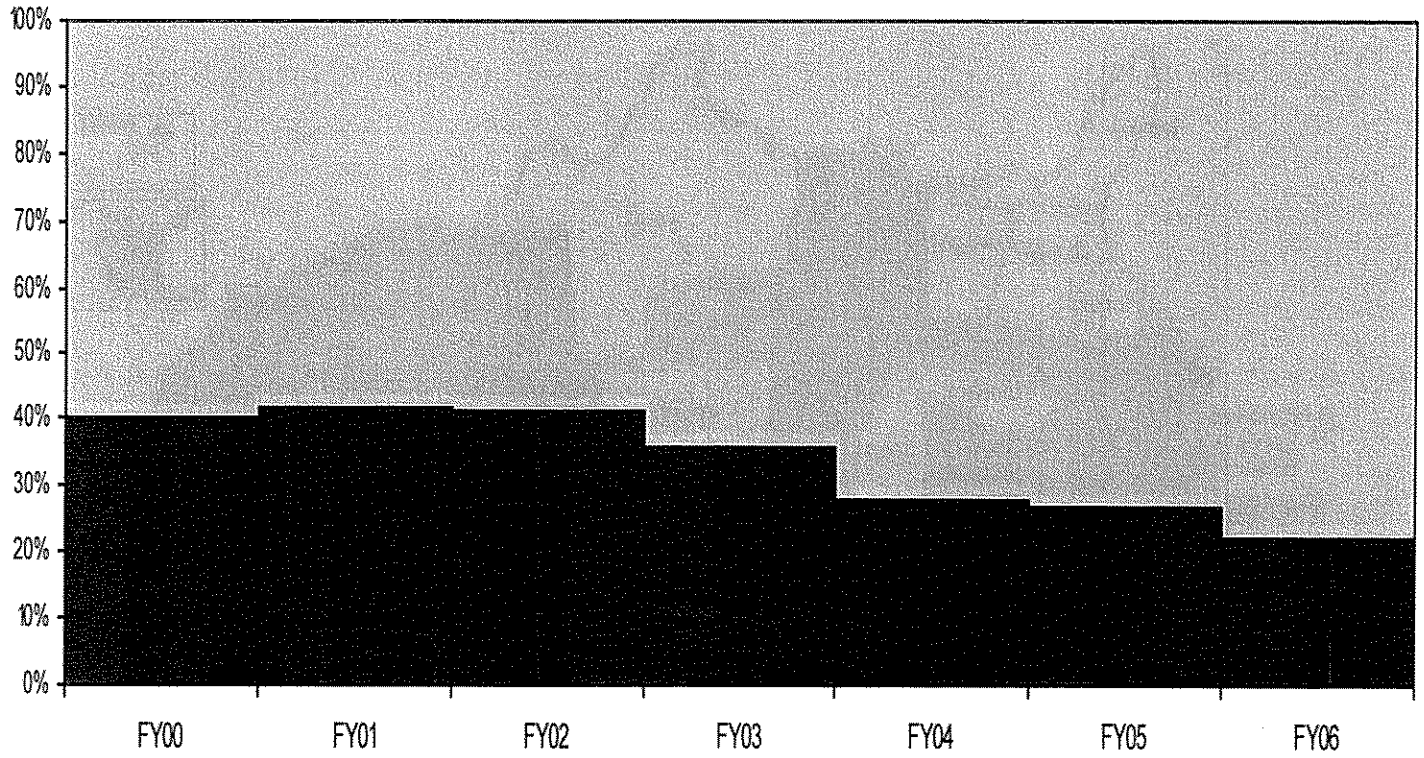


≥ 100% of CDC min.; >50% of CDC min.; 25-50% of CDC min.; <25% of CDC min.; no state funding

Source: American Heart Association, et al. (2006)

Figure Nine

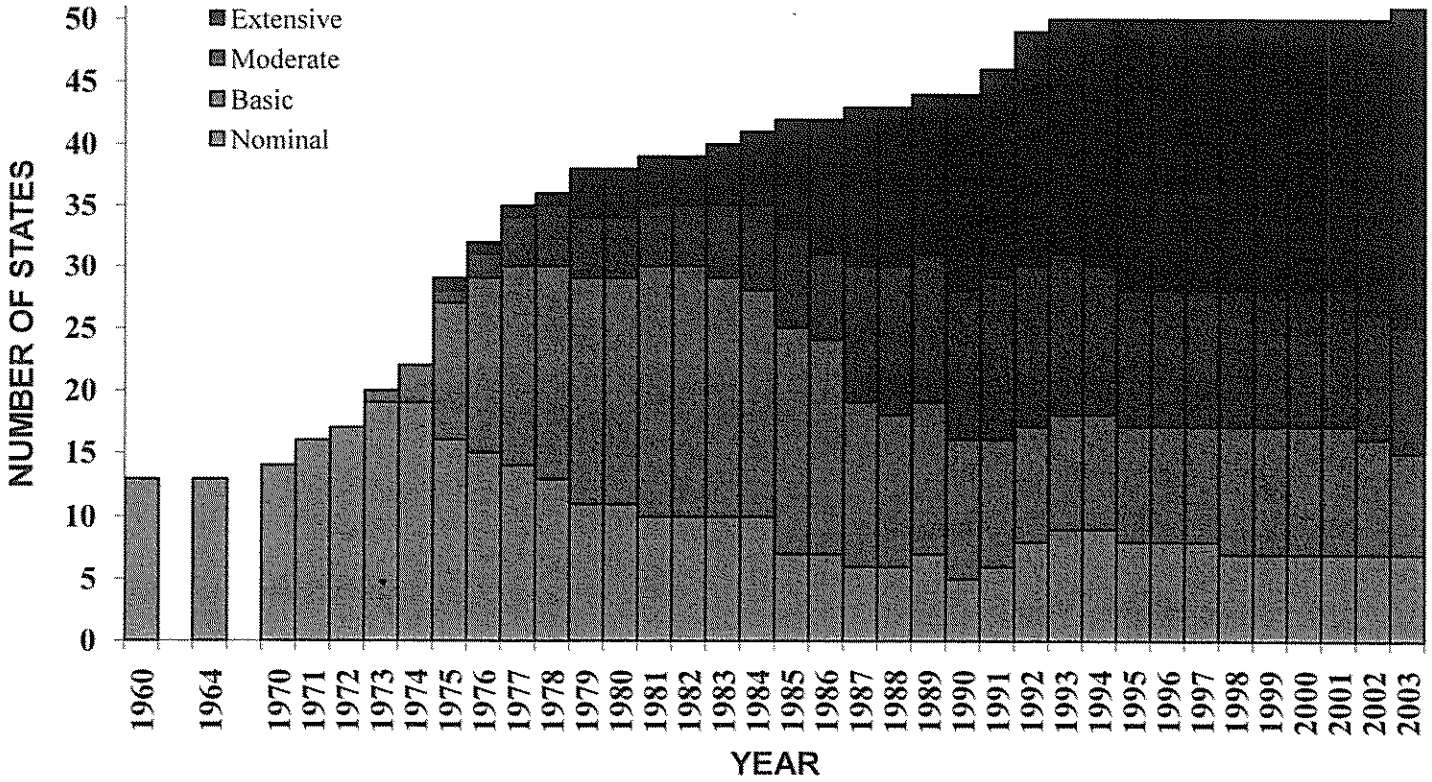
State Tobacco Control Funding as Percentage of CDC Recommended Minimum, FY00-FY06



Sources: American Heart Association, et al. (2006), CDC (1999), and author's calculations.

Figure Ten

Restrictiveness of State Laws Regulating Smoking in Public Places, 1960-2003

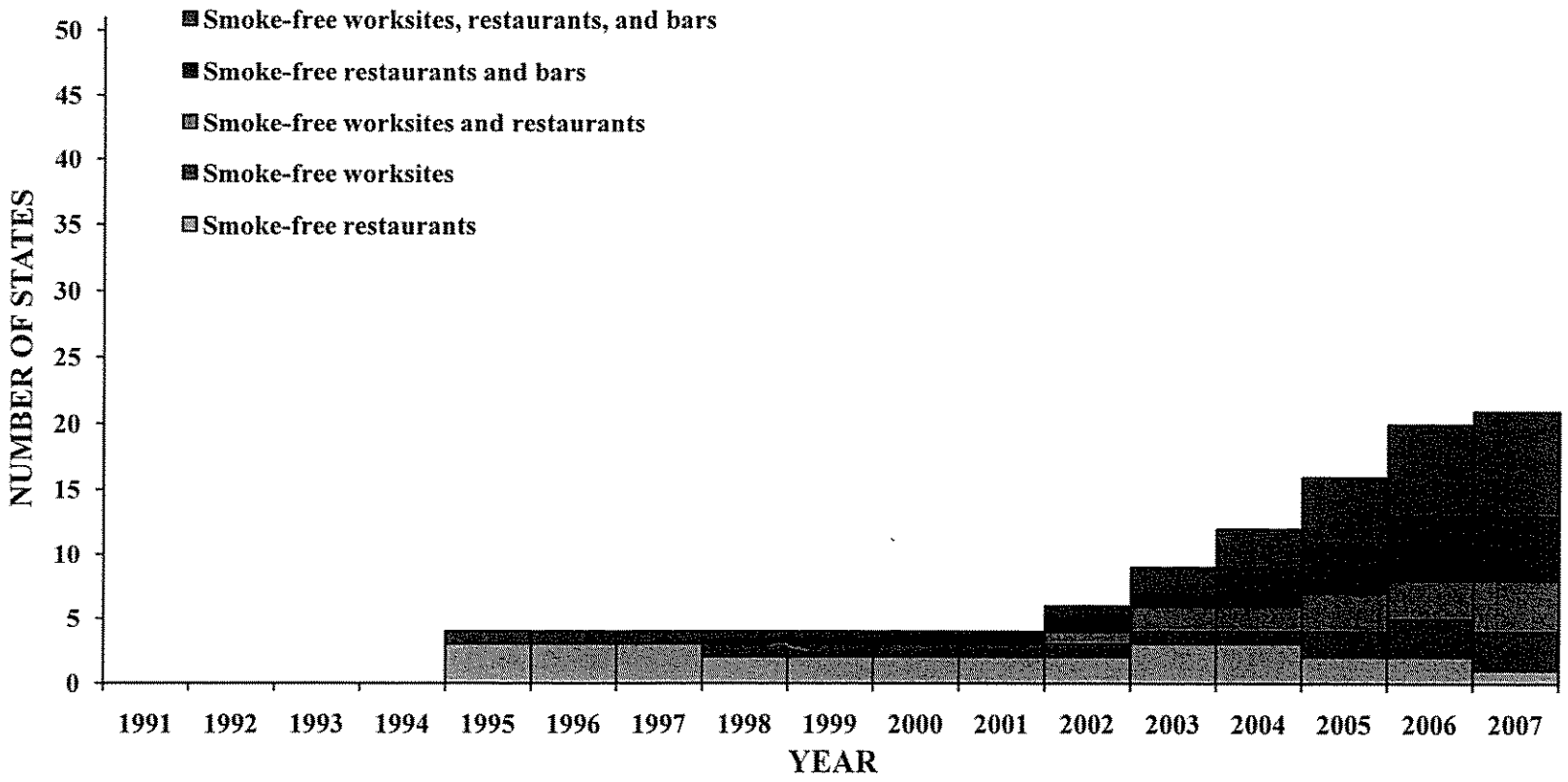


Note: Classification scheme from 1989 Surgeon General's report (USDHHS, 1989) used to define restrictiveness, as follows: nominal – one to three public places, not including restaurants or worksites; basic – four or more public places, not including restaurants or worksites; moderate – regulates smoking in restaurants but not worksites; extensive – regulates smoking in private worksites.

Source: Roswell Park Cancer Institute and the ImpacTeen Project, unpublished data.

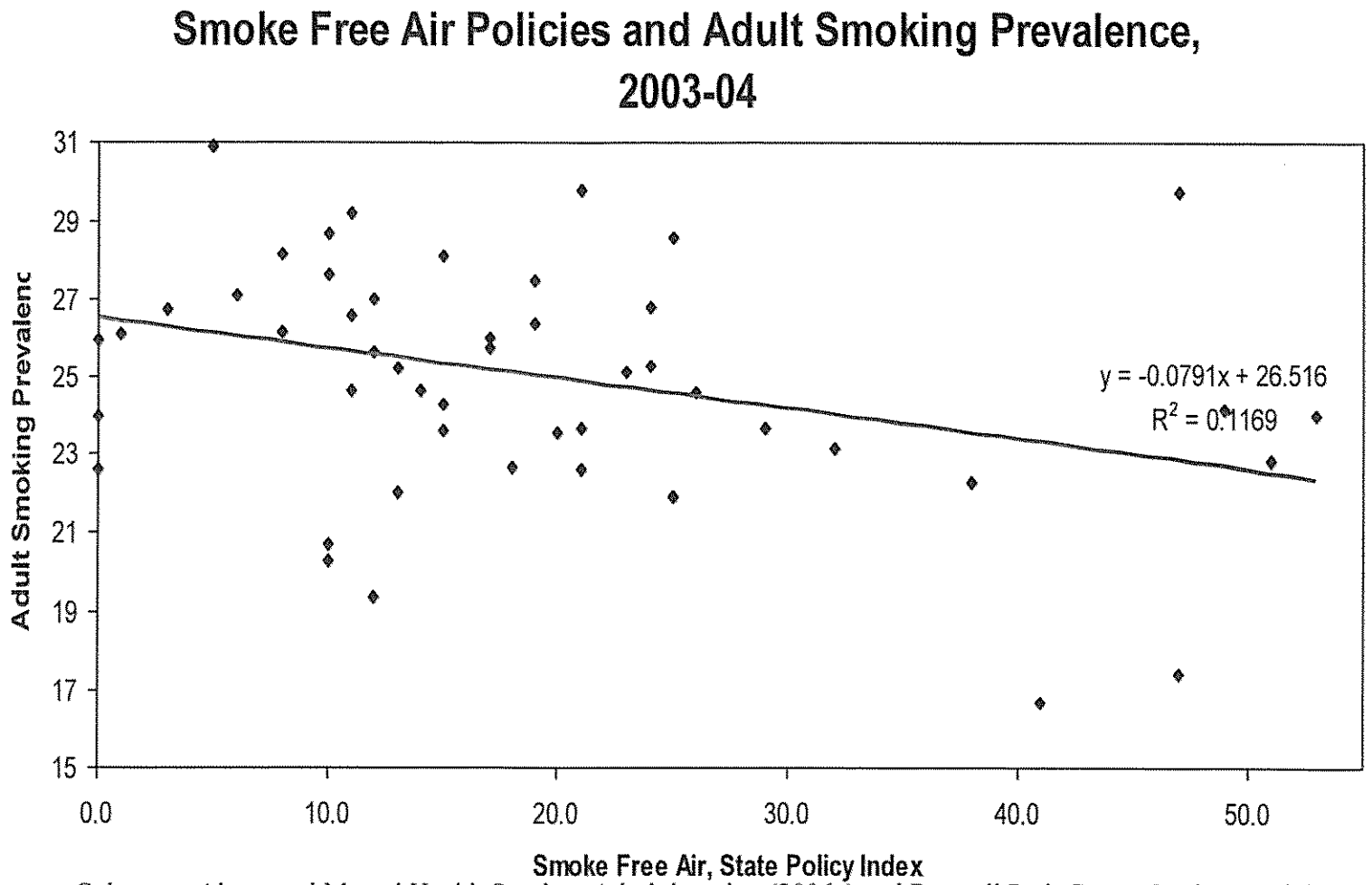
Figure Eleven

Major Smoke-Free Air Legislation in the 50 States and the District of Columbia, 1991-2007



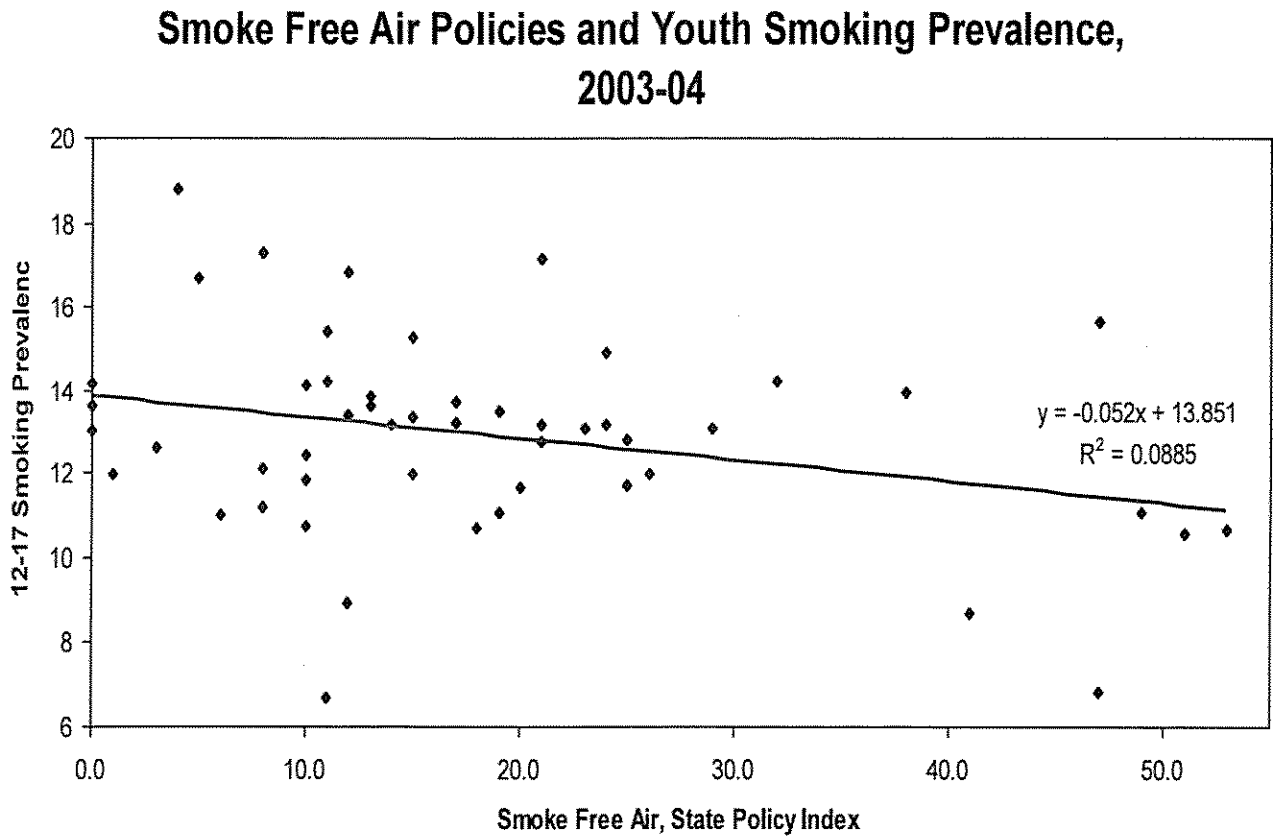
Source: Roswell Park Cancer Institute and the ImpacTeen Project, unpublished data.

Figure Twelve



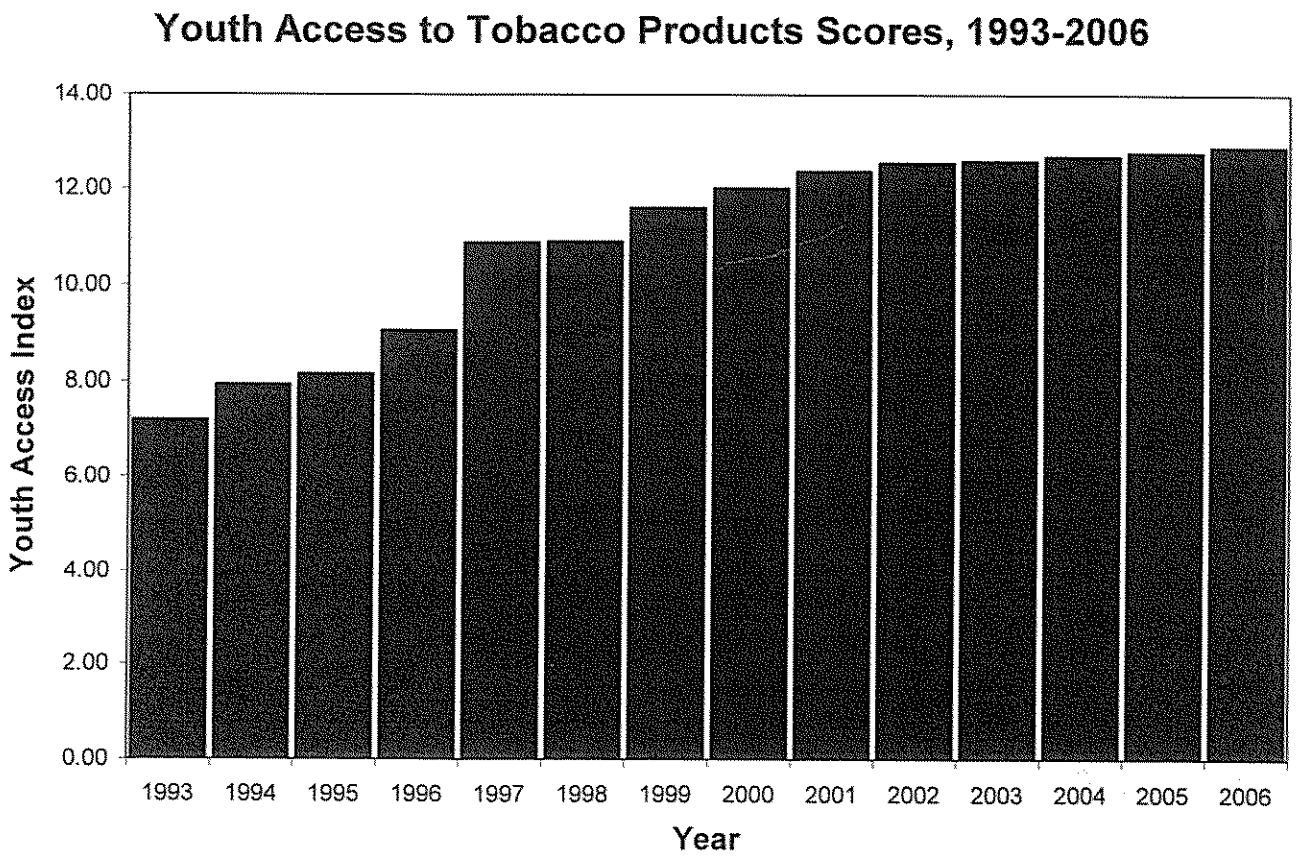
Sources: Substance Abuse and Mental Health Services Administration (2006a) and Roswell Park Cancer Institute and the ImpacTeen project, unpublished data.

Figure Thirteen



Sources: Substance Abuse and Mental Health Services Administration (2006a) and Roswell Park Cancer Institute and the ImpacTeen project, unpublished data.

Figure Fourteen

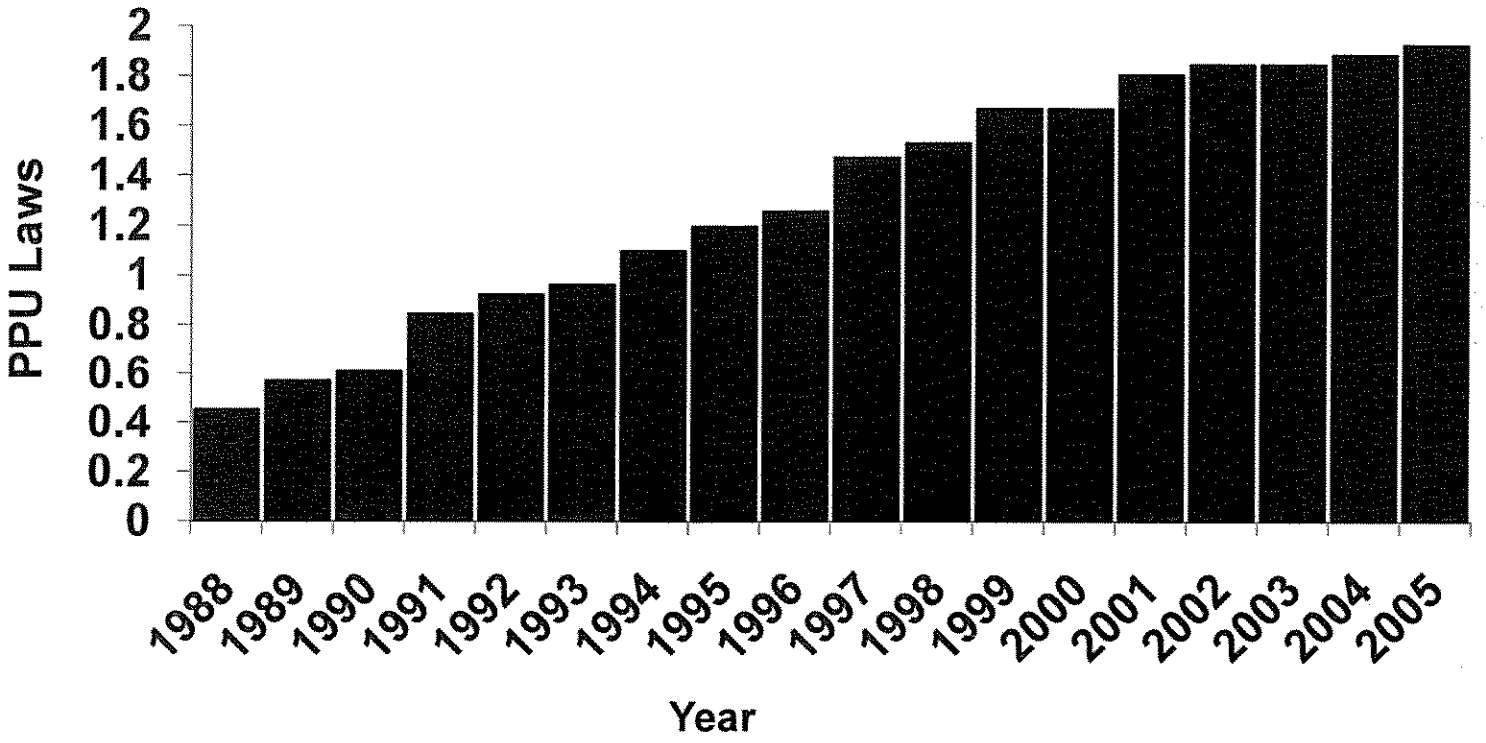


Note: Bars depict the simple average of state scores for the NCI State Cancer Legislative Database Youth Access to Tobacco total score, including pre-emption.

Source: National Cancer Institute (2007).

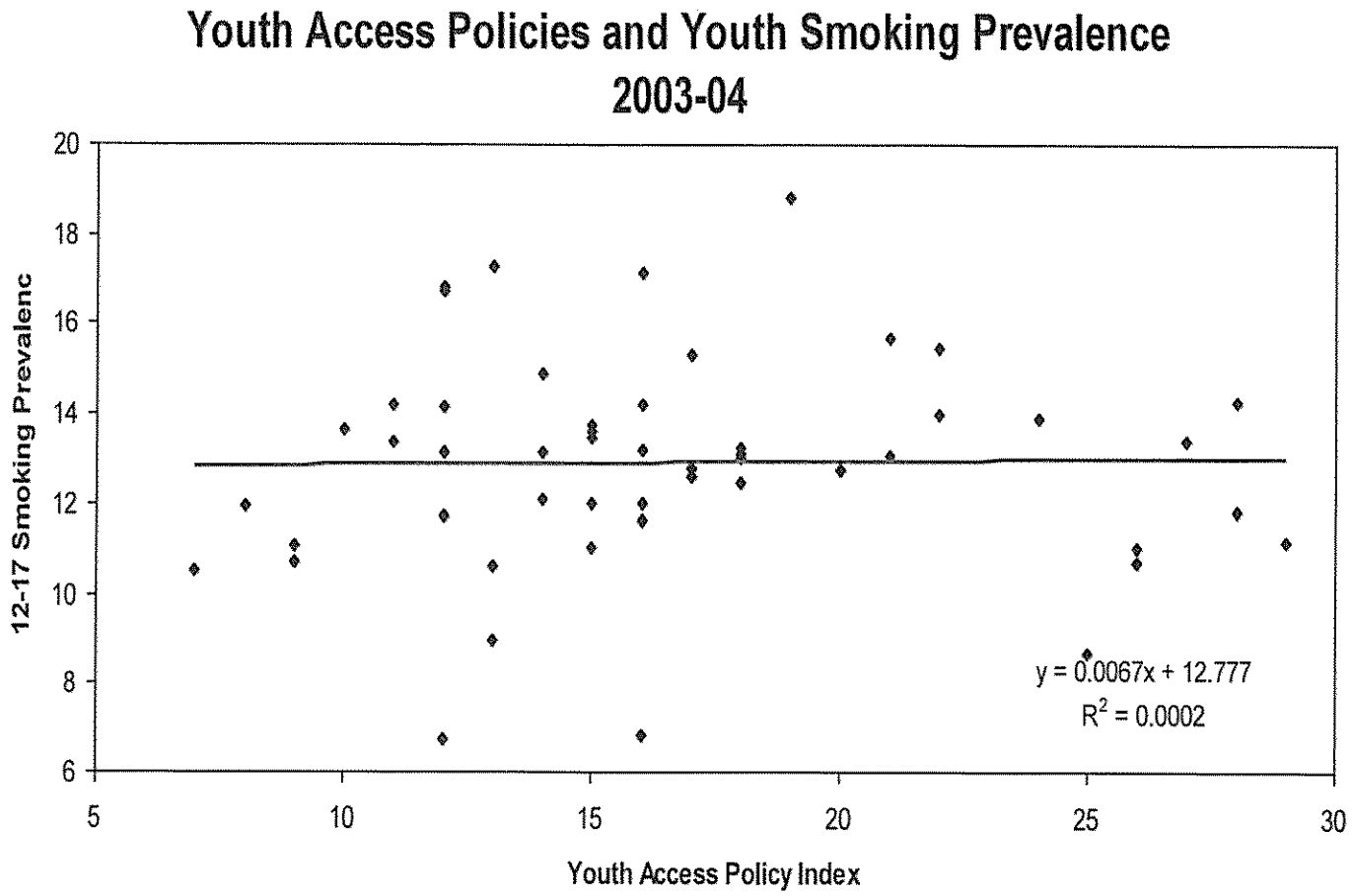
Figure Fifteen

Mean Number of State Purchase, Possession and Use Laws, per State, 1988-2005



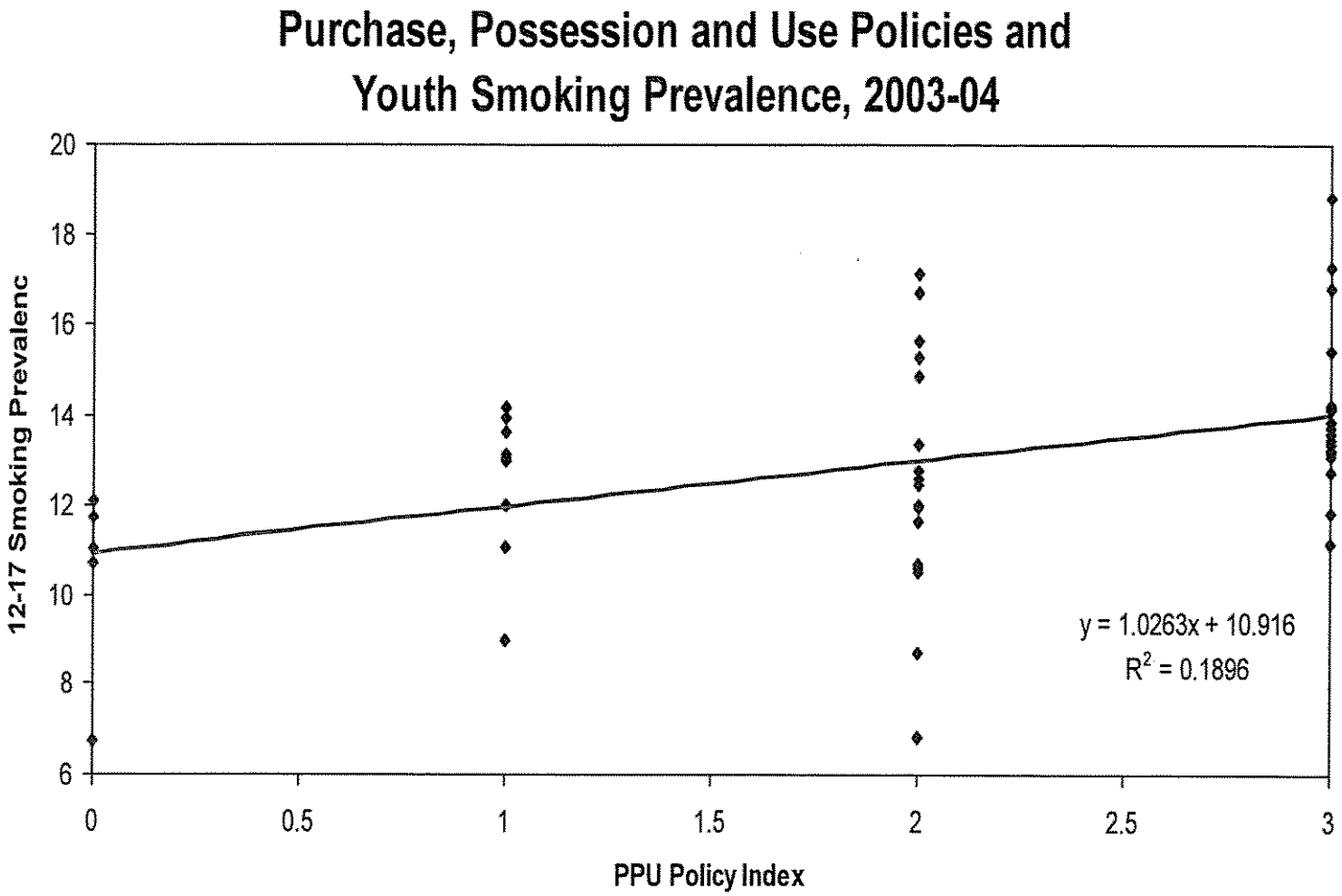
Source: Roswell Park Cancer Institute and the ImpacTeen Project, unpublished data.

Figure Sixteen



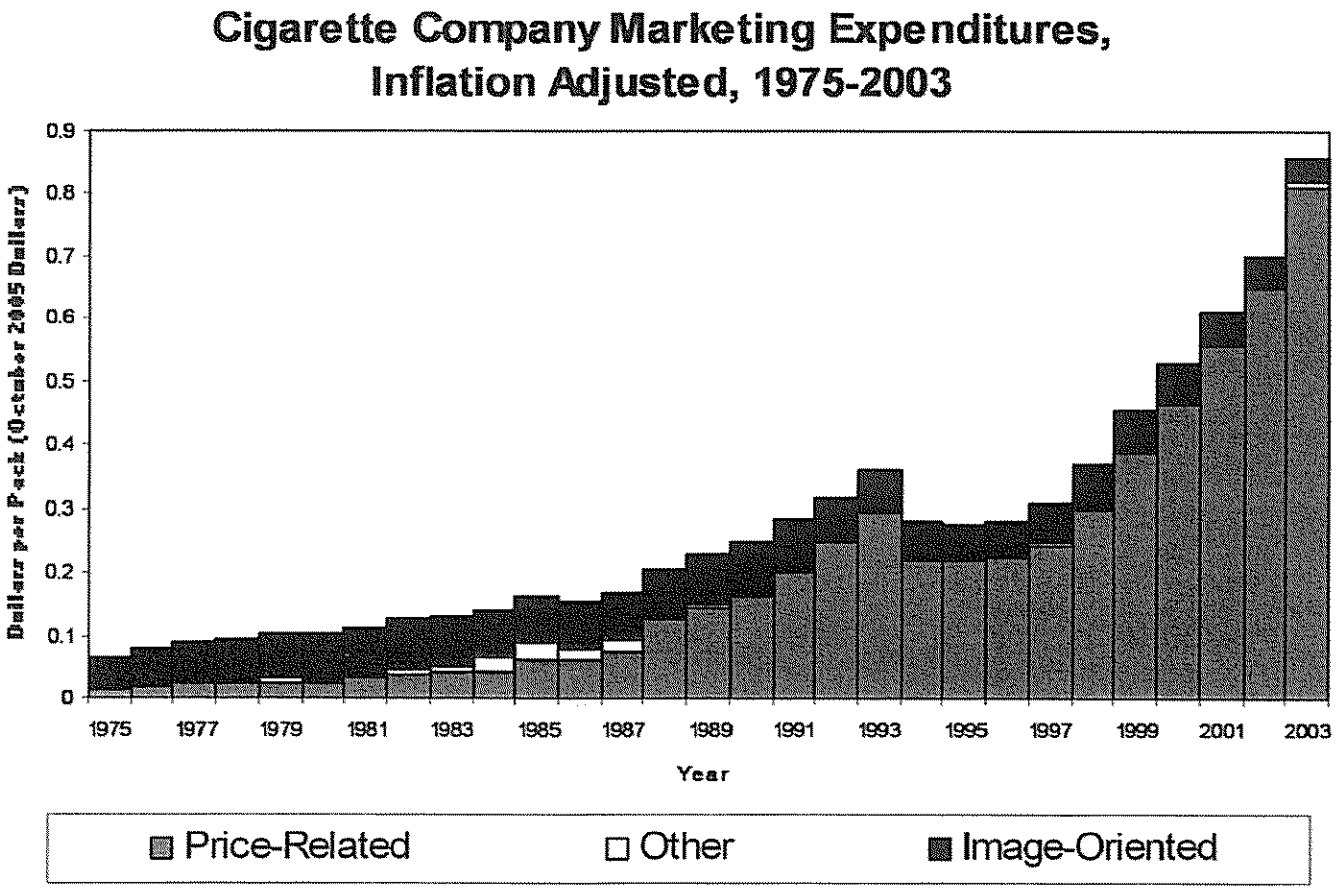
Sources: Substance Abuse and Mental Health Services Administration (2006a), National Cancer Institute (2007), and author's calculations.

Figure Seventeen



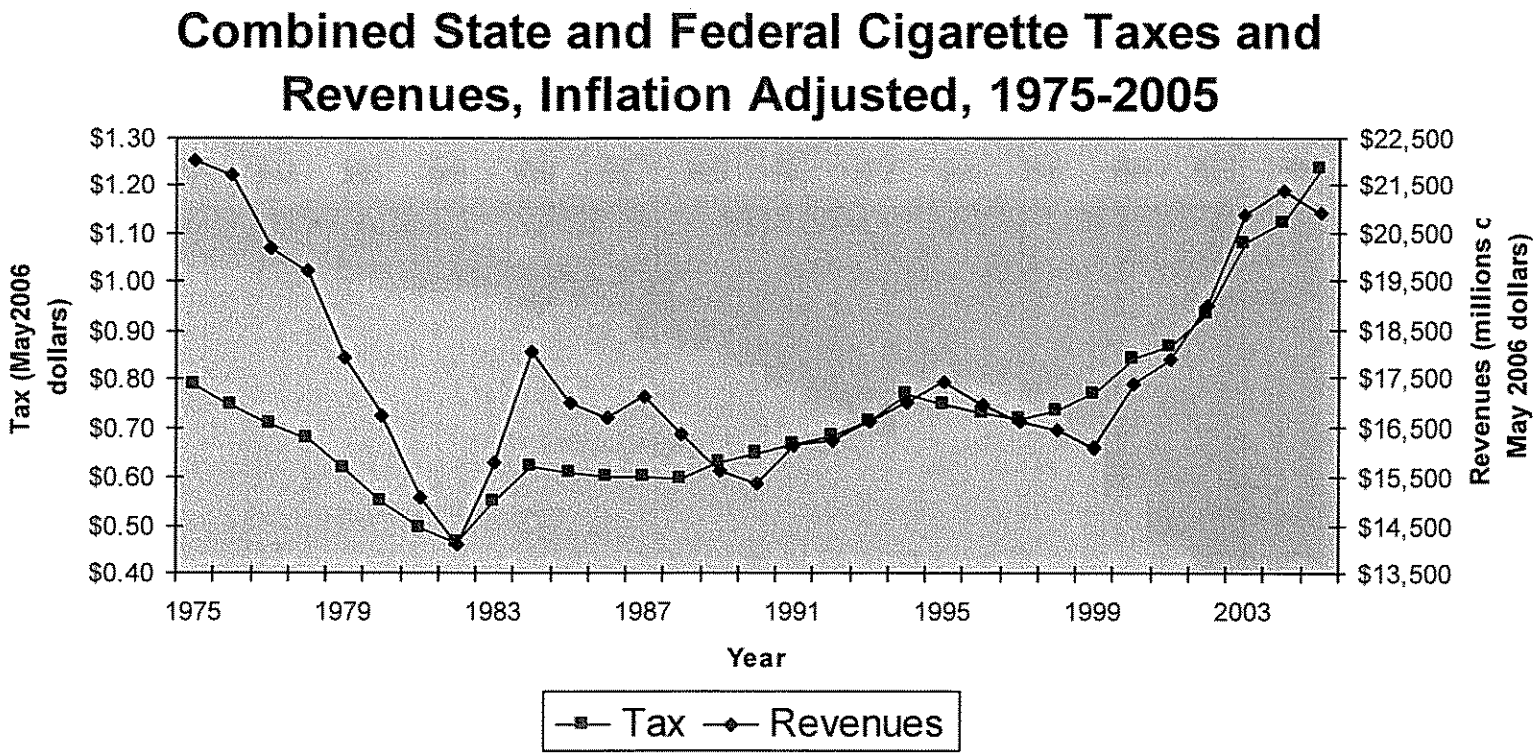
Sources: Substance Abuse and Mental Health Services Administration (2006a) and Roswell Park Cancer Institute and the ImpacTeen project, unpublished data.

Figure Eighteen



Source: Federal Trade Commission (2005) and author's calculations.

Figure Nineteen



Source: Orzechowski and Walker (2006) and author's calculations.

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Nicotine & Tobacco Research Advance Access published December 21, 2011

Original Investigation

Use of Price-Minimizing Strategies by Smokers and Their Effects on Subsequent Smoking Behaviors

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Received June 15, 2011; accepted November 17, 2011

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Abstract

Introduction: Use of cigarette price-minimizing strategies may reduce the effectiveness of cigarette excise taxes on the prevalence of smoking. We examined the use of different price-minimizing strategies by smokers and their associations with subsequent smoking behaviors.

Methods: Seven hundred eighteen current smokers from the Minnesota Adult Tobacco Survey Cohort Study provided information on the use of six different price-minimizing strategies in 2009; 602 of them were resurveyed in 2010 to assess their smoking behavior. Logistic regression was used to assess the effects of use of each strategy, use of at least one strategy, and the number of strategies used on quit smoking, attempted to quit, or cut back on cigarette consumption.

Results: Overall, 78% of participants used at least one price-minimizing strategy in 2009 to save money on cigarettes. About 53% reported buying from less expensive places, 49% used coupons or promotions, 42% purchased by the carton, and 34% changed to a cheaper brand. Participants' characteristics differed somewhat by strategy. Participants who reported buying by the carton were less likely to attempt to quit smoking and cut back on cigarette consumption subsequently; those who used more strategies were less likely to cut back on their cigarette consumption.

Conclusions: Use of cigarette price-minimizing strategies is common among smokers and appears to hinder smokers from attempting to quit and reducing cigarette consumption. Prohibiting the use of coupons and promotions may uphold the effect of cigarette taxes to reduce the prevalence of smoking.

Introduction

Cigarette taxes are one of the most effective tobacco control policies (Institute of Medicine, 2007; Shibuya et al., 2003). Research has shown that a 10% increase in cigarette prices is associated with a 3%–5% decrease in demand for cigarettes among adults in high-income countries such as the United States, a 6%–10% decrease among middle- and low-income countries, and a reduction in the prevalence of cigarette smoking overall (Levy, Chaloupka, & Gitchell, 2004). In response to high cigarette taxes, smokers may engage in cigarette price-minimizing strategies to maintain their smoking habits. Studies have showed that, to save money on cigarettes, 34%–61% of adult smokers in the United States buy cigarettes from cheaper sources (Hyland et al., 2005; White, Gilpin, White, & Pierce, 2005), 28%–41% buy cartons instead of single packs (Licht et al., 2011; White et al., 2005), 23%–29% use cheaper brands of cigarettes (Cummings, Hyland, Lewit, & Shopland, 1997; Hyland et al., 2005; Licht et al., 2011; White et al., 2005), 18%–35% use coupons or promotions (Hyland et al., 2005; White et al., 2005; White, White, Freeman, Gilpin, & Pierce, 2006), and 2.6% roll their own cigarettes (Licht et al., 2011). Use of these strategies may weaken the effect of cigarette taxes on the prevalence of smoking and consumption of cigarettes, since they enable smokers to significantly reduce their cigarette expenditures (White et al., 2005).

The current literature on the use of price-minimizing strategies has several limitations. First, the prevalence of using another form of tobacco to reduce cigarette expenditures has not been reported. Given the known association between high cigarette excise tax rates and increasing use of smokeless tobacco (Ohsfeldt, Boyle, & Capilouto, 1997) and the recent introduction of Swedish style moist snuff tobacco commonly known as Snus to the United States (Craver, 2008), it is important to investigate what proportion of smokers switch to smokeless tobacco products to avoid high cigarette prices. Second, previous studies only examined demographic characteristics of the use of price-minimizing strategies and have not investigated the effect of the social environment on use of these strategies. Third, the longitudinal effect of using price-minimizing strategies on subsequent smoking behaviors is understudied. Only two studies examined the association between use of price-minimizing strategies and subsequent quitting behaviors. Cummings et al. (1997) reported smoking cheaper brands was associated with

doi: 10.1093/ntr/ntr300
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lower likelihood of quitting, and Hyland et al. (2006) found no association between purchasing from low/untaxed sources and quitting behaviors in the United States. The effect of using other strategies on quitting, quit attempts, and reducing consumption is unknown.

In light of these limitations, the objectives of this analysis are to estimate the prevalence of the use of price-minimizing strategies in a cohort of current smokers immediately following the federal tobacco tax increase in 2009 and to examine the demographic and social characteristics of those who use price-minimizing strategies. We also assess the longitudinal effect of using price-minimizing strategies on subsequent smoking behaviors. Findings from the analysis further characterize smokers who use price-minimizing strategies and provide policy implications for tobacco control.

Methods

Study Population

The Minnesota Adult Tobacco Survey (MATS) Cohort Study is designed to further understand the quitting process and the influence of various factors, such as tobacco control policies and media campaigns, on smoking-related attitudes and behaviors. The sample was drawn from the 12,580 MATS 2007 participants randomly selected from the Minnesota adult population (n = 7,532) and Blue Cross Blue Shield members (n = 5,048), detailed elsewhere (ClearWay Minnesota, Blue Cross and Blue Shield of Minnesota, & Minnesota Department of Health, 2008). To be eligible for the cohort study, participants had to have smoked more than 100 cigarettes in their lifetime and be current smokers or former smokers who quit smoking less than 10 years ago in 2007 (n = 3,147). Of those eligible, 2,436 (77%) agreed to participate in the cohort study and were interviewed every year between 2008 and 2010. Computer-assisted telephone interviewing was conducted by trained interviewers at Westat, and participants received a $20 incentive after completing each survey. The current analysis was restricted to smokers who reported smoking at least 1 day in the previous 30 days in the 2009 survey (n = 718) when use of price-minimizing strategies was first assessed. Six hundred two (83.8%) of them completed the 2010 survey. All study protocols and instruments were reviewed and approved by the Westat Institutional Review Board.

Measures

In 2009, participants were asked to indicate if they used the following price-minimizing strategies in the past year to save money on cigarettes: (a) bought a cheaper brand of cigarettes, (b) rolled their own cigarettes, (c) used a form of tobacco other than cigarettes, (d) used coupons, rebates, or promotions (e.g., buy-one-get-one free, in-store discount), (e) purchased cartons instead of individual packs, and (f) found less expensive places to buy cigarettes. We derived two additional variables to describe the use of price-minimizing strategies: used at least 1 of the 6 strategies and the count of the number of strategies used. Those who indicated buying cigarettes from less expensive places were asked if they bought from discount stores in Minnesota, out of state, the Internet, mail order, a 1-800 phone number, Native American reservations, street vendors, tobacco shops, convenience store, grocery/drug store, or out of country/duty-free shop.

Participants' age (classified into five age groups: 18–29, 30–39, 40–49, 50–59, and 60 or above), gender, race/ethnicity (collapsed into non-Hispanic White vs. others), and education (categorized into less than high school, high school graduate, some college, and college graduate or above) were assessed. Their annual household income, smoking status, and having someone close to them who uses tobacco products were assessed in 2009. Annual household income was categorized into less than $25,000, $25,000–$50,000, $50,000–$75,000, and more than $75,000. Based on the number of days smoked in the past 30 days and number of cigarettes smoked on the days smoked, participants were classified as smoking nondaily (smoked less than 30 days in the past 30 days), smoking daily but less than 15 cigarettes/day, and smoking daily and 15 or more cigarettes/day. The classification is consistent with previous literature on determinants of use of price-minimizing strategies (White et al., 2005, 2006). Participants were also asked if someone close to them (e.g., parents, spouse, close friends, and relatives) smoked or used other forms of tobacco.

Detailed smoking behaviors were measured in 2010. Participants were asked the number of days smoked in the past 30 days and were categorized on whether they smoked on at least 1 day in the 30 days prior to the interview (yes/no). They were also asked if they had stopped smoking for 1 day or longer because they were trying to quit smoking in the past 12 months. We assessed whether participants cut back the number of days smoking by subtracting the number of days smoked in the past 30 days in 2009 from that of 2010, and participants with a negative difference were classified as cutting back the number of days smoking.

Statistical Analysis

To examine the determinants of use of each price-minimizing strategy and use of at least one strategy, we employed multivariate logistic regression models. We employed multivariate linear regression models to examine the determinants of number of strategies used. To examine the effect of use of each strategy, use of at least one strategy, and number of strategies used on subsequent smoking behaviors, we employed multivariate logistic regression models. All models were adjusted for age, gender, race/ethnicity, education, income, baseline smoking status, and having someone close to them who uses tobacco. Odds ratio or regression coefficients with 95% confidence intervals were calculated.

Results

Demographic and social characteristics of the sample are reported in Table 1. Additional analysis showed that smokers who were lost to follow-up between 2009 and 2010 were more likely to be younger and have someone close to them who smokes or uses tobacco ($p < .05$). Distributions of smoking behavior variables among those who completed the 2010 survey were also reported in Table 1. About 53% of the participants reported buying cigarettes from less expensive places to save money (Table 1). The top three places reported by the participants were discount stores (24.1%), out of state (19.6%), and

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Table 1. Sample Characteristics and Use of Price-Minimizing Strategies in 2009

Variables	*N*	%
Gender		
Male	343	47.77
Female	375	52.23
Age (in 2007)		
18–29	124	17.27
30–39	123	17.13
40–49	171	23.82
50–59	173	24.09
60 or above	127	17.69
Race/ethnicity		
Non-Hispanic White	636	88.83
Other	80	11.17
Education (in 2007)		
Less than high school	51	7.12
High school graduate	246	34.36
Some college or technical school	285	39.80
College graduate or beyond	134	18.72
Annual household income		
<$25K	154	22.55
$25–$50K	209	30.60
$50–$75K	150	21.96
>$75K	170	24.89
Have close one use tobacco		
Yes	514	71.69
No	203	28.31
Smoking status		
Daily, ≥15 cigarettes/day	261	36.35
Daily, <15 cigarettes/day	250	34.82
Nondaily	207	28.83
Use of price-minimizing strategies		
Bought from less expensive places	376	52.59
Used coupons or promotions	348	48.54
Purchased cartons instead of packs	301	41.92
Bought a cheaper brand	240	33.52
Rolled own cigarettes	66	9.19
Used another form of tobacco	37	5.15
Used at least one strategy	557	77.58
Number of strategies used		
0	161	22.42
1	175	24.37
2	220	30.64
3	138	19.22
4	21	2.92
6	3	0.42
Smoking behaviors ($n = 602$)		
Did not smoked in the past 30 days	73	12.13
Attempted to quit smoking	378	46.88
Cut back no. of days smoked	148	24.58

Native American reservations (11.7%). Less than 1.9% of participants reported places such as convenience stores, tobacco shops, mail order, the Internet, grocery/drug stores, and out of country/duty-free shops. About 49% of all participants used coupons or promotions, close to 42% purchased cartons instead of packs, and about 34% changed to a cheaper brand. Only 9% of participants rolled their own cigarettes to save money, and 5% used another form of tobacco product. Overall, 78% of participants used at least one strategy to save money on cigarettes, and the majority (74.2%) used 1 to 3 strategies.

We found that heavier smoking smokers were more likely to buy cigarettes from less expensive places, using coupons or promotions, and purchasing cartons instead of packs but less likely to use another form of tobacco ($p < .05$; Table 2). In addition, the lowest income group was more likely than the highest income group to report buying cigarettes from cheaper places, buying a cheaper brand, and rolling their own cigarettes ($p < .05$). The middle-income groups (i.e., those who reported annual household income between $25,000 and $75,000) were more likely than the highest income group to report buying cigarettes from cheaper places, using coupons or promotions, and buying cartons instead of packs ($p < .05$). Being older was associated with buying cartons instead of packs and buying cheaper brands ($p < .05$), and being young adults (aged 18–29 years) was associated with using coupons or promotions ($p < .0001$). Male participants were more likely than female participants to report rolling their own cigarettes and using another form of tobacco ($p < .05$). In addition, non-Hispanic White participants were more likely than participants of other races/ethnicities to report using coupons or promotions and buying cartons instead of packs ($p < .05$). Smokers with someone close to them who smokes or uses tobacco were more likely to roll their own cigarettes to save money ($p < .05$). Overall, being non-Hispanic Whites, having some college education, having an annual household income between $25,000 and $75,000, and being a heavier smoker were associated with higher odds of using at least one price-minimizing strategy ($p < .05$); being non-Hispanic Whites, having less than high school education, having annual household income less than $75,000, being a heavier smoker, and having someone close to them who uses tobacco were associated with higher number of strategies used ($p < .05$).

The relationship between using price-minimizing strategies and subsequent smoking behaviors are presented in Table 3. Participants who reported buying cartons instead of packs to save money in 2009 were less likely to attempt to quit smoking in the following year and were also less likely to have cut back the number of days smoked in the prior 30 days ($p < .05$). Use of at least one price-minimizing strategy and using a higher number of strategies in 2009 were each associated with lower odds of cutting back the number of days smoked in 2010 ($p < .05$).

Discussion

Although cigarette taxes are one of the most effective tobacco control policies (Levy et al., 2004; Shibuya et al., 2003), smokers' engagement in price-minimizing strategies may reduce the effectiveness of cigarette taxes on reducing the prevalence of smoking. We found that 78% of current smokers used at least one price-minimizing strategy to reduce their cigarette expenditure. More importantly, smokers who used price-minimizing strategies were subsequently less likely to attempt to quit or cut back their cigarette consumption. These strategies appear to hinder the decline in prevalence of smoking and cigarette consumption in the population that might occur because of a tax increase.

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Table 2. Determinants of Use of Price-Minimizing Strategies in 2009

Predictors	Bought from less expensive places	Used coupons or promotions	Purchased cartons instead of packs	Bought a cheaper brand	Rolled own cigarettes	Used another form of tobacco	Used at least one strategy	No. of strategy used[a]
Gender								
Male	1.06 (0.77, 1.62)	0.76 (0.54, 1.05)	0.82 (0.58, 1.16)	1.00 (0.72, 1.41)	**2.28 (1.30, 4.02)**	**9.92 (3.38, 29.13)**	1.09 (0.74, 1.45)	0.06 (−0.10, 0.23)
Female	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Age								
18–29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
30–39	0.91 (0.53, 1.55)	**0.56 (0.33, 0.98)**	**1.87 (1.03, 3.39)**	0.81 (0.44, 1.48)	0.62 (0.27, 1.43)	0.39 (0.11, 1.39)	0.91 (0.53, 1.55)	**−0.40(−0.68, −0.11)**
40–49	1.23 (0.75, 2.02)	**0.53 (0.32, 0.88)**	1.50 (0.87, 2.61)	1.37 (0.80, 2.33)	0.64 (0.30, 1.37)	0.80 (0.29, 2.20)	1.23 (0.75, 2.02)	−0.09(−0.35, 0.18)
50–59	1.24 (0.75, 2.05)	**0.51 (0.30, 0.86)**	**1.78 (1.01, 3.11)**	**2.12 (1.25, 3.60)**	**0.39 (0.17, 0.89)**	0.66 (0.24, 1.87)	1.24 (0.75, 2.05)	−0.09(−0.35, 0.17)
60 or above	0.82 (0.48, 1.41)	**0.12 (0.01, 0.23)**	**3.19 (1.75, 5.82)**	**2.07 (1.17, 3.67)**	0.42 (0.17, 1.05)	0.30 (0.07, 1.24)	0.82 (0.48, 1.41)	−0.14(−0.42, 0.14)
Race/ethnicity								
Non-Hispanic White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Other	1.00 (0.61, 1.65)	**0.42 (0.25, 0.71)**	**0.31 (0.16, 0.57)**	1.18 (0.67, 1.97)	1.65 (0.81, 3.37)	0.06 (0.17, 2.05)	**0.56 (0.31, 0.99)**	**−0.36(−0.63, −0.10)**
Education								
<High school	1.74 (0.85, 3.56)	1.25 (0.59, 2.62)	1.40 (0.65, 3.03)	2.07 (1.00, 4.29)	1.22 (0.45, 3.33)	3.94 (0.94, 16.61)	1.52 (0.63, 3.67)	**0.38 (0.01, 0.75)**
High school graduate	1.32 (0.84, 2.08)	1.33 (0.83, 2.13)	1.26 (0.77, 2.07)	1.44 (0.88, 2.35)	0.70 (0.32, 1.56)	1.60 (0.50, 5.07)	1.62 (0.95, 2.76)	0.16 (−0.08, 0.40)
Some college	1.15 (0.74, 1.78)	1.16 (0.74, 1.83)	1.39 (0.86, 2.26)	1.26 (0.78, 2.04)	0.68 (0.31, 1.50)	1.30 (0.42, 4.04)	**1.69 (1.02, 2.78)**	0.11 (−0.12, 0.34)
College graduate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Annual household income								
<$25K	**1.78 (1.10, 2.87)**	1.58 (0.96, 2.61)	1.36 (0.80, 2.31)	**2.41 (1.45, 4.02)**	**2.73 (1.25, 5.93)**	1.00 (0.33, 2.98)	2.10 (0.81, 5.48)	**0.55 (0.15, 0.96)**
$25–$50K	**1.98 (1.28, 3.06)**	**1.74 (1.11, 2.73)**	**1.91(1.18, 3.07)**	1.45 (0.89, 2.35)	1.28 (0.58, 2.82)	1.26 (0.47, 3.36)	**2.01 (1.12, 3.61)**	**0.38 (0.12, 0.63)**
$50–$75K	1.20 (0.75, 1.90)	1.54 (0.96, 2.47)	**1.72 (1.04, 2.85)**	1.61 (0.96, 2.70)	0.70 (0.26, 1.85)	0.80 (0.27, 2.43)	**1.80 (1.07, 3.04)**	**0.44 (0.21, 0.67)**
>$75K	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Having close one use tobacco								
Yes	1.16 (0.82, 1.64)	1.37 (0.95, 1.97)	1.24 (0.85, 1.81)	1.28 (0.88, 1.87)	**2.03 (1.00, 4.11)**	0.93 (0.42, 2.01)	1.40 (0.92, 2.12)	**0.19 (0.01, 0.38)**
No	1.00	1.00	1.00	1.00	**1.00**	1.00	1.00	**1.00**
Smoking status								
Daily, ≥15 cigarettes	**2.23 (1.50, 3.31)**	**2.23 (1.48, 3.38)**	**6.32 (4.04, 9.88)**	1.14 (0.75, 1.37)	1.49 (0.73, 3.06)	**0.33 (0.14, 0.75)**	**5.46 (3.29, 9.06)**	**0.71 (0.50, 0.92)**
Daily, <15 cigarettes	**1.82 (1.24, 2.68)**	**1.84 (1.23, 2.75)**	**2.20 (1.41, 3.41)**	1.12 (0.74, 1.70)	1.51 (0.74, 3.06)	**0.22 (0.08, 0.58)**	**2.71 (1.76, 4.19)**	**0.37 (0.17, 0.58)**
Nondaily	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

Note. Adjusted for all variables in the table. Odds ratios and 95% confidence intervals presented. Bolded estimates are statistically significant ($p < .05$).

[a]Regression coefficients and 95% confidence intervals presented.

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Table 3. Use of Price-Minimizing Strategies in 2009 and Smoking Behaviors in 2010

Price-minimizing strategies	Did not smoked in the past 30 days	Attempted to quit smoking	Cut back no. of days smoked
Bought from less expensive places			
Yes	0.73 (0.43, 1.25)	1.23 (0.89, 1.82)	0.71 (0.47, 1.07)
No	1.00	1.00	1.00
Used coupons or promotions			
Yes	1.10 (0.64, 1.89)	1.23 (0.85, 1.78)	0.98 (0.64, 1.51)
No	1.00	1.00	1.00
Purchased cartons instead of packs			
Yes	0.93 (0.52, 1.66)	**0.62 (0.43, 0.91)**	**0.61 (0.38, 0.97)**
No	1.00	1.00	1.00
Bought a cheaper brand			
Yes	0.83 (0.47, 1.46)	1.46 (1.00, 2.14)	1.01 (0.65, 1.58)
No	1.00	1.00	1.00
Rolled own cigarettes			
Yes	0.72 (0.24, 2.17)	1.63 (0.88, 3.04)	0.56 (0.24, 1.32)
No	1.00	1.00	1.00
Used another form of tobacco			
Yes	0.44 (0.10, 2.05)	1.59 (0.68, 3.74)	0.71 (0.26, 1.93)
No	1.00	1.00	1.00
Used at least one strategy			
Yes	0.66 (0.67, 1.18)	0.97 (0.62, 1.51)	**0.56 (0.35, 0.89)**
No	1.00	1.00	1.00
No. of strategy used	0.91 (0.71, 1.15)	1.05 (0.90, 1.24)	**0.82 (0.68, 0.99)**

Note. Adjusted for age, gender, race/ethnicity, education, annual household income, having close ones use tobacco, and smoking status. Odds ratios and 95% confidence intervals presented. Bolded estimates are statistically significant ($p < .05$).

A potential strategy to discourage the use of cigarette price-minimizing strategies and uphold the effectiveness of cigarette taxes is to have a federal policy to disallow "buy down" promotional programs (e.g., time-limited discount or sales, coupons) used by tobacco manufacturers to reduce cigarette prices, the second most commonly used price-minimizing strategy by smokers. A study showed that minimum legal cigarette price laws are ineffective in increasing cigarette prices if they allow manufacturers to provide incentive programs (Feighery, Ribisl, Schleicher, Zellers, & Wellington, 2005). For example, in Minnesota, the minimum legal price law allows the use of promotional programs (Minnesota Department of Commerce, 2011). Therefore, smokers can purchase a pack of American Spirit (regular retail price $6.16) at $1.16 with a $5 off coupon from the manufacturer (E. Brock, personal communication, June 9, 2011), an 82% discount from the state minimum legal price for American Spirit $6.32. Another potential strategy is to prohibit tobacco companies from engaging in price-reducing tobacco marketing activities, such as direct mailing with coupons and providing coupons on brand websites.

A ban on selling cigarettes by the carton may also be considered. Our findings showed that buying by the carton was the third most commonly used cigarette price-minimizing strategy, and smokers who reported purchasing cigarettes by the carton were less likely to attempt to quit and to reduce the number of days smoking. Although lower intention to quit smoking and heavier smoking habit may be associated with buying cigarettes by the carton, additional analysis adjusting for participants' intention to quit smoking did not significantly change our finding on the association between buying by the carton and attempting to quit (data not shown). It is possible that an ample supply of cigarettes makes it harder for smokers to consider quitting and subsequently to attempt to quit or cut back cigarette consumption. Banning sales of cigarette by the carton will cut down the stock of cigarettes in smokers' hands and may make it easier for them to consider quitting.

Several findings on the determinants of use of price-minimizing strategy are noteworthy. First, our finding that young adult smokers (aged 18–30 years) are more likely than older smokers to use coupons or promotions is supported by a previous report (White et al., 2006). Young adult smokers are particularly price sensitive (Levy et al., 2004) and therefore may be more likely to seek out opportunities to save money on cigarettes. More importantly, tobacco companies see young adults as their target market (Ling & Glantz, 2002) and have been actively recruiting young adults to their mailing lists through promotional events in bars and nightclubs (Biener, Nyman, Kline, & Albers, 2004; Gilpin, White, & Pierce, 2005; Rigotti, Moran, & Wechsler, 2005). As a result, young adult smokers may receive a disproportionately large number of coupons and promotions and, consequently, be more likely to use this strategy to save money on cigarettes. Therefore, disallowing these promotional programs will be particularly beneficial for young adult smokers.

Second, low-income smokers are more likely to roll their own cigarettes to lower their cigarette expenditures. Although the federal tobacco tax increase in 2009 increased the tax for

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roll-your-own tobacco from $1.10 to $24.78 per pound, roll-your-own tobacco companies avoided the increase by quickly changing the labels of their products to "pipe tobacco," which has a tax rate of $2.83 per pound (Apuzzo, 2009). Consequently, roll-your-own cigarettes are still the cheapest alternative to manufactured cigarettes and are welcomed by low-income smokers. Clarifying and expanding the definition of roll-your-own tobacco at the federal level are necessary to close this loophole.

Third, we observed that smokers who have someone close to them who uses tobacco are more likely to roll their own cigarettes and use more price-minimizing strategies. This finding suggests that smokers' social environment does influence their use of price-minimizing strategies. Perhaps, smokers learn about these price-minimizing strategies through other smokers; having someone close to them who uses tobacco allows them to gather information on different money-saving strategies and hence more likely to use multiple strategies. Rolling your own cigarette may also require some skills, which are probably best taught by someone close to them who rolls their own cigarettes.

The proportions of smokers using each price-minimizing strategy reported here are higher than those reported in previous studies (Cummings et al., 1997; Hyland et al., 2005; Licht et al., 2011; White et al., 2005, 2006). This may be because our data were collected in 2009 while those in the previous studies were collected in or before 2007. Cigarette prices may have increased over time and triggered more smokers to use price-minimizing strategies. Our data were also collected immediately after the $0.61 federal tax increase in April 2009, which stimulated smokers to seek measures to counter cigarette price increases (Ayers, Ribisl, & Brownstein, 2011).

A limitation of the study is its state-specific sample, which limits the generalizability of our findings to the adult smokers in the United States. However, although the use of price-minimizing strategies varies by geographical location, determinants of use of these strategies and their effect on subsequent smoking behaviors do not seem to vary by state (Cummings et al., 1997; White et al., 2005, 2006) or country (Licht et al., 2011). Missing data due to loss to follow-up may also introduce bias. However, since loss to follow-up is not associated with smoking status, we do not expect the estimates of the effects of use of price-minimizing strategies on subsequent smoking behaviors to be biased.

In conclusion, a high proportion of smokers engaged in price-minimizing strategies to reduce their expenditures on cigarettes and types of strategies used differ by demographic characteristics and social environment. These strategies appeared to hinder smokers from attempting to quit and reducing their cigarette consumption. Prohibiting use of coupons and other promotional programs coupled with a cigarette tax increase may have greater effect on reducing the prevalence of smoking than a cigarette tax increase alone.

Funding

This research is funded by ClearWay Minnesota.

Declaration of Interests

None declared.

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Young Adults' Favorable Perceptions of Snus, Dissolvable Tobacco Products, and Electronic Cigarettes: Findings From a Focus Group Study

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Objectives. We explored young adults' perceptions of snus (spitless moist snuff packed in porous bags), dissolvable tobacco products, and electronic cigarettes and intention to try these products.

Methods. We conducted 11 focus group discussions involving a total of 66 young adults (18–26 years old) on these new tobacco products (e.g., harmfulness, potential as quit aids, intention to try) held between July and December 2010. We analyzed discussions using a thematic approach.

Results. Participants generally reported positive perceptions of the new products, particularly because they came in flavors. Few negative perceptions were reported. Although some participants believed these products were less harmful than cigarettes and helpful in quitting smoking, others thought the opposite, particularly regarding electronic cigarettes. Participants also commented that these products could be gateways to cigarette smoking. Half of the participants, including a mix of smokers and nonsmokers, admitted they would try these products if offered by a friend.

Conclusions. Young adults perceive the new tobacco products positively and are willing to experiment with them. Eliminating flavors in these products may reduce young adults' intentions to try these products. (*Am J Public Health.* Published online ahead of print July 19, 2012: e1–e6. doi:10.2105/AJPH.2011.300525)

Tobacco control policies have been effective in reducing the prevalence of cigarette smoking and per capita cigarette consumption,[1] and contribute to recent decline in cigarette sales in the United States.[2] Probably because of this decline and clean indoor air laws, tobacco companies have introduced new smokeless tobacco products to the United States.[3–9] These products include snus (spitless moist snuff packed in porous bags) and dissolvable tobacco products (spitless, dissolvable oral tobacco products in the shape of breath mint, breath strip, and toothpick). In addition, electronic cigarettes (e-cigarettes; devices that vaporize nicotine to be inhaled) recently have been introduced to the United States. These yet-to-be-regulated products have gained popularity: 10.4% of adult smokers in the test markets for snus tried snus,[10] and in an experiment examining adult smokers' intention to use smokeless tobacco and nicotine replacement therapies as alternatives for cigarettes, 55.1% of the participants preferred snus and dissolvable tobacco over nicotine lozenges.[11] Internet searches for e-cigarettes also have increased dramatically.[12] These products are a public health concern because they may act as gateways to cigarette smoking,[13] substitute for cigarettes in smokeless locations, or displace effective cessation treatment[14] and consequently obstruct further decline in the prevalence of tobacco use.

Research focusing on public perceptions of newly introduced tobacco products has been limited. This presents a missed opportunity because behavioral theories posit that individuals' perceptions and attitudes predict behavior changes,[15] and consumer research has found that perceptions of a product's attributes are associated with intent to purchase.[16] It is particularly important to examine young adults' perceptions of these new products because they have been a target of tobacco company marketing.[17] One study examining patrons' posts on the Camel Snus Web site found that patrons liked the flavors of the product and the fact that they could use it in places where smoking is not allowed.[18] However, the investigators could not determine the ages of the patrons, and the study also lacked generalizability since it only included the subset of Camel Snus users who visited and posted comments. In another study, an online survey of 81 persons who visited a smoking cessation Web site showed that e-cigarettes are primarily used to help in quitting cigarette smoking[19]; however, the sample was highly selective and largely European, which restricts generalizing the findings to the United States. We did not identify any research on perceptions of dissolvable tobacco products.

To provide insights into young adults' perceptions of these products, we recruited young adults to participate in a series of focus group discussions on their perceptions of snus, dissolvable tobacco products, and e-cigarettes and their intention to try these products. We also examined whether these perceptions differed by gender and socioeconomic level. We discuss implications for tobacco control policies.

METHODS

We recruited young adults in the Minneapolis–St. Paul, Minnesota, metropolitan area who were enrolled in or had graduated from 4-year colleges (to represent those with higher socioeconomic status) and young adults who were enrolled in or had graduated from 2-year colleges or who had not enrolled in postsecondary education (to represent those with lower socioeconomic status). We used 4 recruitment strategies: (1) online advertisements, (2) flyers on one 4-year and two 2-year college campuses, (3) announcements in a student life newsletter at a 2-year college, and (4) a recruitment booth on a 2-year college campus. To be eligible, participants had to be

between 18 and 26 years old, and either had used some tobacco product at least 1 day in the past 30 days or could specify where they had seen tobacco advertisements (e.g., saw ads in magazines or received direct mail from tobacco companies) during the 30 days prior to recruitment. We offered a $25 gift card as an incentive.

Data Collection

Focus group discussions were held between July and December 2010. We assigned participants to groups on the basis of their gender and education (enrolled in or graduated from a 4-year college or not) because exposure to tobacco marketing has been reported to differ by these 2 characteristics.[20,21] We developed a discussion guide based on a literature review of new tobacco products and related marketing strategies, and on discussion with experts in tobacco control policy, tobacco marketing, advertising and communication, and social media. The guide included topics such as perceptions of new tobacco products (e.g., harmfulness relative to cigarettes and potential as quit aids) and experiences with these products. We showed participants pictures of snus, dissolvable tobacco products (Camel Strips, Orbs, and Sticks) and e-cigarettes because some of the products were not available in Minnesota at the time of the focus groups. One author (K. C.), who had received training in conducting and analyzing focus group discussions, moderated each 2-hour semistructured focus group discussion. Participants completed a short questionnaire on demographic information and tobacco use before the discussion.

Data Analysis

We audio-recorded and transcribed verbatim all focus group discussions, and analyzed them using a thematic approach.[22] The first author (K. C.) reviewed all transcripts and derived a set of themes and subthemes from the discussions, and the second author (L. F.) independently reviewed all transcripts and the appropriateness of the themes and subthemes derived by the first author. Disagreements on themes and subthemes were resolved through discussion. The first author then coded all the transcripts by categorizing relevant statements in the transcripts under themes and subthemes.[23] The second author then reviewed the coded statements. Disagreements on the codes were resolved through discussion. Two other authors (N. M and A. C. R.) then verified the results of the analysis after reading through all transcripts. We also examined results by gender and education level.

RESULTS

We conducted 11 focus group discussions involving a total of 66 young adults (26 men and 40 women, 2–11per group). Participants were between 18 and 26 years old (Table 1). About 50% of the participants were 4-year college students or graduates, 56% were White and 29% were Asian, and 70% used tobacco within 30 days prior to recruitment. We observed only minor differences by gender and education on perceptions of snus, dissolvable tobacco products, and e-cigarettes. These differences are discussed in the appropriate subsections of Results.

General Perceptions of New Tobacco Products and E-Cigarettes

Accessible and convenient. Participants commonly said that snus, dissolvable tobacco products, and e-cigarettes made tobacco use very accessible, since they could use these products at any time and anywhere, including places where smoking cigarettes was prohibited ("[Y]ou can't just light up a cigarette in class. But if you have [the dissolvable tobacco products], you can just easily slip [them] in so you're always constantly getting nicotine and other stuff."). Participants thought they could use these products when they were in a hurry ("You're in a rush to go places, you can't just be smoking."). They perceived these products as more convenient than cigarettes and chewing tobacco because they did not need a lighter or to spit. Participants also said snus and dissolvable tobacco products could be carried around very easily because of the compact size of the packaging.

Attractive and modern. Participants unanimously found the packaging of snus and dissolvable tobacco products "extremely attractive" (Figure 1). They thought the packages were more modern than a pack of cigarettes. Participants believed the products were cleverly designed to attract attention and induce curiosity so people would try them ("The packaging is flashy. I could see people going for it just because of the packaging."). Female participants thought the packaging of snus and dissolvable tobacco products also looked "stylish," "cute," and "could be [a] fashion accessory." These products were perceived as innovative since they presented new ways to consume tobacco and redefined tobacco use. Participants also said that the tobacco companies were trying to update the image around smoking from "rustic, rugged" to "more modern, sleek" with these products. Participants perceived use of these products as "hip" and "on the cutting edge of being the new 'in' thing." Some thought these products were for younger and new generations of smokers. E-cigarettes were perceived as "high-tech."

Fun and recreational. Participants thought the flavors of dissolvable tobacco products made them fun and interesting to use. Female participants described the pill-form dissolvable tobacco products (Camel Orbs) as "candy that gives you a little buzz" and "fresh and minty." They also thought the new products presented "many different and exciting ways" to use tobacco, and made tobacco use "a fun activity." Some male participants perceived snus and dissolvable tobacco products as more "simple," "casual," and "recreational" than cigarettes and chewing tobacco. They commented that snus and dissolvable products were "out on the town tonight let's grab one and pass it around" type of products.

Concealed. Participants commonly thought that snus and dissolvable tobacco products made tobacco use more "discreet" since they were compact in size ("could just put them in your back pocket and have it concealable") and odorless ("wouldn't smell like cigarettes"). Participants agreed that these products would help people hide their smoking habits and "get your fix while still not giving out the image that you're a smoker or other tobacco user."

Distasteful. The most commonly reported negative perception of snus and dissolvable tobacco products was that they were distasteful. Participants thought the light-brown color of the actual dissolvable tobacco products made them "look like they would taste really icky." Female participants frequently reported they did not like the idea of putting tobacco products directly into their mouths, and said "[that is] kind of disgusting" and "gross."

TABLE 1—Characteristics of Young Adult Participants in Focus Group Discussions of Snus, Dissolvable Tobacco Products, and Electronic Cigarettes: Minneapolis–St. Paul, MN, 2010

	Men, Range or No. (%) (n = 26)	Women, Range or No. (%) (n = 40)	Total, Range or No. (%) (n = 66)
Demographic characteristics			
Age, y	19–26	18–26	18–26
Education			
4-y college student or graduate	13 (50)	18 (45)	31 (47)
≤ 2-y college student or graduate	13 (50)	22 (55)	35 (53)
Race/ethnicity			
Asian	8 (31)	11 (28)	19 (29)
African American	2 (8)	2 (5)	4 (6)
White	15 (58)	22 (55)	37 (56)
Other	1 (3)	5 (12)	6 (9)
Used tobacco in the past 30 d			
Any tobacco products			
Yes	21 (81)	25 (63)	46 (70)
No	5 (19)	15 (37)	20 (30)
Cigarettes			
Yes	21 (81)	25 (63)	46 (70)
No	5 (19)	15 (37)	20 (30)
Other combustible products (e.g., cigars, hookah)			
Yes	6 (23)	4 (10)	10 (15)
No	20 (77)	36 (90)	56 (85)
Smokeless tobacco products			
Yes	2 (8)	0 (0)	2 (3)
No	24 (92)	40 (100)	64 (97)

Manipulative and cunning. Participants agreed that tobacco companies developed these products to deceive people. They said manufacturers of these products were trying to distance themselves from the "negative image of smoking," and made these products "seem less harmful [than] they really still are" to "trick people into thinking [they are] better [than cigarettes]," but they still provide nicotine to "[get people] to try more things to be even more hooked or addicted." Participants thought the tobacco companies wanted to simultaneously "get around the smoking ban" and "target everybody in every circle," particularly those who do not like "the yellow teeth and the smell [that results from smoking]." The bottom line for tobacco companies, participants reported, was to make the most money. Some participants thought tobacco companies showed "greed" through developing these new tobacco products and commented that "they don't need any more money. Stop killing people." These comments were more commonly made by those who were not enrolled in or graduated from 4-year colleges.

Perceived Harmfulness Relative to Cigarettes

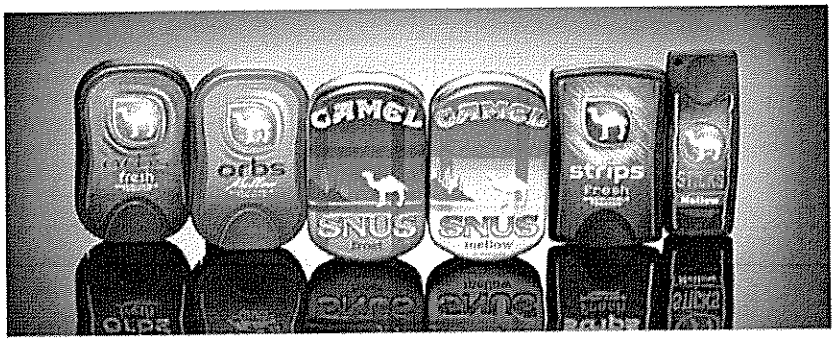
Participants were not in agreement on whether snus, dissolvable tobacco products, and e-cigarettes were less harmful than cigarettes. Some participants said they lacked important information about these products, such as their ingredients ("I want to know more about the chemicals"), their health impact ("What happens when you dissolve nicotine rather than chewing it or smoking it?"), and, in the case of e-cigarettes, the mechanism used to vaporize nicotine.

Some participants thought these products were just as harmful as cigarettes. They generally reported that the new products and cigarettes were "all one product, in different forms" and were "all unhealthy in their own way." Similarly, participants said that although these products might not cause lung cancer, they might cause other problems such as oral cancer or gastrointestinal problems. Some participants were concerned that snus and dissolvable tobacco products were even more harmful than cigarettes because they come into direct contact with the mouth, and people would consume them much faster than cigarettes because they were easy to use and led to nicotine overdose.

Some participants perceived that these products were less harmful than cigarettes because they were smokeless. They reflected that smoking causes lung cancer and therefore these smokeless products were "obviously healthy compared to cigarettes." The colorful packaging and the labeling of snus and dissolvable tobacco products as "fresh" also made these products seem healthier than cigarettes. Participants believed e-cigarettes were less harmful than cigarettes because they deliver only nicotine, and hence were "definitely a lot healthier than cigarettes because you don't get all the additives." A couple of participants cited data from European countries that supported snus as less harmful than cigarettes.

Potential as Quit Aids

Participants expressed diverse opinions on the potential of snus, dissolvable tobacco products, and e-cigarettes to help people quit smoking. Some reported that these products were ineffective as quit aids because "they all have nicotine," and they did not believe that one can treat nicotine addiction with nicotine. Participants said individuals might quit smoking but "might become addicted to [these products] instead." Some participants agreed that smokers would not completely switch to these products because the products did not offer the same "oral fixation" as cigarettes and smokers were "used to the motion of having a cigarette in their fingers, breathing it in, breathing it out." Participants also commented that they valued the opportunities to meet other smokers when smoking outside, and that these products eliminated those opportunities. Participants said that people would "just keep smoking [cigarettes], but try all this new stuff too," and that tobacco companies would not manufacture products that would help people quit smoking.



Source. SnusCentral.org.[24]

FIGURE 1—Impressions of snus, dissolvable tobacco products, and electronic cigarettes held by young adult participants in focus group discussions: Minneapolis–St. Paul, MN, 2010.

Some participants thought the new products could help people quit smoking, particularly e-cigarettes. They reported that e-cigarette cartridges had different levels of nicotine and therefore people could have a "gradual reduction" in nicotine consumption instead of quitting suddenly. Some shared anecdotes of people successfully quitting smoking with e-cigarettes or cutting back on cigarette consumption with snus. Participants commented that the appearance of snus and dissolvable tobacco products was similar to that of nicotine gums and patches.

Gateway to Tobacco Use and Intention to Try

Participants believed that snus, dissolvable tobacco products, and e-cigarettes would appeal to individuals "who are against smoking and the smoke in the air, but [have] always wanted to know the feeling of a cigarette." Nonsmokers also said that they would start with these products if they wanted to smoke "because [I am] not *smoking* [with these products]." Participants said that using these products would bring people "one step closer" to smoking cigarettes and users would eventually pick up smoking ("I could totally see that any of [these products] could lead to cigarettes."). Participants also thought the dissolvable tobacco products would be "popular" among teenagers because they looked like candy and were much easier to use in school than cigarettes.

Some participants were interested in snus, dissolvable tobacco, and e-cigarettes ("curious because I haven't tried any [of these products]"), whereas others were intimidated because they did not know their health impact ("No one wants to be a guinea pig on these products and ruin their whole lives."). When asked if they would try these new products when offered them by a friend, half of the participants—a mix of smokers and nonsmokers—said they would try them.

DISCUSSION

We expanded the literature on perceptions of new tobacco products by conducting a series of focus group discussions with young adults (aged 18–26 years) on their perceptions of these products. Overall, we found that young adults perceived snus and dissolvable tobacco products as accessible, convenient, attractive, modern, fun, recreational, and concealable, while they perceived e-cigarettes as accessible, convenient, and modern. Although participants also reported negative perceptions of these products (e.g., distasteful) and the tobacco companies (e.g., manipulative and cunning), half of the participants, including both smokers and nonsmokers, admitted they would try these products if offered them by a friend. Female participants were not comfortable about putting tobacco directly into their mouth, and participants with lower education were more likely to comment that snus and dissolvable products demonstrate the greed of tobacco companies.

Particularly concerning is that young adults were unanimously attracted by the packaging of snus and dissolvable tobacco products, and could be tempted by their packaging to try them. Tobacco companies know that people associate lighter colors with low health risk and have been using this to their advantage in cigarette packaging.[25] Restricting the color, shape, and size of packaging and the products to make them less appealing to young adults may reduce their intention to try these products. Participants also described snus and dissolvable tobacco products as "fun and recreational" because they were marketed as flavored. A previous report also found that the various flavors offered by e-cigarettes attracted smokers to use them.[19] Although the Family Smoking Prevention and Tobacco Control Act of 2009 banned flavored cigarettes (except menthol),[26] it does not cover these new tobacco products. Prohibiting flavors in all tobacco products (including e-cigarettes) may be an effective way to dissuade young people from trying these products, and subsequently prevent smoking initiation.

Some of our participants as well as those in another study[19] said that e-cigarettes are "healthier" than cigarettes because e-cigarettes deliver only nicotine and are helpful in quitting smoking. The Food and Drug Administration (FDA) tested several samples of e-cigarettes and detected carcinogens such as tobacco-specific nitrosamines and toxic chemicals such as diethylene glycol in some of them.[27] There is also limited research on the effectiveness of e-cigarettes as quit aids. Given young adults' interest in e-cigarettes, we hope the FDA will further examine the potential risks associated with using e-cigarettes and regulate accordingly.

Some participants reported uncertainty about the health effects of the new products, and perceived as negative both the products (e.g., distasteful, wary of ingredients) and the tobacco companies (e.g., manipulative and cunning). These perceptions can be used as messages for media campaigns to deter individuals, particularly nonsmokers, from using these products. Emphasizing the products' cancer-causing potential, making use of the negative beliefs some people hold about them, and planting doubts about the intentions of tobacco companies may prevent individuals from experimenting with them.

Consistent with public health concerns that tobacco companies develop snus and

dissolvable products to promote dual cigarette and smokeless tobacco use,[28,29] our participants perceived that people would use these smokeless tobacco products in addition to cigarettes instead of completely switching over. Participants also believed these new products could be a gateway to cigarette smoking. Results from previous studies examining the gateway effect of smokeless tobacco to cigarettes were mixed,[30,31] and did not include dissolvable tobacco and e-cigarettes. Future studies need to investigate the role of these products in smoking initiation.

About half of the participants, regardless of their smoking status, expressed interest in trying these products if offered them by friends. This suggests that young adults may be influenced by peers to try these products; additionally, these young adults may act as early adopters and influence others in their social networks to start using these products. Without effective intervention, the diffusion model[32] suggests that these products may become popular among young adults. A potential countermeasure is to identify the peer leaders who are likely to be early adopters, and train them to be peer educators to promote healthy behaviors and influence their peers not to use these new tobacco products, which was effective in preventing alcohol abuse.[33]

Limitations

Our findings should be interpreted with some caution. Although our sample of young adults was recruited from multiple colleges and the Internet, we cannot be certain that comments from participants would be representative of all young adults. A community-based survey with a large number of young adults is needed to confirm our findings. Small group size in some of the conducted focus groups may also be a concern. Although small group size could potentially narrow the range of opinions related to the products, it also allowed us to investigate in-depth participants' perceptions of snus, dissolvable tobacco products, and e-cigarettes, which complemented the breadth of opinions collected from groups with more participants. We also had fewer men than women in our study, despite our attempts to have equal numbers of each gender; however, because we heard fairly consistent opinions among participants within each gender, we believe our findings would not be substantially different if there had been more male participants. We could not determine whether certain comments were made by smokers or by those who had tried these products because we did not stratify the groups by these characteristics.

Another limitation is that unlike snus and e-cigarettes, dissolvable tobacco products were not available in Minnesota during the time of the focus group discussions and therefore participants had less tangible knowledge of them than of snus and e-cigarettes. To compensate, we displayed pictures of the dissolvable tobacco products, described the products, and allowed participants to ask questions about the products during the discussions. We decided it would be inappropriate to bring samples of these products because this could encourage participants to try them. As perceptions of these products may change when young adults become more familiar with them, these perceptions should be reexamined in future studies.

Conclusions

Despite the limitations, this study deepens the understanding of young adults' perceptions of snus, dissolvable tobacco products, and e-cigarettes. We found that young adults generally perceived these products positively, and both smokers and nonsmokers reported that they would use them when the opportunity arose. One strategy to reduce their use is to ban flavoring in these products, as has been done with cigarettes. ■

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This article was accepted October 14, 2011.

Contributors

All authors participated in conceptualizing and designing the study, collecting the data, conducting the analyses, and writing the article.

Acknowledgments

This research was funded by the National Cancer Institute (grant R01 CA86191; J. Forster, principal investigator).

We recognize Betsy Brock, MPH, Michael Freiberg, JD, Barbara Loken, PhD, Jared Roy, and Brian Southwell, PhD, for their contributions to our expert panel on Tobacco Marketing Strategies.

Human Participant Protection

This study was approved by the University of Minnesota institutional review board. Participants provided written informed consent before taking part in the study.

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The Preventable Causes of Death in the United States: Comparative Risk Assessment of Dietary, Lifestyle, and Metabolic Risk Factors

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Abstract

Background: Knowledge of the number of deaths caused by risk factors is needed for health policy and priority setting. Our aim was to estimate the mortality effects of the following 12 modifiable dietary, lifestyle, and metabolic risk factors in the United States (US) using consistent and comparable methods: high blood glucose, low-density lipoprotein (LDL) cholesterol, and blood pressure; overweight–obesity; high dietary trans fatty acids and salt; low dietary polyunsaturated fatty acids, omega-3 fatty acids (seafood), and fruits and vegetables; physical inactivity; alcohol use; and tobacco smoking.

Methods and Findings: We used data on risk factor exposures in the US population from nationally representative health surveys and disease-specific mortality statistics from the National Center for Health Statistics. We obtained the etiological effects of risk factors on disease-specific mortality, by age, from systematic reviews and meta-analyses of epidemiological studies that had adjusted (i) for major potential confounders, and (ii) where possible for regression dilution bias. We estimated the number of disease-specific deaths attributable to all non-optimal levels of each risk factor exposure, by age and sex. In 2005, tobacco smoking and high blood pressure were responsible for an estimated 467,000 (95% confidence interval [CI] 436,000–500,000) and 395,000 (372,000–414,000) deaths, accounting for about one in five or six deaths in US adults. Overweight–obesity (216,000; 188,000–237,000) and physical inactivity (191,000; 164,000–222,000) were each responsible for nearly 1 in 10 deaths. High dietary salt (102,000; 97,000–107,000), low dietary omega-3 fatty acids (84,000; 72,000–96,000), and high dietary trans fatty acids (82,000; 63,000–97,000) were the dietary risks with the largest mortality effects. Although 26,000 (23,000–40,000) deaths from ischemic heart disease, ischemic stroke, and diabetes were averted by current alcohol use, they were outweighed by 90,000 (88,000–94,000) deaths from other cardiovascular diseases, cancers, liver cirrhosis, pancreatitis, alcohol use disorders, road traffic and other injuries, and violence.

Conclusions: Smoking and high blood pressure, which both have effective interventions, are responsible for the largest number of deaths in the US. Other dietary, lifestyle, and metabolic risk factors for chronic diseases also cause a substantial number of deaths in the US.

Please see later in the article for the Editors' Summary.

Citation: Danaei G, Ding EL, Mozaffarian D, Taylor B, Rehm J, et al. (2009) The Preventable Causes of Death in the United States: Comparative Risk Assessment of Dietary, Lifestyle, and Metabolic Risk Factors. PLoS Med 6(4): e1000058. doi:10.1371/journal.pmed.1000058

Academic Editor: Simon Hales, University of Otago, New Zealand

Received September 17, 2008; **Accepted** February 20, 2009; **Published** April 28, 2009

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Funding: This research was supported by a cooperative agreement from the Centers for Disease Control and Prevention (CDC) through the Association of Schools of Public Health (ASPH) (Grant No. U36/CCU300430-23). The contents of this article are solely the responsibility of the authors and do not necessarily represent the official views of CDC or ASPH. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The Academic Editor declares that he had no competing interests when the first version of this paper was submitted. After a revised version was submitted, he started working on the global burden of disease from climate change project at the WHO in Geneva. Majid Ezzati is also working on the Global Burden of Disease project.

Abbreviations: BAC, blood alcohol concentration; BMI, body mass index; CI, confidence interval; FARS, Fatality Analysis Reporting System; FPG, fasting plasma glucose; HDL, high-density lipoprotein; ICD, International Classification of Diseases; IHD, ischemic heart disease; LDL, low-density lipoprotein; NCHS, National Center for Health Statistics; NESARC, National Epidemiologic Survey on Alcohol and Related Conditions; NHANES, National Health and Nutrition Examination Survey; OR, odds ratio; PAF, population attributable fraction; PUFA, polyunsaturated fatty acids; RR, relative risk; SBP, systolic blood pressure; SD, standard deviation; SFA, saturated fatty acids; TMRED, theoretical-minimum-risk exposure distribution.

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Introduction

Valid and comparable information on mortality caused by diseases, injuries, and their modifiable risk factors is important for health policy and priority setting [1,2]. The standard death certificate is valuable for assigning deaths to specific diseases or injuries, but does not provide information on the modifiable risk factors that cause these diseases. Previous research has indicated that modifiable risk factors are responsible for a large number of premature deaths in the United States [1,3]. However, prior analyses did not use consistent and comparable methods for the mortality effects of different risk factors. More importantly, previous analyses did not include any dietary risk factors. The only metabolic risk factor—i.e., those measured by physiological indicators such as blood pressure, blood glucose, serum cholesterol, and body mass index (BMI)—in these analyses was overweight–obesity.

We estimated the number of deaths attributable to major dietary, lifestyle, and metabolic risk factors in the US using consistent, comparable, and current definitions, methods, and data sources. We conducted the analysis in the US because the results can inform priority-setting decisions for policies and programs that aim to improve the nation's health, e.g., *Healthy People 2010* and (the forthcoming) *Healthy People 2020*. The US also has high-quality data on disease-specific mortality and on population exposure to a range of risk factors from nationally representative health examination and interview surveys. Our results provide, to our knowledge, the most comprehensive and comparable quantitative assessment of the mortality burden of important modifiable risk factors in the US population, and the only one to include the effects of multiple dietary and metabolic factors.

Methods

We conducted a population-level CRA (comparative risk assessment) for 12 major modifiable dietary, lifestyle, and metabolic risks. The CRA analysis estimates the number of deaths that would be prevented in the period of analysis if current distributions of risk factor exposure were changed to a hypothetical alternative distribution. The inputs to the analysis are (1) the current population distribution of risk factor exposure, (2) the etiological effect of risk factor exposures on disease-specific mortality, (3) an alternative exposure distribution, and (4) the total number of disease-specific deaths in the population.

We also calculated the proportion of the mortality burden of risk factors among people in specific exposure ranges and categories that correspond to current clinical and public health guidelines, e.g., the proportion of deaths attributable to high blood pressure, that is, among individuals with systolic blood pressure (SBP) $\geq$140 mmHg. This threshold-based analysis helps evaluate the relative impact of programs that focus on people whose high-risk status is either undiagnosed or remains uncontrolled after receiving the currently administered usual care.

Selection of Risk Factors

Among dietary, lifestyle, and metabolic factors, we selected specific risks that fulfilled the following criteria. (1) Sufficient evidence was available on the presence and magnitude of likely causal associations with disease-specific mortality from high-quality epidemiological studies; (2) available or envisionable interventions existed to modify exposure to the risk; and (3) data on risk factor exposure were available from nationally representative surveys and epidemiological studies without systematic bias.

The 12 major modifiable risk factors selected based on these criteria are shown in Table 1. High blood pressure and high low-density lipoprotein (LDL) cholesterol were selected as major modifiable risk factors for cardiovascular mortality, with their effects on cardiovascular diseases established in observational as well as randomized studies. High blood glucose, overweight–obesity (high BMI), physical inactivity, five dietary factors, alcohol use, and tobacco smoking were selected as major modifiable risk factors for cardiovascular diseases, cancers, and other diseases. The mortality-reducing effects of omega-3 fatty acids and of replacing saturated fatty acids (SFA) with polyunsaturated fatty acids (PUFA) (denoted as PUFA and PUFA-SFA replacement interchangeably hereafter) have been confirmed in randomized trials. The mortality effects of other risk factors were considered probable or convincing based on the breadth and consistency of evidence from well-conducted observational studies. The relationship between dietary salt (sodium) and cardiovascular mortality was based on convincing effects on blood pressure in intervention studies, as well as on disease outcomes in at least one study.

Several other important risk factors were considered, but could not be included because sufficient or unbiased data on their national exposure distributions and/or effects on disease-specific mortality were not available, or because the evidence on causal effects was less convincing. Examples of important risk factors not included in this work because of insufficient data on exposure or on the presence and magnitude of causal effects include illicit drug use, caloric intake, triglycerides and high-density lipoprotein (HDL) cholesterol, whole-grain intake, gun ownership, and risk factors that primarily affect mental health outcomes. The focus of our analysis was not on environmental and occupational risks (e.g., exposure to urban particle pollution, radon, and arsenic), primarily because for many of these risks nationally representative data on population exposure using the same metrics as used in epidemiological studies are unavailable. Comparative analyses of these risks should be a priority for future research.

Data Sources

We obtained risk factor exposure distributions from nationally representative health examination and interview surveys, etiological effect sizes from published or new systematic reviews and meta-analyses of epidemiological studies, and the number of deaths by cause from the National Center for Health Statistics (NCHS).

Risk factor exposure. For most risk factors in this analysis, we used data from the National Health and Nutrition Examination Survey (NHANES) to measure population exposures (Table 1). NHANES uses a complex multi-stage, stratified, clustered probability sample design to provide nationally representative data on health and nutrition characteristics of the civilian, noninstitutionalized US population. NHANES includes an in-person interview and a subsequent examination component in a MEC (mobile examination clinic); those unable to visit the MEC are offered a limited examination at home. We used two NHANES rounds that covered 2003–2006 to provide sufficient sample size for exposure estimates by age and sex, for years as close as possible to the latest year for which mortality data were available (2005). The total sample size for the 2003–2006 rounds was 20,470. Additional information on survey design and methods is available at http://www.cdc.gov/nchs/nhanes.htm. We adjusted the intakes of fruits and vegetables, omega-3 fatty acids, and salt (sodium) from NHANES for total energy intake using the residual method [4].

We used the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) to measure the quantity of alcohol consumed and the pattern of consumption. NESARC is a multi-

Table 1. Risk factors in this analysis, their exposure variables, theoretical-minimum-risk exposure distributions, disease outcomes, and data sources for exposure.

Risk Factor	Exposure Metric	Exposure Data Sources	TMRED ± SD	Disease Outcomes[a]
High blood glucose	Usual level of fasting plasma glucose [61]	NHANES 2003–2006 (SD corrected for intra-individual variation)	4.9±0.3 mmol/l [61]	IHD; stroke; renal failure; *colorectal, breast, and pancreatic cancers*
High LDL cholesterol[b]	Usual level of LDL cholesterol	NHANES 2003–2006 (SD corrected for intra-individual variation)	2.0±0.44 mmol/l[c] [62]	IHD; ischemic stroke; *selected other cardiovascular diseases*
High blood pressure	Usual level of systolic blood pressure	NHANES 2003–2006 (SD corrected for intra-individual variation)	115±6 mmHg [63,64]	IHD, stroke, hypertensive disease, other cardiovascular diseases[d], *renal failure*
Overweight–obesity (high BMI)	BMI	NHANES 2003–2006	21±1 kg/m^2 [21,65]	IHD; ischemic stroke; hypertensive disease; diabetes mellitus; corpus uteri, colon, kidney, and postmenopausal breast cancers; *gallbladder cancer*[e]
High dietary trans fatty acids	Usual percent of total calories from dietary trans fatty acids	CSFII 1989–1991[f]	0.5%±0.05% of total calories from trans fatty acids [16]	IHD
Low dietary poly-unsaturated fatty acids (PUFA) (in replacement of saturated fatty acids; see Table 2)	Usual percent of total calories from dietary PUFA	NHANES 2003–2006	10%±1% of total calories from PUFA	IHD, stroke
Low dietary omega-3 fatty acids (seafood)	Usual dietary omega-3 fatty acids in five categories adjusted for total calories[g]	NHANES 2003–2006	250 mg/d [31]	IHD, stroke
High dietary salt (sodium)[h]	Usual level of dietary sodium adjusted for total calories	NHANES 2003–2006	0.5±0.05 g/d [66]	IHD, stroke, hypertensive disease, other cardiovascular diseases, stomach cancer, *renal failure*
Low intake of fruits and vegetables	Usual dietary fruit and vegetable intake adjusted for total calories[i]	NHANES 2003–2006	600±50 g/d [67]	IHD; ischemic stroke; colorectal, stomach, lung, esophagus, mouth, and pharyngeal cancers
Alcohol use	Current alcohol consumption volumes and patterns[j]; prevalence of alcohol use among emergency room patients; BAC levels of drivers in road traffic injuries	NESARC 2001–2002, FARS 2005 and emergency room studies	No alcohol use[k]	IHD; ischemic stroke; hemorrhagic stroke; hypertensive disease; cardiac arrhythmias; diabetes mellitus; liver, mouth, and pharynx, larynx, breast, esophagus, colorectal, selected other cancers[l]; liver cirrhosis; acute and chronic pancreatitis; road traffic injuries; falls; homicide and suicide; other injuries; alcohol use disorders[m]; *selected other cardiovascular diseases; hepatitis C; epilepsy; fetal effects of alcohol use during pregnancy; tuberculosis*
Physical inactivity	Physical activity measured in four categories: inactive, low-active, moderately active, and highly active[n]	NHANES 2003–2006	The whole population being highly active (≥1 h/wk of vigorous activity and at least 1,600 met·min/wk)[o]	IHD; ischemic stroke; breast cancer and colon cancers; diabetes mellitus

Table 1. cont.

Risk Factor	Exposure Metric	Exposure Data Sources	TMRED ± SD	Disease Outcomes[a]
Tobacco smoking	Current levels of Smoking Impact Ratio (SIR) (indirect indicator of accumulated smoking risk based on excess lung cancer mortality) [18][p]	Lung cancer mortality from adjusted vital registration in 2004	No smoking	IHD; stroke; selected other cardiovascular diseases; diabetes mellitus; lung, esophagus, mouth and pharynx, stomach, liver, pancreas, cervix, bladder, kidney and other urinary cancers; leukemia; chronic obstructive pulmonary disease (COPD); other respiratory diseases[q] tuberculosis; *colorectal cancer and hypertensive disease[r], burns and fire injuries, effects of smoking during pregnancy on maternal and perinatal conditions*

[a]Outcomes in italics are those for which the effects were not quantified in the main analysis due to weaker evidence on causality (e.g. tobacco smoking and colorectal cancer or high blood glucose and cancers) or because there were very few deaths from the disease (e.g. high BMI and gallbladder cancer).

[b]We evaluated sensitivity to the choice of exposure metric by using total cholesterol instead of LDL-cholesterol (Table S1).

[c]Two alternative TMREDs for LDL cholesterol with means of 1.6 mmol/l and 2.3 mmol/l were examined in sensitivity analysis (Table S1).

[d]This category includes rheumatic heart disease, acute and subacute endocarditis, cardiomyopathy, other inflammatory cardiac diseases, valvular disorders, aortic aneurysm, pulmonary embolism, conduction disorders, peripheral vascular disorders, and other ill-defined cardiovascular diseases.

[e]We did not include some of the cancers that were found to have significant association with BMI in a recent meta-analysis [17] either because there were very few deaths in the US (adenocarcinoma of esophagus and gallbladder cancer) or because there was not strong evidence on a causal effect from other studies (leukemia and multiple myeloma). We included non-Hodgkin lymphoma in a sensitivity analysis (Table S1).

[f]The NHANES rounds in 2003–2006 include a 2-d dietary intake survey and could be used to estimate dietary trans fatty acids. However, a reliable source for the trans fat content of each food item was not available to us. We have used the intake estimates in the Continuing Survey of Food Intakes by Individuals (CSFII) 1989–1991 [68] in our analysis.

[g]Omega-3 intake categories in the analysis were: 0 to <62.5; 62.5 to <125; 125 to <187.5; 187.5 to <250; and ≥250 mg/d of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

[h]The effect of reduction in salt intake on SBP and the effect of subsequent decline in SBP on the relevant disease outcomes were estimated at the individual level to account for possible correlation between salt intake and SBP.

[i]We evaluated sensitivity to the assumption of normal distribution for fruit and vegetable intake (Table S1).

[j]Exposure categories were: Abstainer, a person not having had a drink containing alcohol within the last year; DI, 0–19.99 g of pure alcohol daily (females) and 0–39.99 g (males); DII, 20–39.99 g (females) and 40–59.99 g (males); and DIII, >40 g (females) and >60 g (males). Binge drinking was defined as having at least one occasion of five or more drinks in the last month.

[k]An alternative TMRED for alcohol use as regular drinking of small amounts of alcohol is considered in sensitivity analysis (Table S1).

[l]This category includes ICD-9 codes 210–239.

[m]This category includes ICD-9 codes 291, 303, and 305.0.

[n]Categories of physical activity were defined as below using responses to questions regarding physical activity during the past 30 d: inactive, no moderate or vigorous physical activity; low-active, <2.5 h/wk of moderate activity or <600 met·min/wk; moderately active, either ≥2.5 h/wk of moderate activity or ≥1 h of vigorous activity and ≥600 met·min/wk; highly active, ≥1 h/wk of vigorous activity and ≥1,600 met·min/wk.

[o]This TMRED is based on multiple prospective studies that report beneficial effects of physical activity continuing above the current recommended levels [69–72].

[p]We also calculated the mortality effects of tobacco smoking using the prevalence of current and former smokers, as used by Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC; http://apps.nccd.cdc.gov/sammec) [73], in a sensitivity analysis (Table S1).

[q]This category includes lower respiratory tract infections and asthma.

[r]Evidence of a causal association between tobacco smoking and colorectal cancer was classified as suggestive in the 2004 Report of the US Surgeon General [73]. The 2004 report also excluded hypertensive disease from the outcomes considered in smoking-attributable mortality. Therefore, colorectal cancer and hypertensive disease were not included in the main analysis, but were included in sensitivity analysis (Table S1).

doi:10.1371/journal.pmed.1000058.t001

stage, stratified, cluster-sampling, nationally representative survey of the noninstitutionalized US population, whose target population includes boarding houses, rooming houses, nontransient hotels and motels, shelters, facilities for housing workers, college quarters, and group homes. The 2001–2002 sample size was 43,093. Detailed information on frequency, amount, and type of beverage during the previous 12 mo was sought using computer assisted personal interviewing. Average daily alcohol consumption in NESARC was estimated using responses to questions on both the usual quantity-and-frequency of drinking, and quantity-and-frequency of binge drinking. This method provides a more valid estimate of average consumption than do calculations based solely on questions regarding usual drinking [5]. A summary is available online at http://www.census.gov/rophi/www/nesarc.html.

We accounted for complex survey design and sampling weights in estimating exposures. Using one-off measurements in health examination surveys overestimates the standard deviation (SD) of the "usual" population exposure distribution, due to within-person variation. We estimated the usual population SD of blood pressure, fasting plasma glucose (FPG), and LDL cholesterol by multiplying the SD of NHANES sample by the dilution ratio from studies that had multiple exposure measurements [6–8]. We did not adjust the SD of BMI for within-person variations in body weight, because studies with multiple BMI measurements have not found evidence for substantial within-person variability in BMI [9]. For dietary factors, we calculated the SD of population exposure by partitioning the within- and between-person variabilities of the two 24-h diet recalls using a random-effect regression model (using XTREG in STATA software). We also did not adjust the distributions of alcohol use and physical activity, because there were very few prospective studies with multiple measurements to provide reliable evidence for the relationship between one-off and usual exposure distributions [9,10].

Etiological effects of risk factors on disease-specific mortality. We obtained the relative risk (RR) per unit of exposure (for risks measured continuously) or for each exposure category (for risks measured in categories) for diseases with probable or convincing causal associations with each risk factor, based on the most recent published systematic reviews and meta-analyses of epidemiological studies or by conducting new systematic reviews and meta-analyses when they were not available in the published literature (Tables 2–7).

The studies used for etiological effect sizes included both randomized intervention studies of exposure reduction and observational studies (primarily prospective cohort studies) that estimated the effects of baseline exposure. The majority of observational studies used for effect sizes had adjusted for important potential confounding factors. Each RR used in our analysis represents the best evidence for the proportional effect of risk factor exposure on disease-specific mortality in the population based on the current causes and determinants of the population distribution of exposure (see also Discussion).

We used RRs for blood pressure, LDL cholesterol, and FPG that were adjusted for regression dilution bias using studies that had repeated exposure measurement [7,11,12]; for blood pressure and LDL cholesterol, the adjusted magnitude is supported by effect sizes from randomized studies [13,14]. Evidence from a large prospective study with multiple measurements of weight and height showed that regression dilution bias did not affect the RRs for BMI, possibly because there is less variability [15]. RRs for dietary salt and PUFA-SFA replacement were from intervention studies, and hence unlikely to be affected by regression dilution bias. RRs for dietary trans fatty acids were primarily from studies that had used cumulative averaging of repeated measurements [16] that reduces but may not fully correct for regression dilution bias. RRs for physical inactivity, alcohol use, smoking, and dietary omega-3 fatty acids and fruits and vegetables were not corrected for regression dilution bias due to insufficient current information from epidemiological studies on exposure measurement error and variability, which is especially important when error and variability of self-reported exposure may themselves differ across studies.

For each risk factor–disease pair, we used the same RR for men and women except where empirical evidence indicated that the RR differed by sex: colon and pancreas cancers caused by high BMI [17], and all disease outcomes caused by alcohol use and tobacco smoking, for which there are sex differences in factors such as smoking duration and intensity [18] and type of alcohol consumed [19]. The RRs for some risk factor–disease associations vary by age, especially for cardiovascular diseases. We used consistent age-varying distributions of RRs across risk factors and diseases (Tables 2–7).

The current evidence suggests that when measured comparably the proportional effects of the risk factors considered in this analysis are similar across populations, e.g., Western and Asian populations [7,20,21]. The exception to this observation is the effects of alcohol use on ischemic heart disease (IHD) where the pattern of drinking (regular versus binge) determines the RR. We used both the average quantity of alcohol consumed as well as the drinking pattern in our analysis of exposure and RRs for alcohol use and IHD. The effects of alcohol on injuries and violence may also be modified by social, policy, and transportation factors. Therefore, we did not pool epidemiological studies on the injury effects of alcohol from different countries, but used data sources that appropriately measure effects in the US (Table 4).

Disease-specific deaths. The number of disease-specific deaths, by age and sex, was obtained from the NCHS, which maintains records for all deaths in the US. Although the US has automated (computerized) assignment of an International Classification of Diseases (ICD) code for the underlying cause of death, the validity and comparability of cause of death statistics may be affected at the time of medical certification, especially for cardiovascular causes and diabetes [22–24]. We adjusted for incomparability in cause of death assignment using previously described methods [22,23]. This adjustment required information on multiple contributing causes of death and county of residence. We obtained county identifiers for all deaths in 2005 through a special request to the NCHS.

Several risk factors have different effects on ischemic and hemorrhagic stroke (Table 1). Slightly more than 50% of stroke deaths in 2005 were assigned to unspecified subtype (ICD-10 code I-64). We redistributed these deaths to ischemic and hemorrhagic stroke using proportions from large epidemiological studies with high-quality diagnosis and cause-of-death assignment [25], stratified by age using a meta-analysis of stroke registries in Western populations [26].

Estimating Mortality Attributable to Risk Factors

For each risk factor and for each disease causally associated with its exposure, we computed the proportional reduction in disease-specific deaths that would occur if risk factor exposure had been reduced to an alternative level. This is known as the population-attributable fraction (PAF) and measures the total effects of a risk factor (direct as well as mediated through other factors). For risks measured continuously (blood pressure, BMI, LDL cholesterol, FPG, dietary fruits and vegetables, and trans and polyunsaturated fatty acids), we computed PAFs using the

Table 2. Sources and magnitudes of relative risks for the effects of continuous dietary risk factors on disease-specific mortality.

Risk Factor	Disease Outcome	Source of RR	Units	Age Group	RR
High dietary trans fatty acids	IHD[a]	Meta-analysis of three prospective cohort studies [16]	Per one percentage point more calories	30–44	1.40
				45–59	1.29
				60–69	1.14
				70–79	1.08
				80+	1.06
Low dietary PUFA (in replacement of SFA)	IHD[a]	Meta-analysis of seven intervention studies by authors[b]	Per one percentage point less calories from PUFA, in isocaloric exchange for SFA[b]	30–44	1.05
				45–59	1.04
				60–69	1.02
				70–79	1.01
				80+	1.01
High dietary salt	SBP	Meta-analysis of dietary trials	mmHg SBP per 100 mmol/d dietary sodium	SBP≥140 mmHg	7.11
				SBP<140 mmHg	3.57
	Stomach cancer	Meta-analysis of three prospective cohort studies [74]	Per 100 mmol/d dietary sodium	—	1.57
Low intake of fruits and vegetables	IHD	Meta-analysis of six prospective cohort studies [75]	Per 80 g/d lower intake	30–69	1.04
				70–79	1.03
				80+	1.02
	Ischemic stroke	Meta-analysis of three prospective cohort studies [76]	Per 80 g/d lower intake	30–69	1.06
				70–79	1.05
				80+	1.03
	Lung cancer	Meta-analysis of major observational studies [67]	Per 80 g/d lower intake	30–69	1.04
				70–79	1.03
				80+	1.02
	Stomach cancer	Meta-analysis of major observational studies [67]	Per 80 g/d lower intake	30–69	1.06
				70–79	1.05
				80+	1.03
	Colorectal cancer	Meta-analysis of major observational studies [67]	Per 80 g/d lower intake	30–69	1.01
				70–79	1.01
				80+	1.00
	Esophagus, mouth, and pharynx cancers	Meta-analysis of major observational studies [77]	Per 80 g/d lower intake	30–69	1.10
				70–79	1.08
				80+	1.05

[a]For these risk factor–disease pairs, RRs in the source were reported for all ages combined. We used median age at event and the age pattern of excess risk for serum total cholesterol and IHD to estimate RRs for each age category.

[b]The interventions studies replaced dietary SFA with PUFA, hence the RRs measure the effect of replacement. Effects of replacing PUFA for other macronutrients have not been evaluated in randomized interventions studies. However, evidence from cohort studies suggests that replacement of PUFA for carbohydrates, but not carbohydrates for SFA, would produce similar benefits [78], indicating that the measured benefits are due to PUFA.

doi:10.1371/journal.pmed.1000058.t002

following relationship.

$$PAF = \frac{\int_{x=0}^{m} RR(x)P(x)\,dx - \int_{x=0}^{m} RR(x)P'(x)\,dx}{\int_{x=0}^{m} RR(x)P(x)\,dx} \quad (1)$$

Where x = exposure level; $P(x)$ = actual distribution of exposure in the population; $P'(x)$ = alternative distribution of exposure in the population; $RR(x)$ = relative risk of mortality at exposure level x; and m = maximum exposure level.

For risks measured in categories of exposure (smoking, physical inactivity, alcohol use, and dietary omega-3 fatty acids), we used the discrete version of the same estimator for PAF.

Table 3. Sources and magnitudes of relative risks (RRs) for the effects of categorical dietary risk factors on disease-specific mortality.

Risk Factor	Disease Outcome	Source of RR	Age Group	RR 1	RR 2	RR 3	RR 4	RR 5
Low dietary omega-3 fatty acids[a]	IHD[b]	Meta-analysis of randomized intervention studies and prospective cohort studies [31][c]	30–44	2.18	1.80	1.46	1.14	1.00
			45–59	1.86	1.58	1.33	1.10	1.00
			60–69	1.41	1.28	1.16	1.05	1.00
			70–79	1.23	1.16	1.09	1.03	1.00
			80+	1.19	1.13	1.07	1.02	1.00
	Stroke[b]	Meta-analysis of 12 prospective cohort studies by authors[c]	30–44	1.27	1.19	1.11	1.04	1.00
			45–59	1.27	1.19	1.11	1.04	1.00
			60–69	1.16	1.11	1.06	1.02	1.00
			70–79	1.11	1.08	1.04	1.01	1.00
			80+	1.10	1.07	1.04	1.01	1.00

[a]Omega-3 intake categories in the analysis were (1) 0 to <62.5; (2) 62.5 to <125; (3) 125 to <187.5; (4) 187.5 to <250; and (5) ≥250 mg/d of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

[b]For each disease outcome, RRs in the source were reported for all ages combined. We used median age at event and the age pattern of excess risk for serum total cholesterol and the same disease to estimate RRs for each age category.

[c]RRs were summarized via meta-regression across intake levels [79]. When RRs were reported for fish intake, we converted the units to omega 3 intake using the average omega-3 content of one serving of fish estimated using NHANES 2003–2004.

doi:10.1371/journal.pmed.1000058.t003

We used a different method of estimating the PAFs for effects of alcohol use on injuries. A number of emergency room studies have collected information on alcohol consumption in the 6 h prior to the injury among injury patients. Injuries that occur among patients who had consumed alcohol prior to their injury were classified as "alcohol-related" injuries. Because some of these injuries would have occurred in the absence of alcohol, not all are caused by alcohol use; in other words, the proportion of alcohol-attributable injuries is lower than that of alcohol-related injuries. Highway studies have quantified the increased risk of road traffic deaths among drivers who have consumed alcohol according to the drivers' blood alcohol concentration, often reported as odds ratios (ORs). Ideally, ORs would be used in conjunction with data on population prevalence of intoxication to calculate PAF. Because intoxication data were not available, we used a slightly modified equation to calculate the PAF using ORs from highway studies and data on alcohol-related injuries:

$$PAF \cong (\text{proportion alcohol} - \text{related}) \times \left(\frac{OR-1}{OR}\right) \quad (2)$$

The proportion of alcohol-related injuries was obtained from Fatality Analysis Reporting System (FARS) for road traffic injuries and from a meta-analysis of emergency room studies for other types of intentional and unintentional injuries [27,28]. FARS is a census of fatal crashes maintained by the National Highway Traffic Safety Administration and includes information on the blood alcohol concentration (BAC) level of drivers involved in fatal crashes, regardless of whether the decedent was the driver or not. Beginning in 2001, National Center for Statistics and Analysis uses a multiple imputation method to impute ten values for each missing BAC value. Additional information on FARS is available at http://www-fars.nhtsa.dot.gov/Main/index.aspx. The sources for ORs are provided in Table 4.

We calculated the number of deaths from each causally related disease outcome attributable to a risk factor by multiplying its PAF by total deaths from that disease. Disease-specific deaths attributable to each risk factor were summed to obtain the total (all-cause) attributable deaths. Deaths from different diseases attributable to a single risk factor are additive because in mortality statistics based on the ICD, each death is categorically assigned to a single underlying cause (disease) with no overlap between disease-specific deaths. However, the deaths attributable to individual risk factors often overlap and should not be summed (see Discussion).

To measure the mortality effects of all non-optimal levels of exposure consistently and comparably across risk factors, we used an optimal exposure distribution, referred to as the theoretical-minimum-risk exposure distribution (TMRED), as the alternative exposure distribution (Table 1). The TMREDs were zero for risk factors for which zero exposure led to minimum risk (e.g., no tobacco smoking). For BMI, blood pressure, blood glucose, and LDL cholesterol, zero exposure is physiologically impossible. For these risks we used TMREDs based on the levels corresponding to the lowest mortality rate in epidemiological studies or the levels observed in low-exposure populations (Table 1). Alcohol use may be beneficial or harmful depending on the specific disease outcome and patterns of alcohol consumption [29,30]. We used a TMRED of zero for alcohol in our primary analysis, and regular drinking of small amounts as the TMRED in a sensitivity analysis. The TMREDs for factors with protective effects (physical activity and dietary PUFA-SFA replacement, omega-3 fatty acids, and fruits and vegetables) were selected as the intake and activity levels to which beneficial effects may plausibly continue based on the evidence from current studies. For example, intake of omega-3 fatty acids seems to reduce IHD mortality at intakes up to 250 mg/d, but has relatively little additional mortality benefits at higher intakes [31]. In setting TMREDs for protective factors, we also took into account the levels observed in populations that have high intake, e.g., for fruits and vegetables.

Table 4. Sources and magnitudes of relative risks for the effects of alcohol use on disease-specific mortality.

Disease Outcome	Source of RR	Age Group	Sex	Abstainers	DI[a]	DII[a]	DIII[a]	Binge Drinkers
IHD[a]	Meta-analysis of observational studies for non-binge [19,30] and binge drinkers [80]	30–44	—	1.00	0.60	0.62	1.00	1.00
		45–59	—	1.00	0.63	0.65	1.00	1.00
		60–69	—	1.00	0.82	0.83	1.00	1.00
		70–79	—	1.00	0.92	0.93	1.00	1.00
		80+	—	1.00	0.97	0.98	1.00	1.00
Ischemic stroke[b]	Meta-analysis of 35 observational studies [19,81]	30–44	M	1.00	0.83	0.83	3.84	—
			F	1.00	0.88	1.07	1.33	—
		45–59	M	1.00	0.88	0.88	2.52	—
			F	1.00	0.91	1.05	1.22	—
		60–69	M	1.00	0.94	0.94	1.69	—
			F	1.00	0.96	1.02	1.10	—
		70–79	M	1.00	0.97	0.97	1.32	—
			F	1.00	0.98	1.01	1.05	—
		80+	M	1.00	1.00	1.00	1.00	—
			F	1.00	1.00	1.00	1.00	—
Hemorrhagic stroke[b]	Meta-analysis of 35 observational studies [19,81]	30–44	M	1.00	1.65	3.16	6.65	—
			F	1.00	1.30	2.07	3.89	—
		45–59	M	1.00	1.42	2.21	3.60	—
			F	1.00	1.20	1.67	2.54	—
		60–69	M	1.00	1.19	1.55	2.18	—
			F	1.00	1.09	1.30	1.70	—
		70–79	M	1.00	1.09	1.25	1.55	—
			F	1.00	1.04	1.13	1.32	—
		80+	M	1.00	1.00	1.00	1.00	—
			F	1.00	1.00	1.00	1.00	—
Hypertensive disease	Overview of observational studies [19,82,83]	—	M	1.00	1.4	2.0	4.1	—
		—	F	1.00	1.4	2.0	2.0	—
Cardiac arrhythmias	Overview of observational studies [82]	—	—	1.00	1.51	2.23	2.23	—
Breast cancer	Systematic review of epidemiological studies [19,82,83]	30–44	F	1.00	1.15	1.41	1.46	—
		45+	F	1.00	1.14	1.38	1.62	—
Colorectal cancer	Pooled analysis of 8 prospective cohort studies [84]	—	M	1.00	1.0	1.16	1.41	—
		—	F	1.00	1.0	1.01	1.41	—
Esophagus cancer	Overview of observational studies [19,82,83]	—	—	1.00	1.80	2.38	4.36	—
Mouth and pharynx cancer	Overview of observational studies [19,82,83]	—	—	1.00	1.45	1.85	5.39	—
Laryngeal cancer	Overview of observational studies [82]	—	—	1.00	1.83	3.90	4.93	—
Liver cancer	Overview of observational studies [19,82,83]	—	—	1.00	1.45	3.03	3.60	—
Selected other cancers[c]	Overview of observational studies [19,83]	—	—	1.00	1.1	1.3	1.7	—
Diabetes mellitus	Overview of observational studies [19,82,83]	—	M	1.00	0.99	0.57	0.73	—

Table 4. cont.

Disease Outcome	Source of RR	Age Group	Sex	Abstainers	DI[a]	DII[a]	DIII[a]	Binge Drinkers
		—	F	1.00	0.92	0.85	1.13	—
Liver cirrhosis	Overview of observational studies [19,82,83]	—	—	1.00	1.3	9.5	13	—
Acute and chronic pancreatitis	Meta-analysis of observational studies [85]	—	M	1.00	1.3	1.8	3.2	—
		—	F	1.00	1.3	1.8	1.8	—
			BAC %	<0.01	0.01–0.04	0.05–0.07	0.08–0.1	≥0.11
Road traffic injury deaths	Grand Rapids Study [19,86][d]		OR	1.0	1.2	1.7	4.0	10.7
Falls, homicide and suicide, and other injury deaths	Grand Rapids Study [19,86][d]		OR	10.7[e]	—	—	—	—

[a]Exposure categories were: Abstainer, a person not having had a drink containing alcohol within the last year; DI 0–19.99 g of pure alcohol daily (females) and 0–39.99 g (males); DII, 20–39.99 g (females) and 40–59.99 g (males); and DIII, >40 g (females) and >60 g (males). Binge drinking was defined as having at least one occasion of five or more drinks in the last month. For IHD, the categories refer to non-binge drinkers.

[b]For these risk factor–disease pairs, RRs in the source were reported for all ages combined. We used median age at event and the age pattern of excess risk from smoking and the same disease to estimate RRs for each age category.

[c]This category includes ICD-9 codes 210–239.

[d]These odds ratios were used to estimate PAF as described in the Methods section.

[e]Used to estimated PAF for having drunk alcohol in the last 6 h before injury.

doi:10.1371/journal.pmed.1000058.t004

We conducted all analyses separately by sex and age group (30–44, 45–59, 60–69, 70–79, and ≥80 y). We restricted analyses to ≥30 y because there are limited data on the mortality effects of these risk factors at younger ages and because there are few deaths from diseases affected by these risks in younger ages (about 10,000 deaths from the relevant non-injury causes in Americans <30 y versus 1,745,000 in those ≥30 y). The exception was the effect of alcohol use on injuries for which we also included 0- to 29-y-olds because there are substantial injury deaths at these ages. Therefore, we can assess both the role of alcohol use as a cause of injuries in young drinkers and the effect of alcohol use by any drinker (e.g., an intoxicated driver) on injury in young nondrinkers.

Uncertainty and Sensitivity Analyses

We estimated the uncertainty of the number of deaths attributable to each risk factor as caused by sampling variability. To compute sampling uncertainty, we used a simulation approach to combine the uncertainties of exposure distributions and RRs in each age–sex group. In the simulation method, we drew repeatedly from the distributions of exposure mean and SD (for continuous risks) or prevalence in each exposure category (for categorical risks). The uncertainty of these parameters was characterized using normal, Chi-square, or binomial distributions. RRs for each disease were drawn from a log-normal distribution independently from exposure. Each set of exposure and disease-specific RR draws was used to calculate the PAFs for all diseases associated with the risk factor, separately by age and sex. We used 500 draws for each risk factor, and report 95% confidence intervals (CIs) based on the resulting distributions of 500 estimated attributable deaths. Further simulation details and computer code are available from the authors by request.

In addition to sampling uncertainty, we examined the sensitivity of our results to important methodological factors and data sources. The methodological factors and data sources in the sensitivity analyses included the choice of exposure metrics, the shape of the exposure distribution, the TMREDs, disease outcomes causally associated with risk factors, and etiological effect sizes (Table S1).

We used RRs adjusted for major potential confounders to estimate the causal components of risk factor–disease associations. However, if there is also a correlation between exposure and disease-specific mortality, due to correlations of exposure with other risks or other unobserved factors, the above equations may result in under- (when there is positive correlation) or over-estimation (negative correlation) of the true PAF when used with adjusted RRs [32–36]. To assess the effect of correlation, we also calculated PAFs that incorporated correlations between risk factors or between risk factors and underlying disease-specific mortality in multiple sensitivity analyses. Ideally the analyses of risk factor correlations would have used the complete multivariate distribution of exposure to all risk factors and disease outcomes. However, the sources in this analysis did not provide data on the joint exposure distributions of all risk factors together. Therefore, our analyses of risk factor correlation using current data sources were limited to risk factor pairs.

Analyses were conducted using Stata version 10 (Stata Corp, College Station, Texas) and SAS version 9.1 (SAS Institute, Cary, NC).

Results

In the year 2005, 2,448,017 US residents died; 49% of these deaths were among men. Ninety-six percent of all deaths in the US were in people ≥30 y of age. After adjustment for comparability of cause-of-death assignment [22,23], the four most common causes of death were IHD (434,000 deaths), lung cancer (163,000 deaths), stroke (150,000 deaths), and chronic obstructive pulmonary diseases (124,000 deaths).

Total Mortality Effect of Risk Factors

Tobacco smoking was responsible for an estimated 467,000 (95% CI 436,000–500,000) deaths and high blood pressure for

Table 5. Sources and magnitudes of relative risks for the effects of physical inactivity on disease-specific mortality.

Disease Outcome	Source of RR	Age Group	Highly Active	Recommended Level Active	Insufficiently Active	Inactive
IHD	Meta-analysis of 20 prospective cohort studies [87][a]	30–69	1.00	1.15	1.66	1.97
		70–79	1.00	1.15	1.51	1.73
		80+	1.00	1.15	1.38	1.50
Ischemic stroke	Meta-analysis of 8 prospective cohort studies [87][a]	30–69	1.00	1.12	1.23	1.72
		70–79	1.00	1.12	1.21	1.55
		80+	1.00	1.12	1.18	1.39
Breast cancer	Meta-analysis of 12 prospective cohort and 31 case-control studies [87][a]	30–44	1.00	1.25	1.41	1.56
		45–69	1.00	1.25	1.41	1.67
		70–79	1.00	1.25	1.36	1.56
		80+	1.00	1.25	1.32	1.45
Colon cancer	Meta-analysis of 11 prospective cohort and 19 case-control studies [87][a]	30–69	1.00	1.07	1.27	1.80
		70–79	1.00	1.07	1.21	1.59
		80+	1.00	1.07	1.16	1.39
Diabetes	Meta-analysis of 13 prospective cohort and 9 case-control studies [87][a]	30–69	1.00	1.21	1.50	1.76
		70–79	1.00	1.21	1.43	1.60
		80+	1.00	1.21	1.34	1.45

Categories of physical activity were defined as below using responses to questions regarding physical activity during the past 30 d: inactive, no moderate or vigorous physical activity; low-active, <2.5 h/wk of moderate activity or ≤600 met·min/wk; moderately active: either ≥2.5 h/wk of moderate activity or ≥1 h of vigorous activity and ≥600 met·min/wk; highly active: ≥1 h/wk of vigorous activity and ≥1,600 met·min/wk.

[a]The meta-analysis of RRs for physical inactivity used three categories: inactive, insufficiently active, and recommended-level active. For this analysis, we re-scaled the RRs to set the highly active group as the reference category. The ratio of excess risk from recommended-level active to high-active was from Manson et al. for IHD [69], Hu et al. for ischemic stroke [70], Patel et al. 2003 for breast cancer [71], and Chao et al. for colon cancer [72].

doi:10.1371/journal.pmed.1000058.t005

395,000 (372,000–414,000) deaths, each accounting for about one in five or six deaths in US adults in 2005 (Figure 1A, Table 8). Overweight–obesity, physical inactivity, and high blood glucose each caused 190,000–216,000 deaths (8%–9% of all deaths in adults). The mortality effects of individual dietary risk factors ranged from 15,000 deaths for low dietary PUFA (<1% of all deaths) to 82,000–102,000 deaths for low dietary omega-3 fatty acids, high dietary trans fatty acids, and high dietary salt. Alcohol use caused 90,000 deaths from road traffic and other injuries, violence, chronic liver disease, cancers, alcohol use disorders, hemorrhagic stroke, arrhythmias and hypertensive disease, but also averted a balance of 26,000 deaths from IHD, ischemic stroke, and diabetes, due to benefits among those who drank alcohol moderately and regularly.

Mortality Effects of Risk Factors by Disease

Most deaths attributable to these risks were from cardiovascular diseases (Figure 1). Cancers, respiratory diseases, diabetes, and injuries nonetheless accounted for at least 23% of all deaths caused by smoking, alcohol use, high blood glucose, physical inactivity, low intake of fruits and vegetables, and overweight–obesity. The single largest risk factor for cardiovascular mortality in the US was high blood pressure, responsible for an estimated 395,000 (95% CI 372,000–414,000) cardiovascular deaths (45% of all cardiovascular deaths), followed by overweight–obesity, physical inactivity, high LDL cholesterol, smoking, high dietary salt, high dietary trans fatty acids, and low dietary omega-3 fatty acids. Smoking had the largest effect on cancer mortality compared with any other risk factor, causing an estimated 190,000 (184,000–194,000) or 33% of all cancer deaths.

Mortality Effects of Risk Factors by Sex and Age

High blood pressure was the leading cause of death in women (231,000 deaths [95% CI 213,000–249,000], 19% of all female deaths), whereas smoking remains the leading cause of death in men (248,000 deaths [226,000–269,000], 21% of all male deaths). The leading causes of death in men and women were different because women have higher blood pressure and men higher cumulative (i.e., current and former) smoking. Overweight–obesity, physical inactivity, and high blood glucose were the third to fifth causes of death for both sexes (Figure 1B and 1C). High dietary salt was responsible for slightly more deaths than high LDL cholesterol in women.

The mortality effects of all individual risk factors except alcohol use were almost equally divided between men and women (i.e., at least 40% of deaths attributable to each individual risk factor were either in men or in women). Seventy percent of all deaths attributable to alcohol use occurred in men (45,000 deaths), because men consumed more alcohol and had more binge drinking.

Table 6. Sources and magnitudes of relative risks for the effects of tobacco smoking on disease-specific mortality.

Disease Outcome	Source of RR	Age Group	Sex	RR
IHD	American Cancer Society Cancer Preventions Study, Phase II (ACS CPS-II) [88][a]	30–44	M	5.51
			F	2.26
		45–59	M	3.04
			F	3.78
		60–69	M	1.88
			F	2.53
		70–79	M	1.44
			F	1.68
		80+	M	1.05
			F	1.38
Stroke	ACS CPS-II [88][a]	30–44	M	3.12
			F	4.61
		45–59	M	3.12
			F	4.61
		60–69	M	1.88
			F	2.81
		70–79	M	1.39
			F	1.95
		80+	M	1.05
			F	1.00
Hypertensive disease (sensitivity analysis)[b]	ACS CPS-II [88][a]	30–44	M	5.93
			F	2.38
		45–59	M	3.23
			F	4.05
		60–69	M	1.96
			F	2.67
		70–79	M	1.48
			F	1.74
		80+	M	1.06
			F	1.42
Selected other cardiovascular diseases[b]	ACS CPS-II [88] [a]	30–44	M	6.91
			F	2.65
		45–59	M	3.68
			F	4.65
		60–69	M	2.15
			F	3.00
		70–79	M	1.58
			F	1.89
		80+	M	1.07
			F	1.50
Diabetes mellitus	Meta-analysis of 25 prospective cohort studies with 1.2 million participants [89][a]	—	—	1.44
Lung cancer	ACS CPS-II [90][a]	—	M	21.3
			F	12.5
Mouth, pharynx, and esophagus cancer	ACS CPS-II [90][a]	—	M	8.1
			F	6.0
Stomach cancer	ACS CPS-II [90][a]	—	M	2.16
			F	1.49
Liver cancer	ACS CPS-II [90][a]	—	M	2.33
			F	1.50
Pancreas cancer	ACS CPS-II [90][a]	—	—	2.20
Cervix uteri cancer	ACS CPS-II [90][a]	—	F	1.50
Bladder cancer	ACS CPS-II [90][a]	—	M	3.00
			F	2.40
Leukemia	ACS CPS-II [90][a]	—	M	1.89
			F	1.23
Colorectal cancer (sensitivity analysis)	ACS CPS-II [90,91][a]	—	M	1.32
			F	1.41
Kidney and other urinary cancer	ACS CPS-II [90][a]	—	M	2.5
			F	1.5
Chronic obstructive pulmonary disease	ACS CPS-II [92][a]	—	M	10.8
			F	12.3
Other respiratory diseases[c]	ACS CPS-II [92][a]	—	M	1.90
			F	2.20
Tuberculosis	Meta-analysis of cohort, case-control, and cross-sectional studies [93]	—	—	1.62

[a]We used ACS CPS-II as the source of RRs because the Smoking Impact Ratio (SIR), which was used as the exposure metric for tobacco smoking in the main analysis, is calculated using ACS CPS-II cohort and because the study provided separate RRs for different cancers and cardiovascular diseases by age. The CPS-II RRs were also adjusted for multiple potential confounders.

[b]For these disease outcomes, RRs in the source were reported for all ages combined. We used median age at event and the age pattern of excess risk from IHD to estimate RRs for each age category.

[c]This category includes lower respiratory tract infections and asthma.

doi:10.1371/journal.pmed.1000058.t006

Four percent of all deaths in the US occurred in people between 30 and 45 y of age. No individual risk factor was responsible for more than 7% of deaths in this age group. However, this age group bore 34% of alcohol-caused injuries (Table 9), making

Table 7. Sources and magnitudes of relative risks for the effects of metabolic risk factors on disease-specific mortality.

Risk Factor	Disease Outcome	Source of RR	Units	Age Group	Sex	RR
High blood glucose	IHD	Meta-analysis of 19 prospective cohort studies with 237,000 participants [7][a]	Per mmol/l increase	30–59	—	1.42
				60–69	—	1.20
				70+	—	1.20
	Stroke	Meta-analysis of 19 prospective cohort studies with 237,000 participants [7][a]	Per mmol/l increase	30–59	—	1.36
				60–69	—	1.28
				70+	—	1.08
	Renal failure	Randomized trial of 3,900 participants [94]	Per mmol/l increase		—	1.26
High LDL cholesterol	IHD	Meta-analysis of ten prospective cohort studies [12]	Per mmol/l increase	30–44	—	2.94
				45–59	—	2.10
				60–69	—	1.59
				70–79	—	1.27
				80+	—	1.01
	Ischemic stroke [b]	Meta-analysis of nine prospective cohort studies [12]	Per mmol/l increase	30–44	—	1.30
				45–59	—	1.30
				60–69	—	1.18
				70–79	—	1.00[c]
				80+	—	1.00[c]
High total cholesterol (sensitivity analysis)	IHD	PSC meta-analysis of 61 prospective cohort studies with 900,000 European and North American participants [95]	Per mmol/l increase	30–44	—	2.11
				45–59	—	1.81
				60–69	—	1.39
				70–79	—	1.22
				80+	—	1.18
	Ischemic stroke	PSC [95]	Per mmol/l increase	30–44	—	1.51
				45–59	—	1.37
				60–69	—	1.12
				70–79	—	1.00[c]
				80+	—	1.00[c]
High blood pressure	IHD	PSC [11]	Per 20 mmHg increase	30–44	—	2.04
				45–59	—	2.01
				60–69	—	1.85
				70–79	—	1.67
				80+	—	1.49
	Stroke	PSC [11]	Per 20 mmHg increase	30–44	—	2.55
				45–59	—	2.74
				60–69	—	2.33
				70–79	—	2.00
				80+	—	1.49
	Hypertensive disease[b]	PSC [11]	Per 20 mmHg increase	30–44	—	4.78
				45–59	—	5.02
				60–69	—	4.55
				70–79	—	4.10
				80+	—	3.50
	Other cardiovascular diseases[d]	PSC [11]	Per 20 mmHg increase	30–44	—	2.52

Table 7. cont.

Risk Factor	Disease Outcome	Source of RR	Units	Age Group	Sex	RR
				45–59	—	2.11
				60–69	—	1.89
				70–79	—	1.56
				80+	—	1.43
Overweight–obesity (high BMI)	IHD	APCSC meta-analysis of 33 prospective cohorts with 310,000 participants [65][e,f]	Per kg/m^2 increase	30–44	—	1.14
				45–59	—	1.09
				60–69	—	1.08
				70–79	—	1.05
				80+	—	1.02
	Ischemic stroke	APCSC [65]	Per kg/m^2 increase	30–44	—	1.14
				45–59	—	1.10
				60–69	—	1.08
				70–79	—	1.05
				80+	—	1.03
	Hypertensive disease	APCSC [65]	Per kg/m^2 increase	30–44	—	1.22
				45–59	—	1.18
				60–69	—	1.14
				70–79	—	1.11
				80+	—	1.08
	Postmenopausal breast cancer	Meta-analysis of 31 prospective cohort studies [17]	Per kg/m^2 increase	45+	F	1.02
	Colon cancer	Meta-analysis of 22 prospective cohort studies in males and 19 in females [17]	Per kg/m^2 increase	—	M	1.04
					F	1.02
	Corpus uteri cancer	Meta-analysis of 19 prospective cohort studies [17]	Per kg/m^2 increase	—	F	1.10
	Kidney cancer	Meta-analysis of 11 prospective cohort studies in males and 12 in females [17]	Per kg/m^2 increase	—		1.05
	Pancreatic cancer	Meta-analysis of 12 prospective cohort studies in males and 11 in females [17]	Per kg/m^2 increase	—	M	1.01
					F	1.02
	Non-Hodgkin lymphoma (sensitivity analysis)	Meta-analysis of six prospective cohort studies in males and seven in females [17]	Per kg/m^2 increase	—	—	1.01
	Diabetes mellitus	APCSC meta-analysis prospective cohort studies with 150,000 participants [96]	Per kg/m^2 increase	30–59	—	1.20
				60–69	—	1.16
				70+	—	1.11

[a]See Danaei et al. [61] for sensitivity to using RRs from systematic reviews of other epidemiological studies.

[b]For these risk factor–disease pairs, RRs in the source were reported for all ages combined. We used median age at event and the age pattern of excess risk from another risk factor and the same disease (e.g., age pattern of total serum cholesterol and ischemic stroke was applied to LDL and ischemic stroke) or from the same risk factor and another disease (e.g., age pattern of excess risk for SBP and all cardiovascular diseases was applied to SBP and hypertensive disease) to estimate RRs for each age category.

[c]We used a null association in those 70-y-old and older because RRs in two large meta-analyses of prospective studies [95,97] were not statistically significant from null, and did not show consistent benefits for lower total cholesterol in these ages. There is some evidence from clinical trials that statins reduce the risk of stroke in older ages [98]. However, statins may reduce stroke mortality through other, non-cholesterol mechanisms such as stabilization of atherosclerotic plaques [99]. In the sensitivity analysis for high LDL cholesterol and ischemic stroke, we used an RR of 1.12 in these age groups.

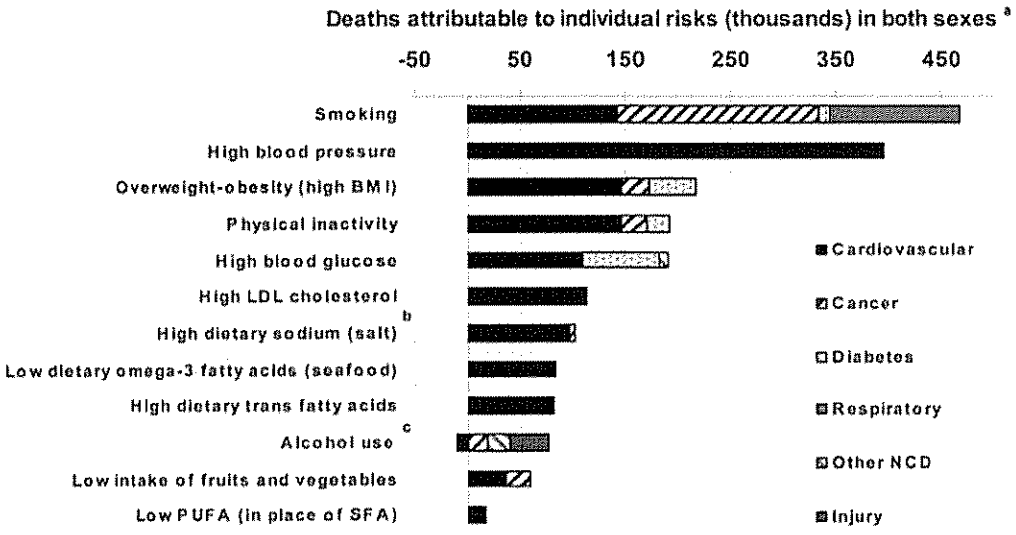
[d]This category includes rheumatic heart disease, acute and subacute endocarditis, cardiomyopathy, other inflammatory cardiac diseases, valvular disorders, aortic aneurysm, pulmonary embolism, conduction disorders, peripheral vascular disorders, and other ill-defined cardiovascular diseases.

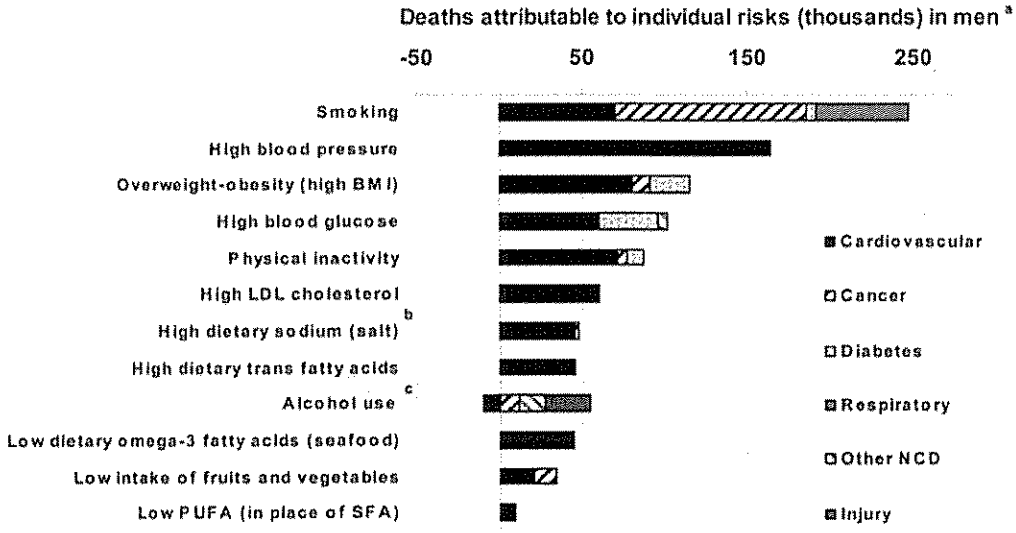
[e]We used meta-analyses of studies with measured weight and height because using self-reported weight and height can lead to bias in estimated RRs. The correlation between self-reported and measured weight, as found in selected studies [100,101], does not remove the possibility of bias because even with perfect correlation, the absolute bias in self-reported weight and height may be a function of its true value.

[f]The RRs reported for Asian and Australia–New Zealand populations were not significantly different in this meta-analysis providing empirical evidence on absence of significant effect modification in the multiplicative scale by ethnicity. A meta-analysis of studies in Europe and North America included studies [102] with self-reported height and weight and was thus not used in this analysis. The RRs reported in that meta-analysis ranged from 1.02 to 1.26 and the average RR weighted by number of cases was 1.07 per kg/m^2 which is almost equal to the RR for 60- to 69-y-olds in this analysis.

APCSC, Asia-Pacific Cohorts Studies Collaboration; PSC, Prospective Studies Collaboration.

doi:10.1371/journal.pmed.1000058.t007


Deaths attributable to individual risks (thousands) in both sexes [a]
-50
50
150
250
350
450
Smoking
High blood pressure
Overweight-obesity (high BMI)
Physical inactivity
High blood glucose
High LDL cholesterol
High dietary sodium (salt) [b]
Low dietary omega-3 fatty acids (seafood)
High dietary trans fatty acids
Alcohol use [c]
Low intake of fruits and vegetables
Low PUFA (in place of SFA)
Cardiovascular
Cancer
Diabetes
Respiratory
Other NCD
Injury


Deaths attributable to individual risks (thousands) in men [a]
-50
50
150
250
Smoking
High blood pressure
Overweight-obesity (high BMI)
High blood glucose
Physical inactivity
High LDL cholesterol
High dietary sodium (salt) [b]
High dietary trans fatty acids
Alcohol use [c]
Low dietary omega-3 fatty acids (seafood)
Low intake of fruits and vegetables
Low PUFA (in place of SFA)
Cardiovascular
Cancer
Diabetes
Respiratory
Other NCD
Injury

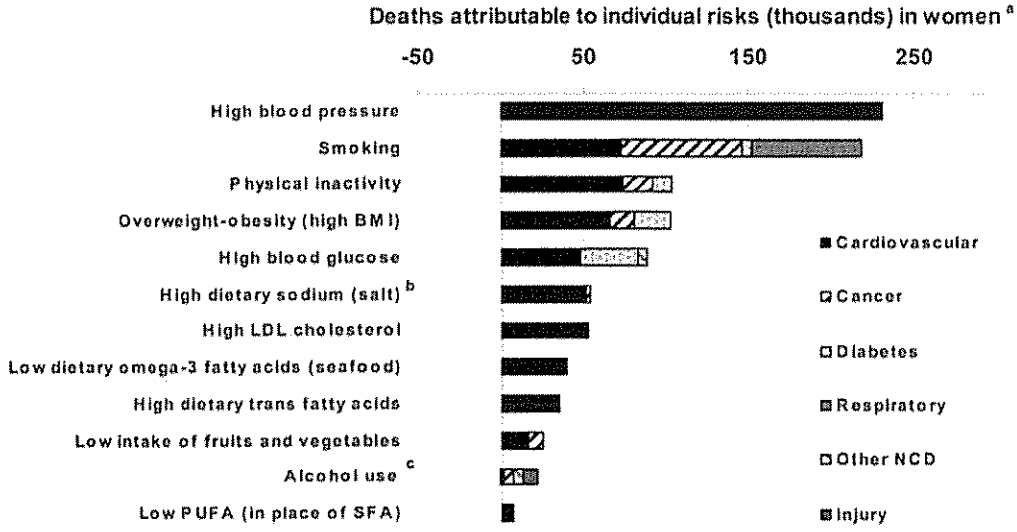

Deaths attributable to individual risks (thousands) in women [a]
-50
50
150
250
High blood pressure
Smoking
Physical inactivity
Overweight-obesity (high BMI)
High blood glucose
High dietary sodium (salt) [b]
High LDL cholesterol
Low dietary omega-3 fatty acids (seafood)
High dietary trans fatty acids
Low intake of fruits and vegetables
Alcohol use [c]
Low PUFA (in place of SFA)
Cardiovascular
Cancer
Diabetes
Respiratory
Other NCD
Injury

Figure 1. Deaths attributable to total effects of individual risk factors, by disease. Data are shown for both sexes combined (upper graph); men (middle graph); and women (lower graph). See Table 8 for 95% CIs. Notes: We used RRs for blood pressure, LDL cholesterol, and FPG that were adjusted for regression dilution bias using studies that had repeated exposure measurement [7,11,12]; for blood pressure and LDL cholesterol, the adjusted magnitude is supported by effect sizes from randomized studies [13,14]. Evidence from a large prospective study using multiple measurements of weight and height showed that regression dilution bias did not affect the RRs for BMI, possibly because there is less variability [15]. RRs for dietary salt and PUFA were from intervention studies, and hence unlikely to be affected by regression dilution bias. RRs for dietary trans fatty acids were primarily from studies that had used cumulative averaging of repeated measurements [16] that reduces but may not fully correct for regression dilution bias. RRs for physical inactivity, alcohol use, smoking, and dietary omega-3 fatty acids and fruits and vegetables were not corrected for regression dilution bias due to insufficient current information from epidemiological studies on exposure measurement error and variability, which is especially important when error and variability of self-reported exposure may themselves differ across studies. Regression dilution bias often, although not always, underestimates RRs in multivariate analysis [48]. [a]The figures show deaths attributable to the total effects of each individual risk. There is overlap between the effects of risk factors because of multicausality and because the effects of some risk factors are partly mediated through other risks. Therefore, the number of deaths attributable to individual risks cannot be added. [b]The effect of high dietary salt on cardiovascular diseases was estimated through its measured effects on systolic blood pressure. [c]The protective effects of alcohol use on cardiovascular diseases are its net effects. Regular moderate alcohol use is protective for IHD, ischemic stroke, and diabetes, but any use is hazardous for hypertensive disease, hemorrhagic stroke, cardiac arrhythmias, and other cardiovascular diseases. NCD, noncommunicable diseases.
doi:10.1371/journal.pmed.1000058.g001

injury deaths in young adults the major mortality impact of alcohol use. Eighty percent of deaths attributable to high blood pressure and 68% and 70% of those attributable to high dietary salt and physical inactivity, respectively, occurred after 70 y of age (Table 9). Conversely, 40% or more of all deaths attributable to high LDL cholesterol, overweight–obesity, high dietary trans fatty acids, low dietary PUFA and omega-3 fatty acids, low intake of fruits and vegetables, alcohol use, and smoking occurred before 70 y of age (Table 9). As a result, when the young and middle-aged (≤70 y of age) mortality effects of these risk factors were evaluated, smoking was by far the leading cause of death in both men and women ≤70 y, followed by overweight–obesity (Figure 2).

Mortality Effects of Risk Factor by Exposure Level

There was substantial variation in how deaths attributable to these risks were distributed below or above commonly used thresholds and guidelines (Table 10): close to two-thirds of deaths attributable to high blood pressure (66%), high BMI (63%), and high blood glucose (60%) occurred in people who would be clinically classified as hypertensive, obese, or diabetic, even though these groups make up only 10%–33% of the US adult population (note that the estimated benefits in these people would be achieved if risk factor levels are reduced to their TMREDs, and not simply to the clinical threshold). In contrast, more than one-half of deaths attributable to high LDL cholesterol were among people below the conventional threshold for defining dyslipidemia (3.37 mmol/l).

The burden of smoking was almost equally distributed among current and former smokers, because harmful effects continue among many Americans who have quit smoking. Twenty-nine percent of the chronic disease mortality effects of alcohol use occurred among heavy drinkers (i.e., men who consumed more than 60 grams of pure alcohol or 4 drinks per day and women who consumed more than 40 grams per day); this group did not have any mortality benefits from alcohol use. In contrast, in those who had light alcohol consumption (up to 40 g per day for men and 20 g per day for women), the protective effects on IHD and diabetes mortality were larger than the hazardous effects from other chronic diseases, leading to an overall reduction in mortality in this group (unpublished results).

Sensitivity Analyses

The results of the sensitivity analyses in Table S1 show that the estimated numbers of deaths attributable to risk factors were most sensitive to the choice of the optimal exposure distribution (the TMRED) to which current risk factor exposure distributions were compared. For example, if the TMREDs for LDL cholesterol and BMI were 2.3 (instead of 2.0) mmol/l and 23 (instead of 21) kg/m^2, respectively, the number of deaths attributable to them would

Table 8. Deaths from all causes (thousands of deaths) attributable to risk factors and the 95% confidence intervals of their sampling uncertainty.

Risk factor	Male	Female	Both Sexes
Tobacco smoking	248 (226–269)	219 (196–244)	467 (436–500)
High blood pressure	164 (153–175)	231 (213–249)	395 (372–414)
Overweight–obesity (high BMI)	114 (95–128)	102 (80–119)	216 (188–237)
Physical inactivity	88 (72–105)	103 (80–128)	191 (164–222)
High blood glucose	102 (80–122)	89 (69–108)	190 (163–217)
High LDL cholesterol	60 (42–70)	53 (44–59)	113 (94–124)
High dietary salt (sodium)	49 (46–51)	54 (50–57)	102 (97–107)
Low dietary omega-3 fatty acids (seafood)	45 (37–52)	39 (31–47)	84 (72–96)
High dietary trans fatty acids	46 (33–58)	35 (23–46)	82 (63–97)
Alcohol use[a]	45 (32–49)	20 (17–22)	64 (51–69)
Low intake of fruits and vegetables	33 (23–45)	24 (15–36)	58 (44–74)
Low dietary polyunsaturated fatty acids (PUFA) (in replacement of SFA)	9 (6–12)	6 (3–9)	15 (11–20)

[a]Excludes uncertainty in intentional and unintentional injury outcomes because the attributable deaths used data sources that did not report sampling uncertainty.
doi:10.1371/journal.pmed.1000058.t008

Table 9. Distribution of cause-specific and all-cause deaths attributable to risk factors by age group and by sex.

Risk Factor	Disease	0–29 y	30–45 y	45–69 y	≥ 70 y	Males	Females
High blood glucose	Cardiovascular diseases	NA	2 (1 to 3)	31 (24 to 40)	68 (58 to 75)	55 (43 to 68)	45 (32 to 57)
	Diabetes mellitus[a]	NA	3 (3 to 3)	33 (33 to 33)	64 (64 to 64)	51 (51 to 51)	49 (49 to 49)
	Renal failure	NA	1 (0 to 6)	21 (3 to 71)	77 (26 to 96)	53 (12 to 94)	47 (6 to 88)
	All causes	NA	2 (2 to 3)	31 (26 to 36)	67 (61 to 72)	53 (46 to 61)	47 (39 to 54)
High LDL cholesterol	Cardiovascular diseases	NA	4 (0 to 6)	40 (30 to 47)	55 (50 to 66)	53 (44 to 59)	47 (41 to 56)
High blood pressure	Cardiovascular diseases	NA	1 (1 to 1)	19 (18 to 20)	80 (79 to 82)	42 (39 to 44)	58 (56 to 61)
Overweight–obesity (high BMI)	Cardiovascular diseases	NA	5 (3 to 6)	41 (33 to 48)	55 (47 to 63)	55 (47 to 65)	45 (35 to 53)
	Cancers	NA	2 (2 to 3)	42 (38 to 47)	55 (51 to 60)	40 (36 to 46)	60 (54 to 64)
	Diabetes mellitus	NA	5 (4 to 5)	42 (38 to 47)	54 (48 to 58)	52 (46 to 58)	48 (42 to 54)
	All causes	NA	4 (3 to 5)	41 (36 to 46)	55 (49 to 61)	53 (47 to 60)	47 (40 to 53)
High dietary trans fatty acids	Cardiovascular diseases	NA	5 (3 to 7)	41 (31 to 50)	54 (45 to 65)	57 (46 to 67)	43 (33 to 54)
Low dietary polyunsaturated fatty acids (PUFA) (in replacement of SFA)	Cardiovascular diseases	NA	7 (2 to 11)	40 (23 to 56)	53 (37 to 70)	59 (43 to 75)	41 (25 to 57)
Low dietary omega-3 fatty acids	Cardiovascular diseases	NA	4 (3, 5)	36 (30 to 41)	60 (54 to 66)	53 (47 to 60)	47 (40 to 53)
High dietary salt	Cardiovascular diseases	NA	3 (3 to 3)	28 (27 to 30)	69 (67 to 70)	47 (45 to 50)	53 (50 to 55)
	Cancers	NA	5 (1 to 8)	36 (21 to 52)	59 (43 to 74)	58 (40 to 73)	42 (27 to 60)
	All causes	NA	3 (3 to 3)	29 (27 to 30)	68 (66 to 70)	48 (45 to 50)	52 (50 to 55)
Low intake of fruits and vegetables	Cardiovascular diseases	NA	3 (1 to 5)	35 (22 to 52)	62 (44 to 75)	55 (37 to 76)	45 (24 to 63)
	Cancers	NA	3 (2 to 5)	56 (39 to 71)	41 (25 to 58)	62 (47 to 76)	38 (24 to 53)
	All causes	NA	3 (2 to 5)	43 (32 to 57)	54 (39 to 66)	58 (45 to 71)	42 (29 to 55)
Alcohol use[b]	Cardiovascular diseases	NA	11 (4 to 34)	131 (93 to 159)	−42 (−75 to −7)	105 (85 to 126)	−5 (−26 to 15)
	Cancers	NA	5 (4 to 6)	55 (49 to 61)	40 (34 to 46)	64 (58 to 69)	36 (31 to 42)
	Diabetes mellitus	NA	5 (4 to 6)	44 (40 to 49)	51 (46 to 55)	50 (45 to 55)	50 (45 to 55)
	Other noncommunicable diseases[c]	NA	15 (14 to 16)	68 (66 to 71)	17 (15 to 19)	74 (72 to 76)	26 (24 to 28)
	Injuries[d]	31 (31 to 31)	34 (34 to 34)	29 (29 to 29)	6 (6 to 6)	77 (77 to 77)	23 (23 to 23)
	All causes	18 (16 to 23)	24 (21 to 30)	34 (20 to 40)	24 (20 to 30)	70 (62 to 73)	30 (27 to 38)
Physical inactivity	Cardiovascular diseases	NA	2 (1 to 2)	24 (19 to 30)	74 (68 to 79)	49 (40 to 60)	51 (40 to 60)
	Cancers	NA	5 (3 to 7)	42 (35 to 50)	53 (45 to 60)	24 (18 to 29)	76 (71 to 82)
	Diabetes mellitus	NA	3 (2 to 5)	35 (28 to 43)	61 (52 to 69)	50 (40 to 61)	50 (39 to 60)
	All causes	NA	2 (2 to 3)	28 (23 to 33)	70 (64 to 75)	46 (38 to 54)	54 (46 to 62)
Tobacco smoking	Cardiovascular diseases	NA	4 (0 to 7)	51 (43 to 63)	44 (34 to 54)	49 (38 to 60)	51 (40 to 62)
	Cancers	NA	1 (0 to 2)	43 (42 to 44)	56 (55 to 57)	61 (60 to 62)	39 (38 to 40)
	Other respiratory diseases[e]	NA	0 (0 to 1)	21 (19 to 22)	79 (78 to 80)	46 (44 to 48)	54 (52 to 56)
	Diabetes mellitus	NA	1 (0 to 3)	36 (30 to 41)	63 (57 to 68)	50 (44 to 57)	50 (43 to 56)
	All causes	NA	2 (0 to 3)	39 (36 to 42)	59 (56 to 62)	53 (49 to 57)	47 (43 to 51)

Numbers show percent in each age group or in each sex and the corresponding 95% confidence intervals of sampling uncertainty.

[a]There is no sampling uncertainty for this outcome because all the deaths due to diabetes are by definition attributable to high blood glucose.

[b]The negative proportions for alcohol use and cardiovascular diseases in older ages and in females occur because the protective effects are larger than the hazardous effects.

[c]This category includes liver cirrhosis, acute and chronic pancreatitis, and alcohol use disorders.

[d]We did not estimate sampling uncertainty for injury outcomes because the attributable deaths used data sources that did not report sampling uncertainty.

[e]This category includes lower respiratory tract infections, asthma, and tuberculosis.

doi:10.1371/journal.pmed.1000058.t009

be 18% and 19% lower. Similarly, lowering the TMRED of physical activity to the (less ambitious) current recommended level of 600 met·min per week (equivalent to 20 min of moderate activity every day) would prevent 62,000 (32%) fewer deaths than if people pursued a higher goal of 1,600 met·min per week (including at least one hour of vigorous activity per day). The TMRED for alcohol use must balance its harmful and beneficial effects. If the entire adult US population had light alcohol

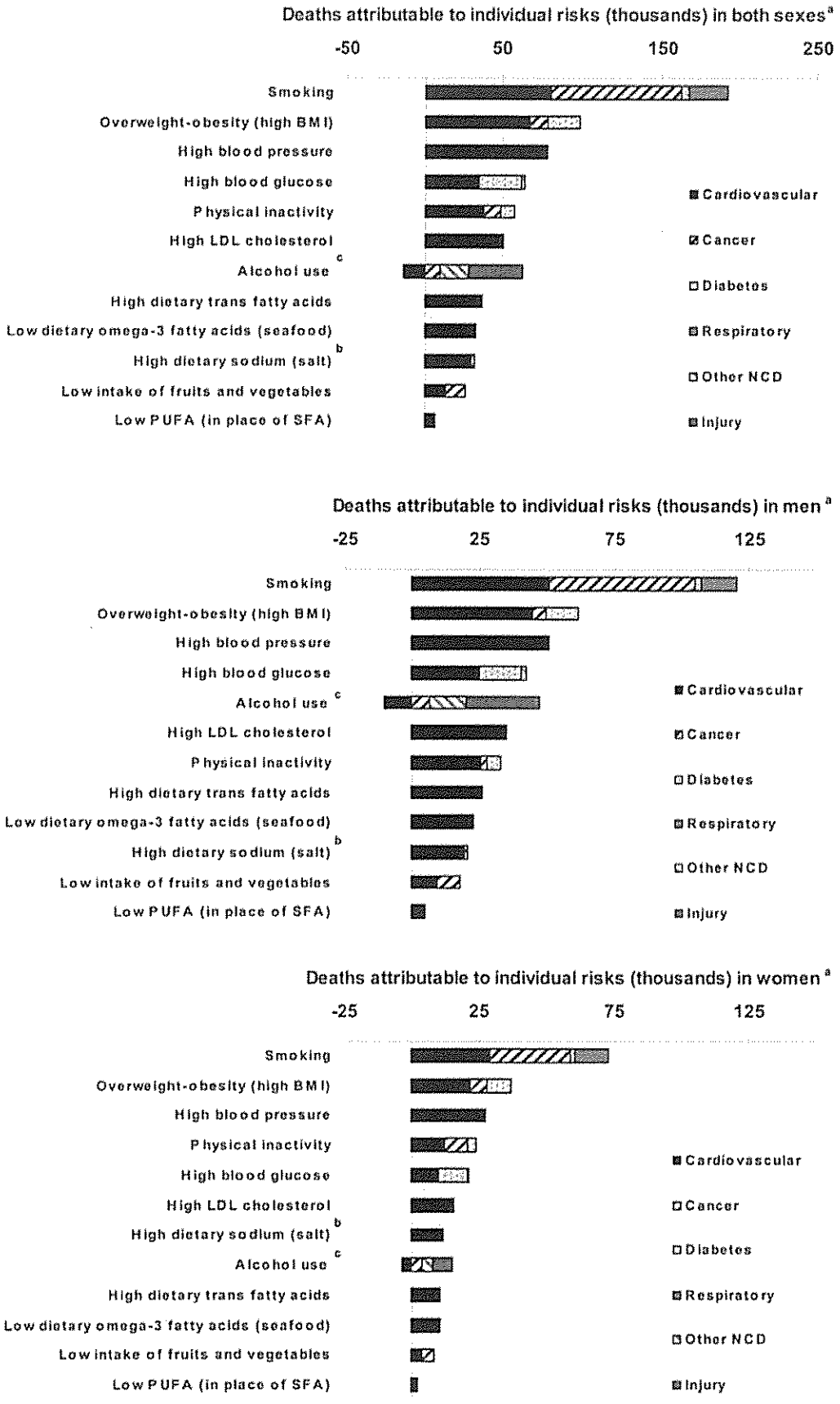


Figure 2. Deaths attributable to total effects of individual risk factors, by disease in those below 70 years of age. Data are shown for both sexes combined (upper graph); men (middle graph); and women (lower graph). See Figure 1 notes.
doi:10.1371/journal.pmed.1000058.g002

Table 10. Distribution of risk factor exposure and attributable deaths by ranges or categories of exposure defined using common clinical and public health thresholds and guidelines.

Risk Factor	Source of Definition for Categories	Exposure Categories	Percentage of Attributable Deaths	Percentage of Population (≥30 Years Old)
High blood glucose[a]	Definition of diabetes (FPG≥7 mmol/l) and impaired FPG (FPG 5.56 to 6.99 mmol/l) by American Diabetes Association [103]	FPG≥7 mmol/l	60	10
		FPG 5.56–6.99 mmol/l	34	29
		FPG<5.56 mmol/l	6	61
High LDL cholesterol	Definition of high LDL cholesterol in low risk (4.14 mmol/l) and moderate risk (3.37 mmol/l) individuals in Adult Treatment Panel III guidelines [104]	LDL≥4.14 mmol/l	5	11
		LDL 3.37–4.13 mmol/l	30	22
		LDL<3.37 mmol/l	65	67
High blood pressure	Definition of hypertension (SBP≥140 mmHg) [105]	SBP≥140 mmHg	66	15
		SBP<140 mmHg	34	85
Overweight–obesity (high BMI)	Definition of obesity (BMI≥30 kg/m^2) and overweight (BMI 25 to 29.9 kg/m^2)	BMI≥30 kg/m^2	63	33
		BMI 25–29.9 kg/m^2	29	33
		BMI<25 kg/m^2	8	33
High dietary salt	Recommended level of dietary sodium (<100 mmol/d) by American Heart Association [106]	Dietary sodium≥100 mmol/d	88	75
		Dietary sodium<100 mmol/d	12	25
Physical inactivity	Definition of moderately active (600 met·min/wk) is the same as the recommended level of activity by Centers for Disease Control and Prevention [107]	Inactive	74	31
		Low-active	19	25
		Moderately active	7	23
		Highly active	0	21
Tobacco smoking	—	Current smokers	43	25
		Former smokers	57	25
		Never smokers	0	50

The proportion of population and mortality effects in different exposure categories. We have not included dietary risks other than dietary salt in this table primarily because current guidelines do not recommend a specific level of intake.

[a]Deaths assigned to diabetes mellitus in the vital statistics and deaths attributable to renal failure are included in the ≥7 mmol/l category because all individuals whose deaths are assigned to diabetes or diabetic renal failure would, by definition, have been diagnosed with diabetes disease, and hence have FPG ≥7 mmol/l.

doi:10.1371/journal.pmed.1000058.t010

consumption, a total of 12,000 cardiovascular deaths would be prevented, largely among adults aged ≥45 y. However, this level of alcohol consumption would also cause an estimated 8,000 deaths due to road traffic accidents largely among adults aged <30 y.

Incorporating correlation of a risk factor with disease-specific mortality and with other risks changed the estimated number of deaths attributable to a risk factor by 3%–31%, depending on the specific risk factor and disease. The results were robust to whether exposure in the population was approximated with a normal distribution and to the inclusion of the few disease outcomes for which the evidence of causal association was weaker. Mortality effects of dietary salt were sensitive to the magnitude of its effects on SBP, because there was an almost 2-fold difference between two separate meta-analyses of salt reduction trials [37,38].

Discussion

Our analysis of the mortality effects of major dietary, lifestyle, and metabolic risk factors in the US using comparable methods showed that tobacco smoking and high blood pressure were the leading risk factors for mortality, responsible for nearly one in five and one in six deaths in US adults, respectively. The large effects of tobacco smoking were caused by long-term cumulative exposure in current smokers as well as the remaining effects in former smokers, especially in men. The large numbers of deaths attributable to high blood pressure were related to high exposure levels, particularly in women [39]. Overweight–obesity, physical inactivity, and high blood glucose each caused about one in ten deaths, and both affected women disproportionately more than men. In those younger than 70 y of age, tobacco smoking was by far the leading modifiable cause of death, and overweight–obesity caused more deaths than did high blood pressure. Other lifestyle, metabolic, and dietary risk factors for chronic diseases also caused significant adult mortality, although their individual effects were 3%–24% of those of smoking. A comparison of our results with those of other risk factors is shown in Table S2. This comparison was done only for those risk factors included in previous analyses, because these analyses had included substantially fewer metabolic and dietary risks than ours.

Each RR used in our analysis represents the best evidence for the impact of risk factor exposure on disease-specific mortality in the population, based on the current causes and determinants of

the population distribution of exposure. The mortality effects of a risk factor may depend on whether an expected increase in exposure is prevented or whether exposure is reduced after it has risen. It may also depend on the specific intervention used to prevent or reverse risk factor exposure. The estimated effects of blood pressure, LDL cholesterol, omega-3 fatty acids, and PUFA-SFA replacement have been generally consistent between observational studies that measure exposure at baseline and intervention studies that reduce exposure prospectively [12,14,31]. There is also evidence that former smokers reduce their risk to that of never-smokers over time [40]. Although mortality effects of other risks in our analysis have not been tested in appropriately designed and powered intervention studies, trials and observational studies provide similarly valid results on related nonfatal events for some risks, e.g., effects of BMI on incident diabetes [41,42]. Possibly the most important case of current discrepancy between prospective observational cohorts and intervention studies is the mortality effect of high blood glucose. Prospective studies have shown relatively large associations between usual FPG and mortality [7,43], but randomized intervention studies have shown null effects, and declines as well as increases in mortality when glucose was lowered intensively relative to those who had conventional management [44,45]. This discrepancy may reflect the actual intervention mechanism (lifestyle versus pharmacologic treatment) or the differential effects of avoiding an increase in blood glucose versus subsequent lowering. Alternatively, blood glucose may be a partial or confounded marker of other underlying metabolic dysfunction, so that interventions targeting only glucose may be unsuccessful at ameliorating all of the observed risk. Further research is needed on the causal effects of blood glucose on mortality risk and on the role of specific lifestyle and pharmacologic interventions. Finally, there is also a need to systematically examine whether salt reduction trials with sufficiently long follow-up duration can capture the full blood pressure–lowering benefits of having maintained low salt intake throughout the life course [37].

Our results estimate the total effects of each individual risk factor. Disease-specific deaths are caused by multiple factors acting simultaneously, and hence could be prevented by intervening on single or multiple risk factors, e.g., some IHD deaths may be prevented by reducing SBP, LDL cholesterol, smoking, or combinations of these risks [46]. Further, part of the effect of one risk factor may be mediated through another, e.g., dietary factors and physical inactivity may affect IHD with part of their effect occurring by changes in BMI, blood pressure, glucose, and LDL cholesterol. Deaths attributable to multiple causally related or overlapping risk factors should not be combined by simple addition. Future analyses, both in epidemiological cohorts and at the population level, should examine the individual and combined effects of multiple exposures that affect the same diseases, including how much of the effects of lifestyle and dietary risks are mediated through metabolic factors. Finally, the effects of dietary macronutrients may vary depending on the macronutrient replacement (e.g., for PUFA; see Table 2 for details). Therefore, the interpretation of results should take such replacement issues into account.

There are a number of innovations and strengths in our analysis. This is, to our knowledge, the first population-level analysis of the mortality effects of risk factors to include a relatively large number of dietary and metabolic risk factors, and to use consistent and comparable methods. This comparative quantification helped identify the important roles of diet and physical inactivity, other lifestyle factors, and metabolic risks as preventable causes of death in the US population. Effect sizes were derived from large meta-analyses of either randomized trials or observational studies that had adjusted for important confounders. RRs from meta-analyses tend to reduce random error relative to individual studies; they may also reduce bias if the directions of bias are not the same in individual studies. We used exposure distributions and effect sizes that accounted for measurement error associated with one-off measurements to the extent possible. Our study presented deaths attributable to risk factors by age and sex, and by exposure level. The latter helped identify whether those whose exposure remains uncontrolled with current diagnosis and treatment programs versus those who are currently below clinical thresholds should be targeted for greatest effects on mortality. Finally, we quantified the sampling uncertainty of our estimates; we also analyzed how specific methods and data sources affected our quantitative results in extensive sensitivity analyses. This demonstrated that although the specific numerical results are uncertain, our overall findings on the relative mortality effects of these dietary, lifestyle, and metabolic risk factors are robust.

Population level analyses of mortality effects of risk factors such as ours are also affected by some limitations and uncertainties. First, several potentially important risk factors were considered, but could not be included because sufficient or unbiased data on their national exposure distributions and/or effects on disease-specific mortality were not available, or because the evidence on causal effects was less convincing. Second, for many risks the choice of disease outcomes and effect sizes were derived from observational studies. In such cases, whether the collectivity of evidence established a causal association had to be assessed using multiple criteria, such as those proposed by Hill [47]. In such cases, the possibility of residual confounding cannot be excluded. Our ability to account for measurement error in exposure and to correct for regression dilution bias was limited to those risk factors for which relevant data were available from epidemiological studies; for other risks, our results should be considered as conservative estimates of the effects because regression dilution bias often, although not always, leads to lower RRs in multivariate analysis [48]. RRs from meta-analyses may not be completely generalizable to population-level effects; nevertheless, such estimation is indispensable to inform policy making. More importantly, in many cases there is empirical evidence to support the proposition that proportional effects are similar across populations, e.g., Western and Asian populations [7,20,21].

The hazardous effects of some risk factors accumulate gradually after exposure begins and decline slowly after exposure is reduced. This is illustrated by results from trials that have lowered blood pressure and cholesterol, and from studies in which some people quit smoking [13,40]. Time-dependence of risk may further vary by disease, e.g., the effects of tobacco smoking on lung cancer versus cardiovascular diseases [49]. Because smoking prevalence has declined in the US, the use of the smoking impact ratio (SIR) as the metric of cumulative exposure [18] may have overestimated the cardiovascular deaths attributable to smoking. However, the difference between the estimated number of deaths using this method and using the measured prevalence of current and former smoking was <14% (Table S1). The use of RRs from cohort studies that started a few decades ago may overestimate the effects of BMI on diseases such as IHD if "mediators" such as SBP and cholesterol have been lowered over time in those with high BMI [50–52], but underestimate the effects for other diseases such as diabetes because the current US population gained weight at younger ages than the cohort participants. Future research should attempt to investigate time-dependent effects of blood glucose, BMI, physical activity, and dietary factors, because their exposures have changed in the US over time.

The results of our analysis of dietary, lifestyle, and metabolic risk factors show that targeting a handful of risk factors has large potential to reduce mortality in the US, substantially more than the currently estimated 18,000 deaths averted annually by providing universal health insurance [53]. Global analyses also found that a relatively modest number of risk factors were responsible for a substantial proportion of mortality and disease burden in many world regions. At the same time the mix of leading risks varied across regions, as did risk factor levels in relation to economic development and urbanization [46,54]. Therefore there is a need for national, and even subnational, analysis of the health consequences of these risks in countries at different levels of development using local exposure data [55].

The risk factors in this analysis can be influenced through both individual-level and population-wide interventions. In particular, effective interventions are available for tobacco smoking and high blood pressure, the leading two causes of mortality in the US [56–58]. Combinations of food industry regulation, pricing, and better information can also be effective in reducing exposure to dietary salt and trans fatty acids, especially in packaged foods and prepared meals. Despite the availability of interventions, blood pressure and tobacco smoking decline in the US have stagnated or even reversed [39,59], and there has been a steady increase in overweight–obesity [60]. Research, implementation, monitoring, and evaluation related to interventions that reduce these modifiable risk factors should be a high priority.

Supporting Information

Table S1 Sensitivity of results to methodological choices and data sources.
Found at: doi:10.1371/journal.pmed.1000058.s001 (0.08 MB DOC)

Table S2 Comparison of estimated number of deaths attributable to risk factors with those from previous studies.
Found at: doi:10.1371/journal.pmed.1000058.s002 (0.07 MB DOC)

Acknowledgments

We thank Timothy Armstrong, Fiona Bull, Malcolm Law, Carlene Lawes, I-min Lee, Bruce Neal, John Powles, Stephen Vander Hoorn, and Gary Whitlock for valuable discussions on data sources and methods.

Author Contributions

ICMJE criteria for authorship read and met: GD ELD DM BT JR CJLM ME. Agree with the manuscript's results and conclusions: GD ELD DM BT JR CJLM ME. Designed the experiments/the study: GD CJLM ME. Analyzed the data: GD ELD DM BT JR. Wrote the first draft of the paper: GD ME. Contributed to the writing of the paper: ELD DM BT JR CJLM. Supervised the research: ME. Participated in collecting data on nutritional exposures and relative risks related to the risk estimates: GD ELD DM. Collected specific data relevant to the alcohol section of the paper: JR BT.

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Editors' Summary

Background. A number of modifiable factors are responsible for many premature or preventable deaths. For example, being overweight or obese shortens life expectancy, while half of all long-term tobacco smokers in Western populations will die prematurely from a disease directly related to smoking. Modifiable risk factors fall into three main groups. First, there are lifestyle risk factors. These include tobacco smoking, physical inactivity, and excessive alcohol use (small amounts of alcohol may actually prevent diabetes and some types of heart disease and stroke). Second, there are dietary risk factors such as a high salt intake and a low intake of fruits and vegetables. Finally, there are "metabolic risk factors," which shorten life expectancy by increasing a person's chances of developing cardiovascular disease (in particular, heart problems and strokes) and diabetes. Metabolic risk factors include having high blood pressure or blood cholesterol and being overweight or obese.

Why Was This Study Done? It should be possible to reduce preventable deaths by changing modifiable risk factors through introducing public health policies, programs and regulations that reduce exposures to these risk factors. However, it is important to know how many deaths are caused by each risk factor before developing policies and programs that aim to improve a nation's health. Although previous studies have provided some information on the numbers of premature deaths caused by modifiable risk factors, there are two problems with these studies. First, they have not used consistent and comparable methods to estimate the number of deaths attributable to different risk factors. Second, they have rarely considered the effects of dietary and metabolic risk factors. In this new study, the researchers estimate the number of deaths due to 12 different modifiable dietary, lifestyle, and metabolic risk factors for the United States population. They use a method called "comparative risk assessment." This approach estimates the number of deaths that would be prevented if current distributions of risk factor exposures were changed to hypothetical optimal distributions.

What Did the Researchers Do and Find? The researchers extracted data on exposures to these 12 selected risk factors from US national health surveys, and they obtained information on deaths from difference diseases for 2005 from the US National Center for Health Statistics. They used previously published studies to estimate how much each risk factor increases the risk of death from each disease. The researchers then used a mathematical formula to estimate the numbers of deaths caused by each risk factor. Of the 2.5 million US deaths in 2005, they estimate that nearly half a million were associated with tobacco smoking and about 400,000 were associated with high blood pressure. These two risk factors therefore each accounted for about 1 in 5 deaths in US adults. Overweight–obesity and physical inactivity were each responsible for nearly 1 in 10 deaths. Among the dietary factors examined, high dietary salt intake had the largest effect, being responsible for 4% of deaths in adults. Finally, while alcohol use prevented 26,000 deaths from ischemic heart disease, ischemic stroke, and diabetes, the researchers estimate that it caused 90,000 deaths from other types of cardiovascular diseases, other medical conditions, and road traffic accidents and violence.

What Do These Findings Mean? These findings indicate that smoking and high blood pressure are responsible for the largest number of preventable deaths in the US, but that several other modifiable risk factors also cause many deaths. Although the accuracy of some of the estimates obtained in this study will be affected by the quality of the data used, these findings suggest that targeting a handful of risk factors could greatly reduce premature mortality in the US. The findings might also apply to other countries, although the risk factors responsible for most preventable deaths may vary between countries. Importantly, effective individual-level and population-wide interventions are already available to reduce people's exposure to the two risk factors responsible for most preventable deaths in the US. The researchers also suggest that combinations of regulation, pricing, and education have the potential to reduce the exposure of US residents to other risk factors that are likely to shorten their lives.

Additional Information. Please access these Web sites via the online version of this summary at http://dx.doi.org/10.1371/journal.pmed.1000058.

- The MedlinePlus encyclopedia contains a page on healthy living (in English and Spanish)
- The US Centers for Disease Control and Prevention provides information on all aspects of healthy living
- Healthy People 2010 is a national framework designed to improve the health of people living in the US. The Healthy People 2020 Framework is due to be launched in January 2010
- The World Health Report 2002—Reducing Risks, Promoting Healthy Life provides a global analysis of how healthy life expectancy could be increased
- The National Health and Nutrition Examination Survey (NHANES) is "a program of studies designed to assess the health and nutritional status of adults and children in the United States"
- The US Centers for Disease Control and Prevention's site Smoking and Tobacco Use offers a large number of informational and data resources on this important risk factor
- The American Heart Association and American Cancer Society provide a rich resource for patients and caregivers on many important risk factors including diet, sodium intake, and smoking

Perceived Accessibility as a Predictor of Youth Smoking

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ABSTRACT

PURPOSE Youths who smoke are more likely to perceive that cigarettes are easily accessible, but the relationship between perceived accessibility of cigarettes and the risk of smoking is not clear. The objective of this study was to determine whether perceived accessibility predicted future smoking among youths.

METHODS This study used data from the second Development and Assessment of Nicotine Dependence in Youth (DANDY-2) study, a 4-year (2002-2006) cohort study that began with 1,246 sixth-grade students in 6 Massachusetts communities. DANDY-2 comprised 11 waves of in-person interviews. A total of 1,195 students who were aged 11 to 14 years at the baseline interview in 2002 were eligible for inclusion in this report. The outcomes for this study were the onset of smoking initiation and regular tobacco use.

RESULTS At baseline 1,027 students had never smoked cigarettes, and 168 had previously initiated smoking. During the 4 years of the study, 177 students newly initiated smoking, and 109 became regular smokers. In unadjusted city-stratified Cox proportional hazard models, perceived accessibility increased the risk for smoking initiation among nonsmokers and regular smoking among all participants in a dose-response fashion. Perceived accessibility also increased the risk for smoking progression among initiators in a dose-response fashion. The associations between perceived accessibility and smoking were robust to adjustment for peer and parental smoking. Youths with both perceived accessibility and peer-smokers had a higher risk of regular smoking and progression after initiation than either factor alone. These associations were stable to adjustment for potential confounders other than peer smoking.

CONCLUSIONS Perceived accessibility increases the risk for smoking among youths and has a stronger effect among those with peer smokers. There may be a role for identifying this group of youths for targeted interventions in child health care settings. Perceived accessibility should be carefully considered and measured in smoking intervention programs for teens.

Ann Fam Med 2008:6;323-330. DOI: 10.1370/afm.841.

INTRODUCTION

Cigarette smoking is a major public health challenge worldwide. In developed countries many adult smokers initiated tobacco use during their teenage years; therefore, smoking experimentation and progression to regular tobacco use in adolescence represent potentially preventable milestones that may lead to nicotine addiction[1,2] and preventable major adverse health consequences. Although several factors have been shown to increase the risk of smoking in adolescence,[3-7] the relationship between perceived accessibility and youth tobacco use is poorly understood.

In the United States, a combination of excise taxation, litigation against tobacco companies, and enforcement of laws prohibiting the sale of tobacco products to minors have increased the cost of and the difficulty in obtaining tobacco products.[8-14] Despite these measures, many youths initiate tobacco use every day.[15-17] Youths may obtain tobacco products from commercial

Conflicts of interest: none reported

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sources[17,18] or from friends or adult relatives.[19,20] These potential sources of cigarettes may cause youths, particularly smokers, to believe that tobacco products are easily accessible.[20-23] It remains unclear, however, whether perceived accessibility is a risk factor for smoking initiation among nonsmoking teens and for the escalation of tobacco use following initiation.

It has been shown that youths who perceive easy access to an illegal substance are more likely to acquire and experiment with it.[24] Although previous studies have found that perceived accessibility is associated with tobacco use among youths,[23,25] those studies were limited to cross-sectional analyses. Because youths who smoke may be more likely to perceive easy access to cigarettes,[26] it is not clear from existing studies whether perceived accessibility predicts future smoking. Additionally, existing literature suggests that peer smoking and perceived accessibility may act jointly to influence youth smoking, but this relationship has not been examined.[26] The objective of this study was to determine whether youths' perception of the accessibility of cigarettes predicts future patterns of smoking.

METHODS

Design, Setting, and Participants

The data for this study were derived from the second Development and Assessment of Nicotine Dependence in Youth (DANDY-2) study. The details of the DANDY-2 study, including methods for standardization of the interviews, have been fully described previously.[27,28] In summary, DANDY-2 is a prospective cohort study of English-speaking students attending schools in 6 central Massachusetts communities. The DANDY-2 study started with a racially diverse nonprobability sample of 1,246 sixth-grade students who were observed for 4 years from January 2002 to February 2006.[27,28] We excluded 38 students who participated in the first interview only. This report is restricted to the 1,195 students who had never before puffed on a cigarette or smoked less than once a week at the time of the baseline interview. The study was approved by the institutional review board of the University of Massachusetts Medical School.

Data Collection

The DANDY-2 study comprised up to 11 waves of standardized confidential face-to-face interviews conducted in school at a frequency of up to 3 per school year by 3 trained interviewers. Interviews were conducted with the aid of personal landmarks, bounded recall, decomposition, and a personalized calendar, techniques that have been shown to facilitate accurate recall of dates and events.[29] A calendar of important events was created for each tobacco user to serve as a memory aid and to assist in establishing the timing and sequencing of smoking events at each interview.

Outcome Measures

The study outcomes were the onset of smoking initiation and regular tobacco use among the cohort. Smoking initiation was defined as puffing on a cigarette for the first time during the period under study. Regular smoking was defined as the onset of weekly smoking (or smoking at least once every week) during the period under study. This outcome was determined in 2 ways. Because we were interested in finding out whether perceived accessibility predicted the onset of future regular smoking among the cohort, we determined the onset of regular smoking among all students included in this report (n = 1,195). We also defined an outcome of smoking progression among initiators, defined as escalation to regular smoking subsequent to the smoking debut (n = 345).

Data on smoking initiation and the frequency of tobacco use were collected during each of the 11 interviews. Specific dates were recorded when available for the first puff on a cigarette and for the first date of weekly smoking. Otherwise, if an event was recalled to have occurred at the beginning of the month, it was recorded as the 7th of the month, the middle as the 15th, and the end of the month as the 25th.

Predictor

The perception that cigarettes were easy to obtain (perceived accessibility) was assessed with the item: "Do you agree or disagree with the following statement: It would be easy for me to get a cigarette." Responses were scored on a 5-point Likert scale ("strongly disagree" to "strongly agree"). Perceived accessibility was assessed at baseline and at yearly intervals thereafter.

Covariates

We evaluated as candidate covariates several demographic, socioenvironmental, attitudinal, belief, and psychological factors known to be associated with tobacco use. Data on date of birth, sex, participants' perceptions about their own weight, number of siblings, and race-ethnicity were obtained at baseline. Race-ethnicity was based on self-report and was categorized as Hispanic, non-Hispanic white, or other.

We collected data on the number of friends that smoked (peer smoking), the presence of adult smokers in the home, and parental smoking.[28] Participants were also asked about how their parents (perceived parental approval of smoking) or friends (perceived peer approval of smoking) would react if they smoked, and about parental approval of watching R-rated mov-

ies (categorized as "yes" vs "no"). They were also asked whether they had a favorite tobacco advertisement and could identify the Joe Camel cartoon character.[28] Another item asked each participant about the number of stores they knew that will sell cigarettes to minors (knowledge of commercial sources, coded as "none" vs "1 or more stores").

Data were also collected for the following factors that were assessed using items validated in previous studies: psychological factors including coping styles (anger, positive, negative, and avoidant coping)[30]; self-esteem,[31] perceived control,[31] novelty-seeking personality[30]; distractibility,[32] depression,[33] and manifest anxiety[34]; being bored in the past 2 weeks[28]; school disaffection[35]; academic achievement[28]; bonding with parents[35]; getting along with parents[28]; parental involvement in the child's life[35]; participants' beliefs that smoking makes a person popular, look cool, or fit in with other youths[28]; and religiosity,[36] participation in Boy Scouts, Girl Scouts, extracurricular activities, lessons, and sports.[28] The internal consistency of the multi-item scales in the DANDY-2 study has been described previously.[28] We also had data on the number of computers in the home and highest level of parental education.

Data Analysis

SAS software, version 9.1 (SAS Institute, Inc, Cary, North Carolina), was used for analyses. The last observation was carried forward for students with missing covariate data who participated in a subsequent interview during the study. Kaplan-Meier analyses were used to determine the probability of smoking initiation among baseline nonsmokers, regular smoking among all participants, and smoking progression among initiators.

We used Cox proportional hazards models to determine whether perceived accessibility increased the risk for smoking initiation among baseline nonsmokers (n = 1,027), regular smoking among all participants (n = 1,195) and smoking progression among initiators (n = 345),[37] and we used city-stratified Cox models to account for clustering of participants in their city of residence. We did not account for clustering within schools in the analyses, because many participants changed schools frequently during the period under study, and this information was not tracked. The time to smoking initiation or regular use was defined from the date of the baseline interview. For the outcome of smoking progression among initiators, we used the date of the first puff on a cigarette as time zero. For participants who had initiated smoking prior to the baseline interview (n = 168), we used the date of the baseline interview as time zero in determining accrued person-time. For all outcomes examined, the time-to-event was censored at the date of the last completed interview. Because some of the participants had initiated smoking prior to the baseline interview, analyses on smoking initiation were restricted to participants who had not previously puffed on a cigarette at the date of the baseline interview. Analyses on smoking progression among initiators were restricted to those who had initiated smoking either before or during the follow-up period. To account for repeated measures within study participants during the period under study, indicator variables for the predictors and covariates were entered as time-varying factors in the models.

A series of Cox models examined the impact of having potential social sources of cigarettes (peer or parental smoking) on the relationship between perceived accessibility and smoking initiation, regular tobacco use, or smoking progression among initiators. The magnitude of the regression coefficient for perceived accessibility in the unadjusted analyses was compared with that from each model, adjusted separately for peer or parental smoking, to determine whether peer or parental smoking mediated the relationship between perceived accessibility and smoking rates.[38] In single-predictor Cox models, there was no association between knowledge of commercial sources and smoking rates; therefore, this factor was not assessed in the mediation analyses.

We assessed interaction between perceived accessibility and potential social or commercial sources of cigarettes[39] and found a significant interaction effect between perceived accessibility and peer smoking. We therefore used indicator variables for combinations of the 2 factors in the final Cox models for analyses on all outcomes. We also determined the synergism between peer smoking and perceived accessibility, that is, the degree to which peer smoking enhances the effects of perceived accessibility on smoking rates, as has been previously described by Hallqvist et al[40] and Andersson et al.[41]

We used the variance inflation factor and correlation coefficient to assess for collinearity or multicollinearity in the multivariable models.[42] After consideration of multicollinearity, we retained the following covariates for potential inclusion in the multivariable models: age; sex; race-ethnicity; number of siblings; knowledge of product affiliation of the Joe Camel character; having a favorite cigarette advertisement; parental permissiveness of watching R-rated movies; parental smoking; perceived parental or peer approval of smoking; belief that smoking makes a person popular, look cool, or fit in; involvement in community activities or Boy or Girl Scouts; impulsivity; concerns about weight; anger coping;

positive self-esteem; positive coping; depression; academic performance; school disaffection; boredom; perceived control; parental involvement; relationship with mother; being close to mother or father; religiosity; and feeling relaxed the first time inhaling from a cigarette. We selected variables for parsimonious multivariable models for each smoking outcome using stepwise variable selection techniques; variables were entered at a $P = .25$ and retained at $P = .06$. The final models for each outcome were adjusted for age, sex, parental smoking, perceived parental approval of smoking, and anger coping. Models on smoking initiation were also adjusted for participant's concerns about weight, parental permissiveness of watching R-rated movies, and school disaffection. Models on regular smoking and smoking progression among initiators were also adjusted for having a favorite cigarette advertisement, parental involvement, and impulsivity.

Table 1. Cumulative Incidence of Tobacco Use

Characteristics	Yearly Study Periods From Date of First Interview			
	1 No. (%)	2 No. (%)	3 No. (%)	4 No. (%)
Smoking initiation	41 (4.0)	92 (9.3)	151 (16.0)	177 (19.9)
Regular tobacco use	68 (5.7)	87 (7.5)	97 (8.7)	109 (10.3)

Note: Because of a loss to follow-up, the denominators vary across the 4 years of the study. The denominators for study years 1 through 4 were 1,027, 989, 944, and 890, respectively, for smoking initiation; and 1,195, 1,157, 1,112, and 1,058, respectively, for the regular smoking outcome.

Table 2. Unadjusted Associations of Tobacco Use With Perceived Accessibility

Accessibility	Smoking Events, Hazard Ratio (95% CI)		
	Initiation (n = 1,027)	Regular Smoking (n = 1,195)	Progression Among Initiators (n = 345)
"It would be easy for me to get a cigarette"			
Strongly disagree	ref	ref	ref
Disagree a little	1.52 (0.99-2.34)	1.66 (0.77-3.61)	1.01 (0.46-2.24)
Neither agree nor disagree	1.65 (0.93-2.95)	3.19 (1.46-6.99)	1.82 (0.85-3.87)
Agree a little	1.86 (1.2-2.87)	3.82 (2.08-7.01)	1.36 (0.75-2.45)
Strongly agree	3.28 (2.16-4.97)	9.58 (5.61-16.37)	2.13 (1.26-3.59)

CI = confidence interval; ref = reference group.

Note: All estimates shown were derived from city-stratified Cox proportional hazards model to account for clustering within students' city of residence.

RESULTS

Of the 1,195 participants included in the analyses, 1,027 had never previously smoked at baseline, and 168 had initiated smoking prior to the baseline interview. The baseline demographic characteristics of the participants were as follows: average age 12.1 years (range 11.2-13.7 years); female 52%; non-Hispanic white 73%, and Hispanic 18%. For parental education, highest educational attainment less than higher school was 5%, high school graduate 20%, some college but did not graduate 16%, college graduate or higher 51%, and unknown 8%. For current parental smoking status, both were nonsmokers 57%, 1 parent smoked 27%, both parents smoked 16%.

At baseline, 21% of the participating students perceived easy accessibility of cigarettes, and 9% had friends who smoked. These percentages increased with time: in the fourth year of the study period, 50% perceived easy accessibility of cigarettes and 32% had smoking friends. By the end of the third study year, 24% knew of at least 1 store that would sell cigarettes to youths, which increased to 32% by the end of the fourth year.

Relationship Between Perceived Accessibility and Smoking Experimentation and Escalation

The cohort contributed a total of 39,893 person-months of observation time for smoking initiation, 46,932 person-months for regular smoking among all participants, and 8,061 person-months for smoking progression among initiators. The initiation of smoking was observed in 177 subjects, and 109 subjects progressed to regular tobacco use.

The cumulative incidences of the smoking outcomes examined during the 4-year study period are shown in Table 1. In Kaplan-Meier analyses, most participants who progressed to regular smoking after initiation did so within 2 years. There was no apparent plateau in the onset of smoking initiation or progression during the period under study (data not shown).

In unadjusted Cox proportional models, perceived accessibility increased the risk for smoking initiation and regular smoking in a dose-response fashion (Table 2). In further Cox proportional hazards modeling, we dichotomized the indicator for perceived accessibility to ease interpretation of the findings ("strongly agree" and "agree a little" were coded as "yes" [1] and other responses as "no" [0]). In unadjusted analyses, participants who perceived that cigarettes were easy to obtain had an increased risk for smoking initiation compared with those who did not (Table 3). These estimates were

stable to adjustment for parental smoking, peer smoking, or both. Perceived accessibility also increased the risk for regular smoking; this estimate was also robust to adjustment for parental smoking, peer smoking, or both. The perception that cigarettes were easy to obtain also increased the risk for smoking progression among initiators. This relationship was stable to adjustment for parental or peer smoking; however, because of the small sample sizes in the analyses for this outcome, the estimate for perceived accessibility was no longer statistically significant after adjustment for peer smoking.

Interaction Between Perceived Accessibility and Peer Smoking

Because we found significant interaction effects between perceived accessibility and peer smoking, we used indicator variables for the interaction between perceived accessibility and peer smoking (coded as 0 vs 1 or more smoking friends) in the final series of Cox models. In unadjusted Cox proportional hazards analyses, the strength of the association with smoking initiation or regular smoking increased in a dose-response fashion from perceived accessibility only through peer smoking to the combined effects of perceived accessibility and peer smoking (Table 4). Because of small sample sizes, however, the association between perceived accessibility alone and smoking progression among initiators was not statistically significant.

The findings on the relationship between smoking outcomes and the combined effect of perceived accessibility with peer smoking were robust to adjustment for the selected covariates (Table 4). The addition of knowledge of commercial sources to the multivariable models (restricted to the last 2 years of the study) did not change the findings. Because feeling relaxed after smoking is a strong predictor of the development of nicotine addiction,[27] we performed additional multivariable analyses on smoking progression among initiators that included this variable. The findings were unchanged for perceived accessibility only (adjusted hazard ratio [AHR] = 0.63; 95% confidence interval [CI], 0.28-1.43); peer smoking only (AHR = 2.25; 95% CI, 1.10-4.60), and both perceived accessibility and peer smoking (AHR = 3.13; 95% CI, 1.68-5.83).

We did not find a significant synergism between perceived accessibility and peer smoking on smoking initiation (unadjusted

Table 3. Impact of Peer and Parental Smoking on the Relationship of Perceived Accessibility and Smoking

Characteristics	Smoking Events, Hazard Ratio (95% CI)		
	Initiation (n = 1,027)	Regular Smoking (n = 1,195)	Progression Among Initiators[a] (n = 345)
Perceived accessibility alone	2.06 (1.51-2.81)	4.62 (3.10-6.89)	1.59 (1.07-2.35)
Adjusted for parental smoking only	1.79 (1.31-2.45)	3.76 (2.47-5.73)	1.53 (1.03-2.27)
Adjusted for peer smoking only	1.59 (1.15-2.20)	2.54 (1.68-3.82)	1.26 (0.86-1.86)
Adjusted for both parental and peer smoking	1.44 (1.04-1.99)	2.25 (1.48-3.43)	1.20 (0.81-1.78)

CI = confidence interval.

[a] Estimates for this outcome were derived from analyses on initiators, including those who had previously initiated but not progressed to weekly smoking at the date of the baseline interview.

Table 4. Relationship Between Perceived Accessibility, Peer Smoking, and Smoking Outcomes

Characteristics	Smoking Outcome, Hazard Ratio (95% CI)[a]					
	Initiation		Regular Smoking		Progression Among Initiators	
	Unadjusted	Adjusted[b]	Unadjusted	Adjusted[c]	Unadjusted	Adjusted[c]
Neither perceived accessibility nor peer smoking	ref	ref	ref	ref	ref	ref
Has perceived accessibility but no peer smokers	2.00 (1.31-3.06)	1.53 (0.98-2.41)	2.32 (1.07-5.02)	1.16 (0.49-2.75)	0.83 (0.39-1.75)	0.64 (0.28-1.44)
Peer smoking but no perceived accessibility	5.60 (3.76-8.36)	4.04 (2.66-6.15)	9.53 (4.92-18.47)	4.85 (2.35-10.02)	2.98 (1.55-5.75)	2.24 (1.09-4.62)
Both perceived accessibility and peer smokers	6.82 (4.53-10.29)	3.65 (2.26-5.9)	27.63 (15.61-48.91)	8.27 (4.23-16.19)	4.74 (2.69-8.35)	3.08 (1.64-5.78)

CI = confidence interval; ref = reference group.

[a] All estimates shown were derived from city-stratified Cox proportional hazards model to account for clustering within students' city of residence.

[b] Model was adjusted for age, sex, parental smoking, perceived parental approval of smoking, concerns about weight, anger coping, parental permissiveness of watching R-rated movies, and school disaffection.

[c] Model was adjusted for age, sex, parental smoking, perceived parental approval of smoking, having a favorite cigarette advertisement, parental involvement, anger coping, and impulsivity.

[d] The categories were the 4 possible combinations of perceived accessibility and peer smoking.

synergy index [SI] = 1.04; 95% CI, 0.63-1.73); however, there was significant synergism between the 2 factors for regular smoking for both unadjusted (SI = 2.70; 95% CI, 1.63-4.50) and adjusted (SI = 1.96; 95% CI, 1.03-3.72) analyses. The adjusted attributable proportion that was due to the interaction, that is, the proportion of regular smoking among those with smoking friends who perceived easy access to cigarettes that was due to the combined effect of these 2 factors, was 44.2% (95% CI, 14.5%-73.8%). The findings were similar for the outcome of smoking progression among initiators for unadjusted (SI = 2.07; 95% CI, 0.83-5.14) and adjusted (SI = 2.13; 95% CI, 0.53-8.51) analyses, but the estimates were less stable because of smaller sample sizes. The adjusted attributable proportion for smoking progression among initiators was 37.2% (95% CI, –5.8% to 80.3%).

DISCUSSION

In this prospective study, the perception that cigarettes were easy to obtain increased the risk for smoking initiation and regular tobacco use. Our findings from this study show that neither peer smoking nor parental smoking mediate the relationship between perceived accessibility and smoking initiation or progression. Rather, the combination of perceived accessibility and peer smoking had a stronger effect on youth smoking than either factor alone.

In cross-sectional analyses among seventh-grade students, Robinson et al reported that those perceiving easy access to cigarettes had 2.13 greater odds of experimenting with smoking than those who did not.[25] In a similar study among 10th-grade students in California, Unger et al found 1.3 greater odds of current smoking among those perceiving easy access of tobacco products.[23] Youths who have already smoked may perceive cigarettes to be more accessible; consequently, those studies were unable to determine the direction of the relationship between perceived accessibility and tobacco use. Because our data were collected prospectively, we were able to show the direction of this association: in youths who had never before smoked cigarettes, perceived accessibility predicted future smoking. In addition, the observation of a strong dose-response relationship between perceived accessibility and tobacco use supports the conclusion that perceived accessibility contributes to youth smoking.

Surprisingly, we found that youths who perceived easy access and had friends who smoked were more likely to smoke regularly than those exposed to either factor alone. The 2 factors combined had a synergistic effect with regards to regular tobacco use. In the adjusted analyses on smoking initiation, however, there was no synergism between perceived accessibility and peer smoking, suggesting that perceived accessibility and peer smoking have independent effects on smoking initiation. These findings may be explained by the mechanisms by which perceived accessibility and peer smoking act to promote smoking. Peer smoking is an established risk factor for youth smoking[5] and, as expected, we found that peer smoking increased the risk for future smoking independent of all other factors examined. Adolescents who smoke regularly typically purchase their tobacco from stores and then share their cigarettes with their peers, becoming the primary source for new smokers.[43] Youths also learn about commercial sources of cigarettes from their peers.[19,44] Thus, smoking peers contribute to perceptions about accessibility of cigarettes.[44,45] Based on our findings, perceived accessibility contributes to the escalation of tobacco use both independently and through its interaction with peer smoking. Thus, the effects of perceived accessibility and peer smoking are intertwined; greater availability increases smoking rates, and a higher prevalence of smoking among youths increases perceived accessibility through peers that smoke.[26]

Strengths and Weaknesses

The data for this study were collected prospectively with multiple rounds of interviews over a 4-year period, reducing the potential for recall bias and allowing us to determine the onset of smoking and to establish the temporal relationship between perceived accessibility and cigarette smoking. Limitations of this study include the reliance on self-reported tobacco use, although previous studies support the accuracy of self-reported tobacco use.[46,47] Youths are more likely to underreport tobacco use, which would likely bias the results towards the null. The sample size for analyses on smoking progression among initiators was small. As a result, our findings on this outcome should be interpreted with caution; the point estimates for the association between perceived accessibility and smoking progression among initiators should not be interpreted as showing a protective effect of perceived accessibility.

Implications for Policy and Practice

Although restricting youths' access to tobacco products is an effective public health measure, additional interventions may be needed to achieve further decreases in smoking experimentation among youths.[48] Screening for risk factors for initiation and escalation in clinical and public health settings has the potential for identifying youths at high-risk for tobacco use. Our results show that perceived accessibility is an important contributor to initiation and escalation of smoking among teenagers, and it should be considered and carefully

measured in future intervention studies. These findings suggest that youths who have peer smokers and perceive easy access may be at high risk for higher levels of smoking and may warrant greater attention in clinical and public health settings. Family physicians and pediatricians currently screen for risk behavior, including peer influences and tobacco use, as part of the Early and Periodic Screening, Diagnosis and Treatment program.[49] We recommend that clinicians routinely ask youths about their perceptions of the accessibility of tobacco and exposure to peer smokers. Additional studies should examine the feasibility of identifying youth susceptibility to smoking at the time of a health care visit based on a combination of factors, including having peer smokers and perceived accessibility. In addition, future larger studies may be needed to further clarify the relationship between perceived accessibility, peer smoking, and escalation of tobacco use among experimenting youths.

In conclusion, in this study we found a complex relationship between perceived accessibility and smoking among youths. The perception among adolescents that tobacco products are easy to obtain is a risk factor for smoking initiation and progression. Having smoking peers increased the impact of perceived accessibility on smoking among youths even when adjusted for other factors. Studies of tailored interventions targeted at youths who perceive easy access to cigarettes may be useful.

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Key words: Smoking; tobacco use disorder; adolescent; friends; perception; accessibility

Submitted October 1, 2007; submitted revised December 23, 2007; accepted January 4, 2008.

Funding support: This study was supported by grant 57704 from the Robert Wood Johnson Foundation's Substance Abuse Policy Research Program.

Disclaimer: The funding organization played no role in the design, conduct, analyses, and interpretation of the study and approval of the manuscript.

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Nicotine & Tobacco Research Advance Access published October 24, 2011

Brief Report

Ad lib Smoking of Black & Mild Cigarillos and Cigarettes

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Received February 17, 2011; accepted May 23, 2011

Abstract

Introduction: Over the past 20 years, there has been a tripling in the consumption of small cigars and cigarillos, with further increases expected because cigar products are not subject to Food and Drug Administration regulations. Acute toxin exposure from cigar smoking is difficult to assess because unlike cigarettes, cigars vary widely in size, design, composition, and in the smoking behavior of their consumers. For example, a recent practice among urban youth is to remove the paper liner (i.e., "freaking") of a small cigar in the belief that it is this paper liner that leads to addiction and cancer.

Methods: We examined acute exposure (CO and nicotine boosts) and puffing behavior in 12 participants (10 men) who smoked (*ad lib*) their usual conventional cigarette, a Black & Mild cigar (B&M) and a B&M without the paper liner (i.e., "freaked" [B&Mf]).

Results: All products (cigarettes, B&M, and B&Mf) significantly increased heart rate and CO with a trend for plasma nicotine. Nicotine boost was significantly higher after cigarette smoking than both B&M and B&Mf, while CO boost was significantly greater after B&M and B&Mf than cigarettes. The CO boost after B&M was larger than after B&Mf.

Conclusions: These findings suggest that small cigar smoking is associated with smoke inhalation that leads to significant exposure to nicotine, CO, and presumably other components of tobacco smoke and that removing the inner liner does not substantially reduce toxin exposure.

Introduction

The authority to regulate tobacco products granted to the Food and Drug Administration (FDA) through the Family Smoking Prevention and Tobacco Control Act (FSPTCA) is limited to cigarettes, roll-your-own tobacco, and smokeless tobacco products; tobacco products meeting the legal definition of cigars are exempt from that regulation. Although the cigar market is a small fraction of the tobacco market (5.4% of adults are current cigar users in the United States; CDC, 2011), it is on the rise (Connoly & Alpert, 2008). In 2008, cigar sales increased 8.3% and yielded more than $4 billion in retail sales (CDC, 2011) with a trend toward greater use of cigarillos and small cigars (23%), while cigarette sales declined approximately 20% (Connoly & Alpert, 2008; U.S. Department of Agriculture. Economic Research Service, 2007). Recent survey data show high rates of small cigar use among military recruits, college students particularly at historically black colleges, and inner city youth (Soldz, Huyser, & Dorsey, 2003).

Traditionally, a cigar is a tobacco product whose wrapper is at least 70% tobacco (CDC, 2011) that can be sold in small units or singly. Small cigars differ from the traditional cigars by their smaller size and availability in a wide range of flavors, including some that may appeal to youth (cherry, cream vanilla, menthol, etc.). Since the 1970s, the tobacco industry has produced and promoted cigar products that blur the distinction between cigarettes; small cigars and cigarillos are not subject to the same taxation as cigarettes (Delnevo & Hrywna, 2007). One popular cigarillo is the Black & Mild (B&M). Internet sites document the practice of "freaking" or "hyping" the B&M(*Freaking*, 2011; *How to freak a Black & Mild*, 2011; *Hyping*, 2011). This practice involves removing the tobacco from a B&M, taking out the inner paper liner, and repacking the tobacco. It is uncertain how the practice of "freaking" arose, but it apparently emanated from the urban legend (belief) that it is the paper liner—sometimes called "cancer paper"—that causes health risks and addiction (*How to freak a Black & Mild*, 2011).

Toxin exposure from cigar smoking is difficult to assess in laboratory studies because there are differences in the cigar products and in individual smoking behavior—whether the whole cigar is consumed at one time, the smoke is inhaled or puffed, or the product is relit. In the present study, a within-subject experimental design was employed for a preliminary comparison of toxin exposure from cigarettes with a popular brand of cigarillos to determine if there was any support for the assumption that "freaking" diminished toxin exposure. The primary hypothesis was that there would be increases in heart rate (HR), exhaled carbon monoxide (CO), and nicotine boosts after smoking all tobacco products. The secondary hypothesis was that HR, CO, and nicotine boosts would vary across the types of products smoked.

doi: 10.1093/ntr/ntr131

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Methods

Participants

Twelve adult (average age = 43.6 years; range: 29–55) volunteers (10 men and 2 women) were recruited from the community through newspaper advertisements and word of mouth. All the participants were Black daily menthol cigarette smokers—10 smoked Newport 100's and the others smoked Newport Kings and Kool 100's. They smoked an average of 16.1 cigarettes/day (range: 10–30). Their score on a test of nicotine dependence averaged 6.0 (range: 3–9; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). All participants were required to have smoked B&M in the past, though no specific amount smoked was required; two reported that they had smoked B&Mf. All the participants signed a consent form approved by the institutional review board describing the study, its risks, and benefits.

Tobacco Products Smoked

Unflavored B&M cigars with plastic tips (John Middleton Company, Limerick, PA) were provided by the investigators; the cigarettes were provided by the participants. At their initial visit, participants were shown a picture (actual size) of a B&M and were asked to draw a line on the picture indicating how much of the tobacco rod (total length = 88 mm) they usually smoked in one sitting. Three participants stated that they usually smoked all (100%) the tobacco rod, whereas the others usually smoked only a portion (35%–83%) and typically saved the remainder for later consumption. In subsequent laboratory sessions, participants smoked only that portion of the B&M or B&Mf that they usually smoke. On one occasion, the participants smoked B&Mf that had been amended (i.e., "freaked") by the laboratory personnel using methods described on an Internet site (*How to freak a Black & Mild*, 2011) as follows: Tobacco was gently removed from the rod, the thin paper liner of the tube was removed, and the loose tobacco was repacked into the outer tobacco wrapping.

Experimental Protocol

This study was performed on an outpatient basis in Battelle's Human Exposure Assessment Laboratory. Participants reported for four sessions at least one day apart. Data from the first session, where participants smoked a conventional cigarette while standing, are not reported. The order of the remaining experimental conditions was randomized (i.e., cigarette, B&M, B&Mf). There were no restrictions on smoking prior to the experimental visits. Baseline physiologic measures of HR and blood pressure (BP), a blood sample, exhaled CO levels, and normal tidal breathing records (data not presented) were obtained. The participant then smoked ad lib the entire cigarette or the portion of the B&M that they had previously indicated was a usual amount smoked (identified by a line drawn on the product). Immediately after smoking, physiologic measures, a blood sample (i.e., for nicotine boost), and exhaled CO levels were collected.

Dependent Measures

Physiologic Measures

HR and BP were collected before and within 2 min after smoking using an automated BP monitor (DRE, Inc., Louisville, KY).

Biochemical Measures

A 7 ml sample of venous blood was drawn before and within 2 min after smoking from a forearm vein using a Vacutainer blood collection set (Becton Dickinson, Franklin Lakes, NJ). Blood samples were centrifuged, and the plasma was removed and frozen until analysis (Labstat International, Kitchener, Ontario, Canada) using flame ionic detection methods. Exhaled CO was measured before and within 5 min after smoking using a BreathCO Monitor (Vitalograph, Lenexa, KS).

Data Analysis

A mixed analysis of variance with a within-subjects factor (i.e., change pre to post) and between-subjects factor (i.e., difference across conditions) was used. The within-subjects factor was used to test the primary hypothesis that smoking any product (i.e., conventional cigarette, B&M, or B&Mf) caused changes in HR, CO, and nicotine boosts. The between-subjects factor was used to test the secondary hypothesis that there were significant differences in toxin exposure among the products. Tukey's post-hoc tests were used to determine specific sources of differences. The data were examined for normality, and two outliers were identified for CO (outlier = 97 ppm) and nicotine (outlier = 57.1 ng/ml) boosts. Nicotine dependency (Heatherton et al., 1991) and the percent of the cigar smoked were evaluated as potential covariates in the analyses; however, neither were significantly associated with the HR, CO, or nicotine boosts ($p > .05$). There was a trend toward significance for CO boost and percent smoked, $r(12) = .55$, $p < .10$.

Results

Change in HR, Nicotine and CO Pre- to Postsmoking

The primary hypothesis was partially supported in that HR, $F(11, 33) = 4.36$, $p = .002$, $\eta^2 = .67$, and CO, $F(11, 33) = 3.22$, $p = .009$, $\eta^2 = .50$, significantly increased from pre- to postsmoking for all smoking conditions. Nicotine boost only trended toward a significant increase from pre- to postsmoking, $F(11, 33) = 2.16$, $p = .065$ (see Table 1).

Variation in HR, Nicotine and CO Boosts Across Conditions

The secondary hypothesis was partially supported in that CO boost, $F(2, 33) = 6.69$, $p = .005$, $\eta^2 = .19$, and nicotine, $F(2, 33) = 5.67$, $p = .011$, $\eta^2 = .02$, significantly varied across the three conditions. The boost in HR did not vary across the three conditions, $F(2, 33) = 0.74$, $p = .489$.

To examine the between-subjects differences, a Tukey's post-hoc test was used. B&M resulted in a higher CO boost than the conventional cigarette, $t(22) = -3.58$, $p = .0046$, and trended toward a higher CO boost than the B&Mf, $t(22) = 2.43$, $p = .0588$. The B&M, $t(22) = 3.11$, $p = .0148$, and B&Mf, $t(22) = 2.83$, $p = .0268$, resulted in a significantly lower nicotine boost than the conventional cigarette. Significant analyses were repeated without outliers. Eliminating the CO boost outlier resulted in the B&M having a higher CO boost than the B&Mf, $t(20) = 2.66$, $p = .0385$ (see Table 1). No other significant differences were noted.

Discussion

Previous research had shown that there has been an increase in small cigar and cigarillo use especially among urban minority

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Table 1. Denotes the Average HR, Exhaled CO, and Plasma Nicotine Across the Three Conditions

	Conventional cigarette					Black & Mild cigarillo (unamended)					Black & Mild cigarillo ("freaked")				
	Presmoking		Postsmoking			Presmoking		Postsmoking			Presmoking		Postsmoking		
	M	SD	*M*	SD	Boost	*M*	SD	*M*	SD	Boost	*M*	SD	*M*	SD	Boost
Average HR (bpm)	78	13.0	83	7.7	5	79	13.1	86	10.5	7	81	12.7	87	8.6	6
Average CO (ppm)*	29	20.0	36	19.9	7	30	19.1	50[a]	24.9	20[b]	28	17.8	41	24.7	13
Average nicotine (ng/ml)*	12	8.9	37	21.6	25	13	9.0	24	12.2	11[c]	11	6.1	23	13.6	12[c]

Note. HR = heart rate; bpm = beats per minute; CO = carbon monoxide; ppm = parts per million.

[a]Data for Black & Mild Cigarillo (unamended) are reflected without outlier. With the outlier, average CO (ppm) ± *SD* = 57 ± 34.8.

[b]CO boost significantly higher in Black & Mild Cigarillo (unamended) than Black & Mild Cigarillo ("freaked").

[c]Nicotine boost significantly lower than conventional cigarette.

*$p < .05$; denotes significant overall change in outcome of interest from pre to post.

youth (Connoly & Alpert, 2008; Page & Evans, 2004; Singer et al., 2007; Terchek, Larkin, Male, & Frank, 2009). The FSPTCA does not give the FDA authority to regulate cigar marketing. Unlike cigarettes, cigars can have flavoring and be sold singly or in small packages. The impact of the FSPCTA on tobacco smoking is not yet evident; however, it is conceivable that enhanced restrictions on the cigarette market could lead to greater use of cigars—especially small cigars that look like and are smoked like cigarettes. This study was a preliminary investigation to compare nicotine and exhaled CO delivery from cigarettes and a popular cigarillo (i.e., B&M) to determine if there is any validity to the urban legend that "freaking" the B&M reduces their delivery of toxicants, which is a viable area for continued research to further explore actual use practices. B&M and B&Mf, like conventional cigarettes, significantly increased nicotine and CO levels and immediately increased HR (similar to Blank et al., 2011). Compared with cigarette smoking, B&M and B&Mf smoking showed significantly less increase in nicotine but significantly more CO exposure. Removing the inner liner ("freaking") did not influence nicotine delivery but showed a significant decrease in CO exposure.

The increase in CO exposure after cigar smoking suggested that there was considerable inhalation of cigar smoke. It is commonly reported (Turner, McNicol, & Sillett, 1986; Turner, Sillett, & McNicol, 1977) that cigars are puffed but not inhaled and that nicotine absorption mainly occurs across the buccal membrane and less in the lower respiratory tract. It is possible that the smoking pattern of cigarillos differs from that of the larger cigars where there is less inhalation. People who are current or former cigarette smokers appear more likely to inhale than those who have only smoked cigars (Pechacek et al., 1985). "Freaking" the B&M had no effect on plasma nicotine boost, but it did diminish the CO boost. The lower CO boost in B&Mf may have occurred because (a) "freaking" removes the paper liner, a carbonaceous source of CO, (b) some tobacco may have been lost in the repacking, and (c) the repacked tobacco may not have been as dense in the rod, which could account for more efficient burning and less CO generation. Alternatively, the burn characteristics of a "freaked" cigar may lead to less inhalation than from an unamended cigar.

The practice of cigar smoking differs from cigarette smoking in that the products are consumed over a longer period of time (cigarette = 360 s, B&M = 780 s, B&Mf = 660 s), and most of the participants do not smoke the whole cigar at one time. The smoking characteristics and toxin exposure from smoking the relit portion of the cigar are unknown; however, relighting cigarettes leads to increased harm (Dark, Pemberton, O'Connor, & Russell, 1963; Rimington, 1974). In the present report, *ad lib* smoking of cigarettes and a cigarillo was studied. That experimental design decision led to expected and substantial variations in the amount of the cigar rod consumed (between 35% and 100%) and may have increased the variability in the markers of acute toxin exposure. In spite of that variability in consumption, significant increases in toxin exposure after B&M and B&Mf were observed. These results confirm that cigarillos deliver quantities of nicotine that could initiate or sustain dependence and deliver CO and other toxicants to the lower respiratory tract (Henningfield, Cohen, & Pickworth, 1993), which could lead to the respiratory diseases usually associated with cigarette smoking.

Funding

This work was supported by a grant from the National Heart Lung and Blood Institute (1R21HL086514-02).

Declaration of Interests

None Declared.

Acknowledgments

We thank Dale Rhoda for his statistical contribution and Justin Byron for his thoughtful comments.

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Federal Trade Commission

Cigarette Report

for 2009 and 2010

ISSUED: 2012

9

I. INTRODUCTION

This report is the latest in a series on cigarette sales, advertising, and promotion that the Federal Trade Commission ("Commission") has prepared since 1967.

The statistical tables appended to this report provide information on domestic sales and advertising and promotional activity by the five largest U.S. cigarette manufacturers. The tables were compiled from data contained in special reports submitted to the Commission pursuant to compulsory process by: Altria Group, Inc.; Commonwealth Brands, Inc.; Lorillard, Inc.; Reynolds American, Inc.; and Vector Group Ltd.

II. TOTAL CIGARETTE SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES

The total number of cigarettes reported sold or given away by the major manufacturers decreased by 32.3 billion cigarettes (10.0 percent) from 2008 to 2009, and then by another 8.6 billion units (3.0 percent) from 2009 to 2010. Advertising and promotional expenditures also declined, falling from $9.94 billion in 2008 to $8.53 billion in 2009, and then to $8.05 billion in 2010. The largest single category of these expenditures in both 2009 and 2010 was price discounts paid to cigarette retailers or wholesalers in order to reduce the price of cigarettes to consumers. This one category accounted for $6.67 billion (78.2 percent of total advertising and promotional expenditures) in 2009, and $6.49 billion (80.7 percent of total expenditures) in 2010.

III. CIGARETTES SOLD AND GIVEN AWAY

Tables 1 and 1A display annual cigarette sales by the manufacturers to wholesalers and retailers. Table 1A displays the total number of cigarettes sold and given away in the years 2001 through 2010.[1] In 2009, the five major domestic cigarette manufacturers sold or gave away 290.3

[1] Cigarettes given away include all cigarettes distributed for free, whether through sampling, coupons for free product, "buy 3 packs, get 1 free" type offers, or otherwise, as long as those cigarettes were not reported as sold. For years prior to 2001, the Commission required the

billion cigarettes domestically, down from 322.6 billion in 2008. Sales declined from 320.0 billion in 2008 to 290.2 billion in 2009, while cigarettes given away declined from 2.7 billion in 2008 to 0.1 billion in 2009. In 2010, the total number of cigarettes sold and given away declined again, to 281.6 billion units, with 282.05 billion sold and 0.05 billion given away.

Because the major manufacturers report sales data to the Commission based on factory shipments, which can reflect changes in inventory holdings by cigarette wholesalers and retailers, the Commission's reports for a number of years included data produced by the U.S. Department of Agriculture (USDA), which were based on an estimate of the number of cigarettes actually consumed.[2] USDA data are not available for years after 2006.

IV. ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY

Tables 2 through 2D show the amounts spent on cigarette advertising and promotion for the years 1970, and 1975 through 2010.[3] These tables list the amounts spent on the different types of media advertising (*e.g.*, magazines) and sales promotion activities (*e.g.*, distribution of cigarette samples), and also give the percentage of the total amount spent for the various types of advertising and promotion.

Table 2D shows that overall, $8.53 billion was spent on cigarette advertising and promotion in 2009, a decline from the $9.94 billion the major cigarette manufacturers reported in 2008.[4] Total

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manufacturers to report the number of cigarettes they sold but not the number they gave away. It is possible that in those earlier years, some manufacturers included in their sales figures some cigarettes that were actually given away.

[2] USDA's estimates also included sales by smaller manufacturers and importers.

[3] The reported figures include all advertising, merchandising, and promotional expenditures related to cigarettes, regardless of whether such expenditures would constitute "commercial speech" or would be protected from law enforcement action under the First Amendment.

[4] Definitions of the advertising and promotional expenditure categories currently used are reported in the Appendix to this report. If only one company reported spending money on a

expenditures declined further, to $8.05 billion, in 2010.

The companies reported spending $36.7 million in 2009 on magazine advertising (up from $25.5 million in 2008) and $46.5 million in 2010.

Spending on "outdoor" advertising decreased from $2.0 million in 2008 to $1.8 million in 2009, and then to $1.7 million in 2010. Since 2002, "outdoor" advertising has been defined to mean billboards; signs and placards in arenas, stadiums, and shopping malls (whether they are open air or enclosed); and any other advertisements placed outdoors, regardless of their size, including those on cigarette retailer property. Before 2002, "outdoor" advertising was not precisely defined and it was not clear that signs in arenas, stadiums, shopping malls, or on retailer property would have been reported in this category.

As they have since 2001, the companies reported no expenditures on transit advertising (*i.e.*, advertising in or on private or public vehicles or any transportation facility) in 2009 or 2010.

Spending on point-of-sale promotional materials (ads posted at the retail location but excluding outdoor ads on retailer property) fell from $163.7 million in 2008 to $110.3 million in 2009, and then to $106.6 million in 2010.

Since 2002, the "promotional allowance" category has been replaced by four separate categories: price discounts, promotional allowances paid to retailers, promotional allowances paid to wholesalers, and other promotional allowances. For both 2009 and 2010, the largest "promotional allowance" category was price discounts paid to cigarette retailers or wholesalers in order to reduce

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particular type of advertising or promotion, that category is shown as "N/A" on Table 2D and its expenditures are included in the "All Others" category, to avoid potential disclosure of individual company data. For this reason, the Commission is not separately reporting the specific amounts spent in one or both of the years covered by this Report for the following expenditure categories: newspaper advertising; general audience public entertainment; sponsorships; retail value added (bonus cigarettes); retail value added (non-cigarette bonus); Internet advertising (other than the company's own website); or telephone advertising.

the price of cigarettes to consumers (*e.g.*, off-invoice discounts, buy downs, and voluntary price reductions), which accounted for expenditures of $6.67 billion in 2009 (down from $7.17 billion in 2008) and $6.49 billion in 2010.

In addition, the industry spent $428.7 million in 2009 (down from $481.5 million in 2008) and $370.0 million in 2010 on promotional allowances paid to cigarette retailers in order to facilitate the sale or placement of cigarettes (*e.g.*, payments for stocking, shelving, displaying, and merchandising brands, volume rebates, and incentive payments); $449.0 million (2009) and $410.4 million (2010) on promotional allowances paid to cigarette wholesalers (*e.g.*, payments for volume rebates, incentive payments, value-added services, and promotional executions); and $965,000 (2009) and $210,000 (2010) on promotional allowances paid to persons other than retailers and wholesalers. When these four promotional allowance categories are combined, they total $7.55 billion, and account for 88.5 percent of all 2009 spending; for 2010, they total $7.27 billion, 90.4 percent of all spending).

Money spent giving cigarette samples to the public ("sampling distribution") decreased from $54.3 million in 2008 to $23.8 million in 2009, and then to $22.2 million in 2010. "Sampling" includes, among other things, when coupons are distributed for free cigarettes and no purchase is required.

In 2009, $7.5 million was spent on branded specialty item distribution through the mail, at promotional events, or by any means other than at the point-of-sale with the purchase of cigarettes; $75.0 million was spent distributing non-branded, non-cigarette items in connection with the marketing or promotion of cigarettes.[5] In 2010, those figures were $6.3 million and $65.6 million, respectively. The total of $82.4 million spent on specialty item distribution in 2009 accounted for 1.0

[5] Specialty item distribution includes the practice of selling or giving to consumers non-cigarette items, such as T-shirts, caps, sunglasses, key chains, lighters, and sporting goods.

percent of total advertising and promotional expenditures, while the combined spending in 2010 ($71.9 million) accounted for 0.9 percent of total expenditures. In 2008, the total had been $101.0 million, representing 1.0 percent of total spending.

Expenditures for the adult-only public entertainment category declined from $154.7 million in 2008 to $134.3 million in 2009, before rising to $138.9 million in 2010. This category includes public entertainment events (*e.g.*, sponsorship of bar nights or concerts) that take place in an adult-only facility and that display the name or logo of a company's cigarettes or otherwise refer to cigarettes.

All reporting companies indicated that no money had been spent on endorsements and testimonials, or on audio-visual advertising, in 2009 or in 2010. They also reported spending no money on sponsorships in 2010.

The companies reported spending $68.9 million for direct mail advertising in 2009, down from $89.9 million in 2008.[6] Direct mail spending then fell in 2010 to $56.5 million.

The industry reported spending $371.0 million on coupons in 2009 (an increase from the $359.8 million reported in 2008). Coupon spending then declined to $235.8 million in 2010.[7]

Retail-value-added expenditures are the costs associated with offers such as "buy one, get one free" and "buy three, get a free T-shirt," where the bonus item is distributed at retail when the cigarettes are purchased. The companies spent $11.7 million in 2009 on retail-value-added involving free cigarettes, down from the $721.8 million they spent in 2008; the Commission is not reporting separately the amount spent in 2010. The companies reported spending no money in 2010 on retail-value-added involving free non-cigarette items; the Commission is not separately reporting 2009 expenditures.

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[6] This category does not include direct mail containing coupons, which is reported separately.

[7] When coupons are distributed for free cigarettes and no purchase is required to redeem them, such activities are reported as "sampling," not as "coupons."

In 2008, the companies reported spending $13.2 million on advertising on company websites; that figure rose to $18.3 million in 2009 and then to $20.8 million in 2010.

The compulsory process orders issued by the Commission in 2011 for 2009 and 2010 data specifically asked for the first time for spending on "social media marketing on Web sites or other online services or communities, including but not limited to social networking sites, microblogging sites, content-sharing sites, and blogs." The companies reported no spending in either year.

The Commission requires the cigarette manufacturers to report the amounts they spent advertising and promoting sports and sporting events.[8] This question is separate from, and duplicative of, the reporting of the individual various advertising and promotion categories. For example, money spent on a magazine advertisement promoting a cigarette-branded sports tournament open to those of all ages is reported under the category "general-audience public entertainment" and is also reported as an expenditure on "sports and sporting events." Similarly, expenditures on sponsorship of sports teams and individual athletes are reported under the category "sponsorship" and are also reported as "sports and sporting events." The companies reported that they did not spend any money on sports and sporting events in 2010; the Commission is not reporting the amount spent in 2009.

In 2001, the Commission began requiring the manufacturers to report expenditures on advertisements directed to youth or their parents that are intended to reduce youth smoking. The companies reported spending $8.1 million on such advertising in 2009, and $4.4 million in 2010.[9]

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[8] This includes expenditures for: (1) the sponsoring, advertising, or promotion of sports or sporting events; support of an individual, group, or sports team; and purchase of or support for equipment, uniforms, sports facilities, and/or training facilities; (2) all expenditures for advertising in the name of the cigarette company or any of its brands in a sports facility, on a scoreboard, or in conjunction with the reporting of sports results; and (3) all expenditures for functional promotional items (clothing, hats, etc.) connected with a sporting event.

[9] These expenditures are not included in the $8.53 billion (2009) and $8.05 billion (2010) reported in Table 2D.

The companies had previously reported spending $20.7 million and $11.5 million on such advertising in 2007 and 2008, respectively. These figures do not include contributions to third parties that engage in such programs.

Cigarette manufacturers reported that neither they nor anyone working for them or on their behalf paid money or any other form of compensation in connection with the production or filming of any motion picture or television show in 2009 or 2010, or paid money or any other form of compensation to anyone engaged in product placement in motion pictures or television shows. The companies also reported that neither they nor anyone working for them or on their behalf: sought, solicited, granted approval, or otherwise gave permission for the appearance of any cigarette product or cigarette brand imagery in any motion picture, television show, or video appearing on the Internet, although one company reported having videos on company websites that were restricted to its employees, contractors, and retailers.

The data on cigarette "advertising and promotional" expenditures reported in Tables 2 through 2D were not collected in their present form until 1975. Therefore, Table 3 reports cigarette advertising expenditures from 1963 through 1974.

V. TAR RATINGS, FILTERS, LENGTH, AND FLAVOR

Tables 4 and 4A give the domestic market share of cigarettes with tar ratings of 15 milligrams (mg.) or less for the years 1967 through 2010. The data for the years since 1982 are further broken down into sub-categories according to tar ratings, *e.g.*, 3 mg. or less, 6 mg. or less, etc. (categories are presented cumulatively). In 2009, cigarettes with tar ratings of 15 mg. or less constituted 82.3 percent of the domestic cigarette market, while cigarettes with tar ratings of 3 mg. or less – the lowest rated portion of the market – made up 0.4 percent of the market. In 2010, these figures were 91.3 percent and 0.4 percent, respectively.

As shown in Tables 5 and 5A, filtered cigarettes have dominated the market since the Commission began collecting this information in 1963. Filtered cigarettes account for 99.5 percent of the market in both 2009 and 2010.

Table 6 provides the domestic market share of the various cigarette length categories. The King-size (79-88 mm.) category continues to be the biggest seller, with 64 percent of the market in 2009 and 62 percent in 2010. This category is followed by the Long (94-101 mm.) group, which held 32 percent of the market in 2009 and 33 percent in 2010. The shortest category (68-72 mm) rose to 4 percent of the total market in 2010; the last time these cigarettes held more than 2 percent of the market was 1985.

Table 7 gives the market share of menthol and non-menthol cigarettes. In 2008, menthol cigarettes were 27 percent of the market, while non-menthols held 73 percent of the market. In 2009, those percentages were 21 percent and 79 percent, respectively; in 2010, menthol cigarettes were 22 percent of the market.

Tables 8 and 8A relate to whether "tar" ratings are displayed on cigarette packaging.[10] Table 8A shows that overall, 0.0 percent of all cigarettes sold in 2009 and 2010, and 0.0 percent of those sold in 2010, printed tar ratings on their packs.[11]

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[10] Prior to 2002, the Commission asked whether "tar and nicotine ratings" were displayed on cigarette packaging.

[11] In 2008, the Commission rescinded guidance issued in 1966 that generally permitted statements concerning tar and nicotine yields if they were based on the Cambridge Filter Method. The Commission took this action because the scientific consensus was that machine-based measurements of tar and nicotine yields based on this testing methodology did not provide meaningful information on the amounts of tar and nicotine smokers receive from cigarettes, and that the test method was sufficiently flawed to make statements of tar and nicotine yields as measured by the method unlikely to help consumers make informed decisions. The Commission also believed that statements of tar and nicotine yields as measured by this test method were likely to mislead consumers who believe they will get proportionately less tar and nicotine from lower-rated cigarettes than from higher-rated brands.

TABLE 1
TOTAL DOMESTIC CIGARETTE UNIT SALES
(IN BILLIONS OF INDIVIDUAL CIGARETTES)

YEAR	TOTAL SALES REPORTED BY CIGARETTE MANUFACTURERS*	UNIT CHANGE FROM PRIOR YEAR	% CHANGE FROM PRIOR YEAR	USDA CIGARETTE CONSUMPTION ESTIMATES
1963	516.5	---	---	523.9
1964	505.0	(11.5)	(2.2)	511.2
1965	521.1	16.1	3.2	528.7
1966	529.9	8.8	1.7	541.2
1967	525.8	5.9	1.1	549.2
1968	540.3	4.5	.8	545.7
1969	527.9	(12.4)	(2.3)	528.9
1970	534.2	6.3	1.1	536.4
1971	547.2	13.0	2.4	555.1
1972	561.7	14.5	2.7	566.8
1973	584.7	23.0	4.1	589.7
1974	594.5	9.8	1.7	599.0
1975	603.2	8.7	1.5	607.2
1976	609.9	6.7	1.1	613.5
1977	612.6	2.7	.4	617.0
1978	615.3	2.7	.4	616.0
1979	621.8	6.5	1.1	621.5
1980	628.2	6.4	1.0	631.5
1981	636.5	8.3	1.3	640.0
1982	632.5	(4.0)	(.6)	634.0
1983	603.6	(28.9)	(4.6)	600.0
1984	608.4	4.8	.8	600.4
1985	599.3	(9.1)	(1.5)	594.0
1986	586.4	(12.9)	(2.2)	583.8
1987	575.4	(11.0)	(1.9)	575.0
1988	560.7	(14.7)	(2.6)	562.5
1989	525.6	(35.1)	(6.3)	540.0
1990	523.7	(1.9)	(.4)	525.0
1991	510.9	(12.8)	(2.4)	510.0
1992	506.4	(4.5)	(.9)	500.0
1993	461.4	(45.0)	(8.9)	485.0
1994	490.2	28.8	6.2	486.0
1995	482.3	(7.9)	(1.6)	487.0
1996	484.1	1.8	0.4	487.0
1997	478.6	(5.5)	(1.1)	480.0
1998	458.6	(20.1)	(4.2)	465.0
1999	411.3	(47.2)	(10.3)	435.0
2000	413.9	2.6	.6	430.0

* Cigarettes sold by manufacturers to wholesalers and retailers within the U.S. and to armed forces personnel stationed outside the U.S.

TABLE 1A

TOTAL DOMESTIC CIGARETTE UNITS SOLD AND GIVEN AWAY
(IN BILLIONS OF INDIVIDUAL CIGARETTES)

YEAR	UNITS SOLD*	UNITS GIVEN AWAY**	TOTAL NUMBER SOLD AND GIVEN AWAY AS REPORTED BY MANUFACTURERS	UNIT CHANGE IN SOLD AND GIVEN AWAY FROM PRIOR YEAR	PERCENT CHANGE IN SOLD AND GIVEN AWAY FROM PRIOR YEAR	USDA CIGARETTE CONSUMPTION ESTIMATES
2001	398.3	3.9	402.2	***	***	425.0
2002	376.4	11.1	387.4	(14.8)	(3.7)	415.0
2003	360.5	7.1	367.6	(19.8)	(5.1)	400.0
2004	361.3	2.1	363.4	(4.2)	(1.1)	388.0
2005	351.6	3.0	354.6	(8.8)	(2.4)	376.0
2006	343.3	7.2	350.5	(4.1)	(1.2)	371.0
2007	337.7	5.0	342.8	(7.7)	(2.2)	****
2008	320.0	2.7	322.6	(20.2)	(5.9)†	****
2009	290.2	0.1	290.3	(32.3)	(10.0)	****
2010	281.6	0.05	281.7	(8.6)	(3.0)	****

† This figure was reported erroneously in the previous Commission report.

* Cigarettes sold by manufacturers to wholesalers and retailers within the U.S. and to armed forces personnel stationed outside the U.S.

** Cigarettes given away within the U.S. and to armed forces personnel stationed outside the U.S.

*** Prior to 2001, the Commission did not ask about cigarettes given away, although some cigarettes given away may have been reported as sold.

**** USDA no longer reports these data.

TABLE 2

DOMESTIC CIGARETTE ADVERTISING AND PROMOTIONAL EXPENDITURES FOR YEARS 1970, 1975-1985 (DOLLARS IN THOUSANDS)*

	1970	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Newspapers	$14,026	$104,460	$155,808	$190,677	$186,947	$240,978	$304,380	$358,096	$282,897	$200,563	$193,519	$203,527
	3.9%	21.3%	24.4%	24.5%	21.4%	22.2%	24.5%	23.1%	15.8%	10.6%	9.2%	8.2%
Magazines	$50,018	$131,199	$148,032	$173,296	$184,236	$257,715	$266,208	$291,227	$349,229	$388,365	$425,912	$395,129
	13.9%	26.6%	23.2%	22.2%	21.1%	23.8%	21.4%	18.8%	19.5%	20.4%	20.3%	16.0%
Outdoor	$7,338	$84,329	$102,689	$120,338	$149,010	$162,966	$193,333	$228,081	$266,925	$295,226	$284,927	$300,233
	2.0%	17.2%	16.1%	15.4%	17.0%	15.0%	15.6%	14.7%	14.9%	15.5%	13.6%	12.1%
Transit	$5,354	$10,852	$19,341	$21,530	$22,899	$21,151	$26,160	$21,931	$24,135	$26,652	$25,817	$33,136
	1.5%	2.2%	3.0%	2.8%	2.6%	2.1%	2.0%	1.4%	1.3%	1.4%	1.2%	1.3%
Point-of-Sale	$11,663	$35,317	$44,176	$46,220	$57,384	$66,096	$79,799	$98,968	$116,954	$170,059	$167,279	$142,921
	3.2%	7.2%	6.9%	5.9%	6.6%	6.1%	6.4%	6.4%	6.5%	8.9%	8.0%	5.8%
Promotional Allowances	$33,789	$72,018	$82,523	$108,227	$125,148	$137,111	$179,094	$229,077	$272,269	$366,153	$363,247	$548,877
	9.4%	14.7%	12.9%	13.9%	14.3%	12.7%	14.4%	14.8%	15.2%	19.3%	17.3%	22.2%
Sampling Distribution	$11,775	$24,196	$40,390	$47,683	$47,376	$64,286	$50,459	$81,522	$141,178	$125,968	$148,031	$140,565
	3.3%	4.9%	6.3%	6.1%	5.4%	5.9%	4.1%	5.3%	7.9%	6.6%	7.1%	5.7%
Specialty Item Distribution	$5,652	$10,088	$20,030	$35,797	$48,281	$62,029	$69,248	$115,107	$95,246	$127,186	$140,431	$211,429
	2.6%	2.1%	3.1%	4.6%	5.5%	5.7%	5.6%	7.5%	5.3%	6.6%	6.7%	8.5%
Public Entertainment	$544	$8,484	$7,946	$9,538	$11,590	$10,783	$16,914	$37,423	$63,168	$76,648	$59,988	$57,581
	0.2%	1.7%	1.3%	1.2%	1.3%	1.0%	1.4%	2.4%	3.5%	4.0%	2.9%	2.3%
Other**	$220,841	$10,311	$18,182	$26,157	$42,100	$60,310	$56,694	$86,226	$181,813	$123,951	$286,035	$443,043
	61.1%	2.0%	2.8%	3.4%	4.8%	5.6%	4.6%	5.6%	10.1%	6.5%	13.7%	17.9%
Total	$361,000	$491,254	$639,117	$779,463	$874,971	$1,083,425	$1,242,289	$1,547,658	$1,793,814	$1,900,771	$2,095,231	$2,476,441
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* Because of rounding, sums of percentages may not equal 100 percent.

** Includes TV and Radio advertising expenditures of $207,324,000 and $12,492,000, respectively, for 1970. Broadcast advertising was banned after January 1, 1971. Expenditures for direct mail, endorsements, testimonials, and audio-visual are included in the "All Others" category to avoid potential disclosure of individual company data.

TABLE 2A

DOMESTIC CIGARETTE ADVERTISING AND PROMOTIONAL EXPENDITURES FOR YEARS 1986-1995 (DOLLARS IN THOUSANDS)*

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Newspapers	$119,629	$95,810	$105,783	$76,993	$71,174	$48,212	$35,467	$36,220	$24,143	$19,122
	5.0%	3.7%	3.2%	2.1%	1.8%	1.0%	0.7%	0.6%	0.5%	0.4%
Magazines	$340,160	$317,748	$355,055	$380,393	$328,143	$278,110	$237,061	$235,253	$251,644	$248,848
	14.3%	12.3%	10.8%	10.5%	8.2%	6.0%	4.5%	3.9%	5.2%	5.1%
Outdoor	$301,822	$269,778	$319,293	$358,583	$375,627	$386,165	$295,657	$231,481	$240,024	$273,664
	12.7%	10.5%	9.7%	9.9%	9.4%	8.3%	5.7%	3.8%	5.0%	5.6%
Transit	$34,725	$35,822	$44,379	$52,294	$60,249	$60,163	$53,293	$39,117	$29,323	$22,543
	1.5%	1.4%	1.4%	1.4%	1.5%	1.3%	1.0%	0.6%	0.6%	0.5%
Point-of-Sale	$135,541	$153,494	$222,289	$241,809	$303,855	$344,580	$366,036	$400,943	$342,650	$259,035
	5.7%	5.9%	6.8%	6.7%	7.6%	7.4%	7.0%	6.6%	7.1%	5.3%
Promotional Allowances	$630,036	$702,430	$879,703	$999,843	$1,021,427	$1,156,280	$1,514,026	$1,557,635	$1,678,917	$1,865,657
	26.4%	27.2%	26.9%	27.6%	25.6%	24.9%	28.9%	25.8%	34.7%	38.1%
Sampling Distribution	$98,866	$55,020	$74,511	$57,771	$100,893	$56,970	$49,315	$40,202	$6,974	$13,836
	4.1%	2.1%	2.3%	1.6%	2.5%	1.2%	0.9%	0.7%	0.1%	0.3%
Specialty Item Distribution	$210,128	$391,351	$190,003	$262,432	$307,037	$184,348	$339,997	$755,780	$850,810	$665,173
	8.8%	15.2%	5.8%	7.3%	7.7%	4.0%	6.5%	12.5%	17.6%	13.6%
Public Entertainment	$71,439	$71,389	$88,072	$92,120	$125,094	$118,622	$89,739	$84,276	$81,292	$110,669
	3.0%	2.8%	2.7%	2.5%	3.1%	2.6%	1.7%	1.4%	1.7%	2.3%
Direct Mail	$187,057	$187,931	$42,545	$45,498	$51,875	$65,002	$34,345	$31,463	$31,187	$34,618
	7.9%	7.3%	1.3%	1.3%	1.3%	1.4%	0.7%	0.5%	0.7%	0.7%
Endorsements & Testimonials	$384	$376	$781	$0	$0	$0	$0	$0	$0	$0
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Coupons & Retail-Value-Added	**	**	$874,127	$959,965	$1,183,798	$1,882,905	$2,175,373	$2,559,387	$1,248,896	$1,348,378
			26.7%	26.5%	29.6%	40.4%	41.6%	42.4%	25.8%	27.5%
Other***	$252,570	$299,355	$78,366	$89,290	$62,917	$68,758	$41,608	$63,680	$47,672	$33,680
	10.0%	11.6%	2.4%	2.5%	1.6%	1.5%	0.8%	1.2%	1.0%	0.7%
Total	$2,382,357	$2,580,504	$3,274,853	$3,616,993	$3,992,008	$4,650,114	$5,231,917	$6,035,437	$4,833,532	$4,895,223
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* Because of rounding, sums of percentages may not equal 100 percent.

** Prior to 1987, the Commission did not specifically collect information on Coupons & Retail-Value-Added.

*** Expenditures for audio-visual are included in the "All Others" category to avoid potential disclosure of individual company data.

TABLE 2B

DOMESTIC CIGARETTE ADVERTISING AND PROMOTIONAL EXPENDITURES
FOR YEARS 1996-2001 (DOLLARS IN THOUSANDS)*

	1996	1997	1998	1999	2000	2001
Newspapers	$14,067 0.3%	$16,980 0.3%	$29,444 0.4%	$50,952 0.6%	$51,652 0.5%	$31,676 0.3%
Magazines	$243,046 4.8%	$236,950 4.2%	$281,296 4.2%	$377,364 4.6%	$294,916 3.1%	$172,853 1.5%
Outdoor	$292,261 5.7%	$295,334 5.2%	$294,721 4.4%	$53,787 0.7%	$9,262 0.1%	$8,241 0.1%
Transit	$28,865 0.6%	$26,407 0.5%	$40,158 0.6%	$5,573 0.1%	$4 0.0%	$0 0.0%
Point-of-Sale	$252,619 4.9%	$305,360 5.4%	$290,739 4.3%	$329,429 4.0%	$347,038 3.6%	$284,319 2.5%
Promotional Allowances	$2,150,838 42.1%	$2,438,468 43.1%	$2,878,919 42.8%	$3,542,950 43.0%	$3,913,997 40.8%	$4,452,709 39.7%
Sampling Distribution	$15,945 0.3%	$22,065 0.4%	$14,436 0.2%	$33,711 0.4%	$22,330 0.2%	$17,175 0.2%
Specialty Item Distribution	$544,345 10.7%	$512,602 9.6%	$355,835 5.3%	$335,680 4.1%	$327,826 3.4%	$333,394 3.0%
Public Entertainment	$171,177 3.4%	$195,203 3.4%	$248,536 3.7%	$267,379 3.3%	$309,610 3.2%	$312,366 2.8%
Direct Mail	$38,703 0.8%	$37,310 0.7%	$57,772 0.9%	$94,610 1.2%	$92,902 1.0%	$133,947 1.2%
Endorsements & Testimonials	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%
Coupons	$1,308,708** 25.6%	$552,550 9.8%	$624,199 9.3%	$531,004 6.5%	$705,299 7.4%	$602,110 5.4%
Retail-Value-Added		$970,363 17.1%	$1,555,391 23.1%	$2,559,883 31.1%	$3,453,446 36.0%	$4,761,792 42.5%
Internet	$432 0.0%	$215 0.0%	$125 0.0%	$651 0.0%	$949 0.0%	$841 0.0%
Other***	$46,696 0.9%	$50,207 1.0%	$61,584 0.9%	$54,658 0.7%	$63,395 0.7%	$104,797 0.9%
Total	$5,107,700 100%	$5,660,014 100%	$6,733,157 100%	$8,237,631 100%	$9,592,627 100%	$11,216,220 100%

* Because of rounding, sums of percentages may not equal 100 percent.

** Prior to 1997, Coupons and Retail-Value-Added were reported as a single category.

*** Expenditures for audio-visual are included in the "All Others" category to avoid potential disclosure of individual company data.

TABLE 2C

DOMESTIC CIGARETTE ADVERTISING AND PROMOTIONAL EXPENDITURES
FOR YEARS 2002-2006 (DOLLARS IN THOUSANDS)*

	2002	2003	2004	2005
Newspapers	$25,538 0.2%	$8,251 0.1%	$4,913 0.0%	$1,589 0.0%
Magazines	$106,852 0.9%	$156,394 1.0%	$95,700 0.7%	$44,777 0.3%
Outdoor	$24,192 0.2%	$32,599 0.2%	$17,135 0.1%	$9,821 0.0%
Transit	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%
Point-of-Sale	$260,902 2.1%	$165,573 1.1%	$163,621 1.2%	$182,193 1.4%
Price Discounts	$7,873,835 63.2%	$ 10,808,239 71.4%	$10, 932,199 77.3%	$9,776,069 74.6%
Promotional Allowances – Retailers	$1,333,097 10.7%	$1,229,327 8.1%	$542,213 3.8%	$435,830 3.3%
Promotional Allowances – Wholesalers	$446,327 3.6%	$683,067 4.5%	$387,758 2.7%	$410,363 3.1%
Promotional Allowances – Other	$2,767 0.0%	$2,786 0.0%	$1,323 0.0%	$1,493 0.0%
Sampling Distribution	$28,777 0.2%	$17,853 0.1%	$11,649 0.0%	$17,211 0.1%
Specialty Item Distribution – Branded	$49,423 0.4%	$9,195 0.1%	$8,011 0.0%	$5,255 0.0%
Specialty Item Distribution - Non-Branded	$174,201 1.4%	$254,956 1.7%	$216,577 1.5%	$225,279 1.7%
Public Entertainment – Adult-Only	$219,016 1.8%	$150,889 1.0%	$140,137 1.0%	$214,075 1.6%
Public Entertainment – General-Audience	$34,089 0.3%	$32,849 0.2%	$115 0.0%	$152 0.0%
Sponsorships	$54,247 0.4%	$31,371 0.2%	$28,231 0.2%	$30,575 0.2%
Endorsements & Testimonials	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%
Direct Mail	$111,319 0.9%	$92,978 0.6%	$93,836 0.7%	$51,844 0.0%
Coupons	$522,246 4.2%	$650,653 4.3%	$751,761 5.3%	$870,137 6.6%
Retail-Value-Added – Bonus Cigarettes	$1,060,304 8.5%	$677,308 4.5%	$636,221 4.5%	$725,010 5.5%
Retail-Value-Added – Non-Cigarette Bonus	$24,727 0.2%	$20,535 0.1%	$14,343 0.1%	$7,526 0.0%
Company Website	$940 0.0%	$2,851 0.0%	$1,401 0.0%	$2,675 0.0%
Internet – Other	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%
Telephone	$679 0.0%	$760 0.0%	$346 0.0%	$59 0.0%
Other**	$112,879 0.9%	$117,563 0.8%	$102,369 0.7%	$99,025 0.8%
Total	$12,466,358 100.0%	$ 15,145,998 100.0%	$14, 149,859 100.0%	$ 13,110,958 100.0%

* Because of rounding, sums of percentages may not equal 100 percent.

** Expenditures for audio-visual are included in the "All Others" category to avoid potential disclosure of individual company data.

TABLE 2D

CIGARETTE ADVERTISING AND PROMOTIONAL EXPENDITURES FOR 2006-2010 (DOLLARS IN THOUSANDS)*

	2006	2007	2008	2009	2010
Newspapers	N/A --	N/A --	$169 0.0%	N/A --	N/A --
Magazines	$50,293 0.0%	$47,203 0.4%	$25,478 0.3%	$36,680 0.4%	$46,463 0.6%
Outdoor	$935 0.0%	$3,041 0.0%	$2,045 0.0%	$1,812 0.0%	$1,744 0.0%
Transit	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%
Point-of-Sale	$242,625 1.9%	$198,861 1.8%	$163,709 1.0%	$110,311 1.3%	$106,634 1.3%
Price Discounts	$9,205,106 73.7%	$7,699,362 70.9%	$7,171,092 72.1%	$6,672,428 78.2%	$6,490,832 80.7%
Promotional Allowances – Retailers	$434,239 3.5%	$454,139 4.2%	$481,500 4.8%	$428,675 5.0%	$369,992 4.6%
Promotional Allowances – Wholesalers	$471,204 3.8%	$479,032 4.4%	$448,461 4.5%	$449,006 5.3%	$410,370 5.1%
Promotional Allowances – Other	N/A --	N/A --	$1,245 0.0%	$965 0.0%	$210 0.0%
Sampling Distribution	$29,431 0.2%	$48,719 0.4%	$54,261 0.5%	$23,784 0.3%	$22,166 0.3%
Specialty Item Distribution – Branded	$5,546 0.0%	$8,070 0.0%	$7,188 0.1%	$7,472 0.1%	$6,322 0.1%
Specialty Item Distribution - Non-Branded	$163,761 1.3%	$160,047 1.5%	$93,798 0.9%	$74,956 0.9%	$65,574 0.8%
Public Entertainment – Adult-Only	$168,098 1.3%	$160,104 1.5%	$154,749 1.5%	$134,328 1.6%	$138,889 1.7%
Public Entertainment – General-Audience	N/A --	N/A --	N/A --	N/A --	N/A --
Sponsorships	N/A --	N/A --	N/A --	N/A --	$0 0.0%
Endorsements & Testimonials	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%
Direct Mail	$102,353 0.8%	$81,929 0.8%	$89,920 0.9%	$68,891 0.8%	$56,482 0.7%
Coupons	$625,777 5.0%	$366,779 3.4%	$359,793 3.6%	$371,028 4.3%	$235,802 2.9%
Retail-Value-Added – Bonus Cigarettes	$817,792 6.5%	$981,566 9.0%	$721,818 7.3%	$11,736 0.1%	N/A --
Retail-Value-Added – Non-Cigarette Bonus	$14,642 0.1%	$17,720 0.1%	$10,983 0.1%	N/A --	$0 0.0%
Company Website	$6,497 0.1%	$2,351 0.0%	$13,172 0.1%	$18,300 0.2%	$20,829 0.3%
Internet – Other	$0 0.0%	N/A --	N/A --	N/A --	N/A --
Telephone	N/A --	N/A --	N/A --	N/A --	N/A --
Audio-Visual	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%	$0 0.0%
Social Media	--	--	--	$0 0.0%	$0 0.0%
All Others**	$151,392 1.2%	$155,843 1.4%	$143,688 1.4%	$122,002 1.4%	$73,291 0.9%
Total	$12,489,692	$10,864,767	$9,943,068	$8,531,375	$8,045,602

* Because of rounding, sums of percentages may not equal 100 percent.

** Expenditures denoted "N/A" are included in the "All Others" category to avoid potential disclosure of individual company data.

TABLE 3

DOMESTIC CIGARETTE ADVERTISING EXPENDITURES
BY MEDIA FOR YEARS 1963 - 1974*
(MILLIONS OF DOLLARS)

YEAR	TV	RADIO	NEWSPAPER	MAGAZINES	DIRECT	BILLBOARD/ POSTER/ OUTDOOR/ TRANSIT	OTHER	TOTAL
1963	$151.7	31.6	45.6		13.2	NA	7.4	249.5
1964	170.2	25.5	45.2		14.6	NA	5.8	261.3
1965	175.6	24.8	41.9		14.7	NA	6.0	263.0
1966	198.0	31.3	43.4		17.9	NA	6.9	297.5
1967	226.9	17.5	41.2		20.3	NA	6.0	311.5
1968	217.2	21.3	44.6		21.6	NA	6.0	310.7
1969	221.3	13.6	48.7		13.4	NA	8.9	305.9
1970	205.0	12.4	14.7	49.5	16.9	11.7	4.5	314.7
1971	2.2	0	59.3	98.3	27.0	60.6	4.2	251.6
1972	0	0	63.1	96.1	22.9	67.5	8.0	257.6
1973	0	0	65.3	92.4	15.2	63.2	11.4	247.5
1974	0	0	80.5	114.6	31.1	71.4	9.2	306.8

* The data reported in Tables 2 through 2D were not collected in their present form until 1975. Thus, Table 3, which reports cigarette advertising expenditures from 1963 through 1974, has been retained in this report for comparative purposes.

TABLE 4 DOMESTIC MARKET SHARE OF CIGARETTES BY TAR YIELD					
Year	Market share of cigarettes having tar yields of:				
	15 mg. or less	12 mg. or less	9 mg. or less	6 mg. or less	3 mg. or less
1967	2.0%	NA	NA	NA	NA
1968	2.5%	NA	NA	NA	NA
1969	3.0%	NA	NA	NA	NA
1970	3.6%	NA	NA	NA	NA
1971	3.8%	NA	NA	NA	NA
1972	6.6%	NA	NA	NA	NA
1973	8.9%	NA	NA	NA	NA
1974	8.9%	NA	NA	NA	NA
1975	13.5%	NA	NA	NA	NA
1976	15.9%	NA	NA	NA	NA
1977	22.7%	NA	NA	NA	NA
1978	27.5%	NA	NA	NA	NA
1979	40.9%	NA	NA	NA	NA
1980	44.8%	NA	NA	NA	NA
1981	56.0%	NA	NA	NA	NA
1982	52.2%	43.8%	27.8%	8.9%	2.9%
1983	53.1%	44.9%	27.9%	9.4%	3.1%
1984	51.0%	43.4%	26.3%	9.4%	2.9%
1985	51.9%	43.1%	25.3%	8.4%	2.3%
1986	52.6%	44.5%	22.3%	9.9%	2.6%
1987	55.4%	47.8%	20.2%	10.0%	2.5%
1988	54.2%	48.7%	20.1%	10.7%	3.1%
1989	55.1%	48.4%	21.5%	11.4%	2.4%
1990	60.6%	51.5%	25.5%	12.2%	2.8%

TABLE 4A DOMESTIC MARKET SHARE OF CIGARETTES BY TAR YIELD					
Year	Market share of cigarettes having tar yields of:				
	15 mg. or less	12 mg. or less	9 mg. or less	6 mg. or less	3 mg. or less
1991	60.5%	52.6%	22.0%	12.7%	2.6%
1992	68.7%	52.9%	24.9%	12.7%	2.5%
1993	66.5%	53.3%	23.4%	12.6%	1.9%
1994	71.2%	53.7%	23.1%	12.3%	2.1%
1995	72.7%	53.6%	27.1%	12.2%	2.2%
1996	67.4%	55.5%	22.3%	11.9%	1.9%
1997	70.2%	55.6%	21.9%	11.5%	1.7%
1998	81.9%	56.8%	22.9%	13.2%	1.6%
1999	86.6%	57.4%	25.3%	13.6%	1.6%
2000	87.1%	50.4%	23.7%	13.6%	1.3%
2001	85.2%	58.1%	22.6%	13.2%	1.0%
2002	84.9%	58.2%	22.5%	12.9%	0.9%
2003	84.9%	59.5%	22.5%	12.6%	0.8%
2004	84.8%	57.7%	19.2%	11.5%	0.8%
2005	83.5%	58.4%	18.7%	11.5%	0.6%
2006	84.4%	57.7%	19.5%	11.1%	0.5%
2007	82.7%	57.3%	19.6%	10.7%	0.4%
2008	82.6%	57.5%	17.8%	9.4%	0.1%
2009	82.3%	61.6%	17.6%	11.0%	0.4%
2010	91.3%	62.7%	14.3%	9.7%	0.4%

TABLE 5

DOMESTIC MARKET SHARE OF FILTER
AND NON-FILTER CIGARETTES

YEAR	NON-FILTER	FILTER	CHARCOAL	NON-CHARCOAL
1963	42%	58%	*	*
1964	39%	61%	*	*
1965	36%	64%	*	*
1966	32%	68%	*	*
1967	28%	72%	*	*
1968	26%	74%	6%	68%
1969	23%	77%	6%	71%
1970	20%	80%	6%	74%
1971	18%	82%	6%	76%
1972	16%	84%	6%	77%
1973	15%	85%	5%	80%
1974	14%	86%	5%	81%
1975	13%	87%	5%	82%
1976	12%	88%	4%	84%
1977	10%	90%	4%	86%
1978	10%	90%	3%	87%
1979	9%	91%	3%	88%
1980	8%	92%	3%	89%
1981	8%	92%	2%	90%
1982	7%	93%	2%	91%
1983	7%	93%	2%	91%
1984	7%	93%	2%	91%
1985	6%	94%	1%	93%
1986	6%	94%	1%	93%
1987	4%	96%	**	**

* Figures for charcoal filter cigarettes for the years 1963 through 1967 were not obtained.
** Beginning with 1987, figures for charcoal filter cigarettes have no longer been reported.

TABLE 5A

DOMESTIC MARKET SHARE OF FILTER
AND NON-FILTER CIGARETTES

YEAR	NON-FILTER	FILTER
1988	5%	95%
1989	5%	95%
1990	5%	95%
1991	4%	96%
1992	3%	97%
1993	3%	97%
1994	3%	97%
1995	3%	97%
1996	3%	97%
1997	2%	98%
1998	2%	98%
1999	2%	98%
2000	2%	98%
2001	2%	98%
2002	2%	98%
2003	1%	99%
2004	1%	99%
2005	1%	99%
2006	1%	99%
2007	1%	99%
2008	1%	99%
2009	0.5%	99.5%
2010	0.5%	99.5%

TABLE 6

DOMESTIC MARKET SHARE OF CIGARETTES
BY LENGTH IN MILLIMETERS (mm.)

YEAR	68-72 mm.	79-88 mm.	94-101 mm.	110-121 mm.
1967	14%	77%	9%	---
1968	12%	74%	13%	---
1969	11%	74%	16%	---
1970	9%	73%	18%	---
1971	8%	72%	20%	---
1972	8%	71%	21%	---
1973	7%	71%	22%	---
1974	6%	71%	23%	--- *
1975	6%	69%	24%	1%
1976	5%	69%	24%	2%
1977	5%	67%	26%	2%
1978	5%	65%	27%	2%
1979	4%	65%	30%	2%
1980	3%	63%	32%	2%
1981	3%	62%	33%	2%
1982	3%	61%	34%	2%
1983	3%	60%	34%	2%
1984	3%	59%	36%	2%
1985	3%	58%	37%	2%
1986	2%	58%	37%	3%
1987	2%	57%	38%	3%
1988	2%	57%	38%	2%
1989	2%	57%	39%	2%
1990	2%	57%	39%	2%
1991	2%	56%	40%	2%
1992	2%	56%	41%	2%
1993	1%	55%	42%	2%
1994	1%	56%	41%	2%
1995	1%	57%	40%	2%
1996	1%	57%	40%	2%
1997	1%	58%	39%	2%
1998	1%	59%	38%	2%
1999	1%	59%	38%	2%
2000	1%	60%	37%	2%
2001	1%	60%	38%	1%
2002	1%	61%	37%	2%
2003	1%	61%	36%	2%
2004	1%	62%	35%	2%
2005	1%	62%	35%	2%
2006	1%	62%	35%	2%
2007	1%	65%	32%	2%
2008	2%	66%	30%	2%
2009	3%	64%	32%	2%
2010	4%	62%	33%	2%

* The 110-121 mm. length was combined with 94-101 mm. length.

TABLE 7

DOMESTIC MARKET SHARE OF MENTHOL AND NON-MENTHOL CIGARETTES

YEAR	MENTHOL	NON-MENTHOL
1963	16%	84%
1964	16%	84%
1965	18%	82%
1966	19%	81%
1967	20%	80%
1968	21%	79%
1969	22%	78%
1970	23%	77%
1971	24%	76%
1972	24%	76%
1973	25%	75%
1974	27%	73%
1975	27%	73%
1976	28%	72%
1977	28%	72%
1978	28%	72%
1979	29%	71%
1980	28%	72%
1981	28%	72%
1982	29%	71%
1983	28%	72%
1984	28%	72%
1985	28%	72%
1986	28%	72%
1987	28%	72%
1988	28%	72%
1989	27%	73%
1990	26%	74%
1991	27%	73%
1992	26%	74%
1993	26%	74%
1994	25%	75%
1995	25%	75%
1996	25%	75%
1997	25%	75%
1998	26%	74%
1999	26%	74%
2000	26%	74%
2001	26%	74%
2002	27%	73%
2003	27%	73%
2004	27%	73%
2005	27%	73%
2006	28%	72%
2007	29%	71%
2008	27%	73%
2009	21%	79%
2010	22%	78%

TABLE 8

DISCLOSURE OF TAR AND NICOTINE RATINGS
ON CIGARETTE PACKS (1994 - 2001)

		1994	1995	1996	1997	1998	1999	2000	2001
% of overall market that discloses ratings on the pack		6.3%	6.3%	6.1%	5.8%	5.3%	4.1%	3.6%	1.8%
more than 15 mg. tar	market share of varieties in tar group	28.8%	27.3%	32.7%	29.8%	18.0%	13.4%	12.9%	14.8%
	% that discloses ratings on pack	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
12-15 mg. tar	market share of varieties in tar group	19.3%	21.0%	15.3%	16.7%	29.1%	32.5%	39.0%	29.7%
	% that discloses ratings on pack	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%
8-11 mg. tar	market share of varieties in tar group	38.6%	38.7%	39.2%	41.0%	39.4%	40.3%	33.9%	42.1%
	% that discloses ratings on pack	2.4%	2.8%	2.6%	2.3%	3.2%	1.6%	0.7%	1.0%
4-7 mg. tar	market share of varieties in tar group	11.2%	10.8%	10.9%	10.8%	11.9%	12.2%	12.9%	12.5%
	% that discloses ratings on pack	30.7%	30.1%	29.3%	28.6%	20.7%	16.2%	16.5%	3.7%
3 mg. tar or less	market share of varieties in tar group	2.1%	2.2%	1.9%	1.7%	1.6%	1.6%	1.3%	1.0%
	% that discloses ratings on pack	91.8%	89.1%	97.2%	97.3%	97.4%	92.3%	92.0%	87.9%

TABLE 8A

DISCLOSURE OF TAR RATINGS ON CIGARETTE PACKS (2002-2010)

		2002	2003	2004	2005	2006	2007	2008	2009	2010
% of overall market that discloses ratings on the pack		1.4%	1.2%	1.2%	0.9%	0.8%	0.8%	0.0%	0.0%	0.0%
more than 15 mg. tar	market share of varieties in group	15.1%	15.1%	15.2%	16.5%	15.5%	17.3%	17.4%	17.7%	8.7%
	% that discloses ratings on pack	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
12-15 mg. tar	market share of varieties in group	28.8%	28.9%	30.3%	28.3%	28.4%	27.4%	26.9%	23.9%	29.4%
	% that discloses ratings on pack	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8-11 mg. tar	market share of varieties in group	43.0%	43.2%	42.5%	43.3%	44.5%	44.3%	45.9%	47.0%	52.1%
	% that discloses ratings on pack	0.9%	0.8%	0.7%	0.6%	0.5%	0.5%	0.0%	0.0%	0.0%
4-7 mg. tar	market share of varieties in group	12.2%	12.0%	11.2%	11.3%	10.9%	10.5%	9.7%	11.0%	9.4%
	% that discloses ratings on pack	1.8%	1.5%	1.5%	1.2%	1.0%	0.8%	0.0%	0.0%	0.0%
3 mg. tar or less	market share of varieties in group	0.9%	0.8%	0.8%	0.6%	0.5%	0.4%	0.1%	0.4%	0.4%
	% that discloses ratings on pack	88.7%	89.9%	91.6%	90.7%	94.9%	100.0%	0.0%	0.0%	0.0%

APPENDIX

2009 and 2010 Advertising and Promotional Expenditure Categories

Newspapers: Newspaper advertising; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Magazines: Magazine advertising; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Outdoor: Billboards; signs and placards in arenas, stadiums, and shopping malls, whether they are open air or enclosed; and any other advertisements placed outdoors, regardless of their size, including those on cigarette retailer property; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Audio-visual: Audio-visual or video advertising on any medium of electronic communication not subject to the Federal Communications Commission's jurisdiction, including screens at motion picture theaters, video cassettes or DVDs, and television screens or monitors in stores; but excluding expenditures in connection with Internet advertising.

Transit: Advertising on or within private or public vehicles and all advertisements placed at, on or within any bus stop, taxi stand, transportation waiting area, train station, airport, or any other transportation facility; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Point-of-Sale: Point-of-sale advertisements; but excluding expenditures in connection with outdoor advertising, sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Price discounts: Price discounts paid to cigarette retailers or wholesalers in order to reduce the price of cigarettes to consumers, including off-invoice discounts, buy downs, voluntary price reductions, and trade programs; but excluding retail-value-added expenditures for promotions involving free cigarettes and expenditures involving coupons.

Promotional Allowances – Retail: Promotional allowances paid to cigarette retailers in order to facilitate the sale or placement of any cigarette, including payments for stocking, shelving, displaying and merchandising brands, volume rebates, incentive payments, and the cost of cigarettes given to retailers for free for subsequent sale to consumers; but excluding expenditures in connection with newspapers, magazines, outdoor, audio-visual, transit, direct mail, point-of-sale, and price discounts.

Promotional Allowances – Wholesale: Promotional allowances paid to cigarette wholesalers in order to facilitate the sale or placement of any cigarette, including payments for volume rebates, incentive payments, value added services, promotional execution and satisfaction of reporting requirements; but excluding expenditures in connection with newspapers, magazines, outdoor, audio-visual, transit, direct mail, point-of-sale, price discounts, and retail promotional allowances.

Promotional Allowances – Other: Promotional allowances paid to any persons other than retailers, wholesalers, and full-time company employees who are involved in the cigarette distribution and sales process in order to facilitate the sale or placement of any cigarette; but excluding expenditures in connection with newspapers, magazines, outdoor, audio-visual, transit, direct mail, point-of-sale, price discounts, and retail and wholesale promotional allowances.

Sampling: Sampling of cigarettes, including the cost of the cigarettes, all associated excise taxes and increased costs under the Master Settlement Agreement, and the cost of organizing, promoting, and conducting sampling. Sampling includes the distribution of cigarettes for consumer testing or evaluation when consumers are able to smoke the cigarettes outside of a facility operated by the Company, but not the cost of actual clinical testing or market research associated with such cigarette distributions. Sampling also includes the distribution of coupons for free cigarettes, when no purchase or payment is required to obtain the coupons or cigarettes.

Specialty Item Distribution – Branded: All costs of distributing any item (other than cigarettes, items the sole function of which is to advertise or promote cigarettes, or written or electronic publications), whether distributed by sale, redemption of coupons, or otherwise, that bears the name, logo, or an image of any portion of the package of any brand or variety of

cigarettes, including the cost of the items distributed but subtracting any payments received for the item. The costs associated with distributing non-cigarette items in connection with sampling or retail-value-added programs are reported in those categories, not as specialty item distribution.

Specialty Item Distribution – Non-Branded: All costs of distributing any item (other than cigarettes, items the sole function of which is to advertise or promote cigarettes, or written or electronic publications), whether distributed by sale, redemption of coupons, or otherwise, that does not bear the name, logo, or an image of any portion of the package of any brand or variety of cigarette, including the cost of the items distributed but subtracting any payments received for the item. The costs associated with distributing non-cigarette items in connection with sampling or retail-value-added programs are reported in those categories, not as specialty item distribution.

Direct Mail: Direct mail advertising; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, retail-value-added, and Internet advertising.

Public Entertainment – Adult-Only: Public entertainment events bearing or otherwise displaying the name or logo or an image of any portion of the package of any of a company's cigarettes or otherwise referring or relating to cigarettes, which take place in an adult-only facility, including all expenditures made by the company in promoting and/or sponsoring such events.

Public Entertainment – General-Audience: Public entertainment events bearing or otherwise displaying the name or logo or an image of any portion of the package of any of a company's cigarettes or otherwise referring or relating to cigarettes, which do not take place in an adult-only facility, including all expenditures made by the company in promoting and/or sponsoring such events.

Retail-Value-Added – Bonus Cigarettes: Retail-value-added expenditures for promotions involving free cigarettes (*e.g.*, buy two packs, get one free), whether or not the free cigarettes are physically bundled together with the purchased cigarettes, including all expenditures and costs associated with the value added to the purchase of cigarettes (*e.g.*, excise taxes paid for the free cigarettes and increased costs under the Master Settlement Agreement).

Retail-Value-Added – Non-Cigarette Bonus: Retail-value-added expenditures for promotions involving free non-cigarettes items (*e.g.*, buy two packs, get a cigarette lighter), including all expenditures and costs associated with the value added to the purchase of cigarettes.

Coupons: All costs associated with coupons for the reduction of the retail cost of cigarettes, whether redeemed at the point-of-sale or by mail, including all costs associated with advertising or promotion, design, printing, distribution, and redemption. However, when coupons are distributed for free cigarettes and no purchase or payment is required to obtain the coupons or the cigarettes, these activities are considered to be sampling and not couponing.

Sponsorships: Sponsorships of sports teams or individual athletes, but excluding endorsements.

Endorsements & Testimonials: Endorsements, testimonials, and product placement.

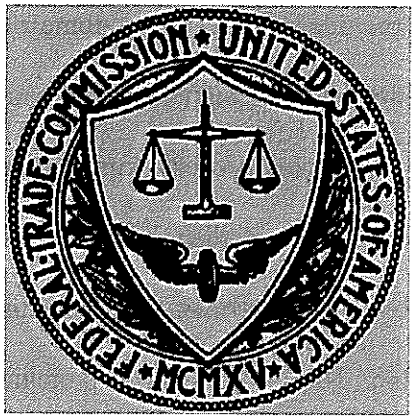
Company Website: All expenditures associated with advertising on any company Internet website.

Internet – Other: Internet advertising other than on the Company's own Internet website, including on the World Wide Web, on commercial on-line services, and through electronic mail messages; but excluding costs associated with social media marketing.

Telephone: Telephone advertising, including costs associated with the placement of telemarketing calls or the operation of incoming telephone lines that allow consumers to participate in any promotion or hear pre-recorded product messages; but excluding costs associated with having customer service representatives available for responding to consumer complaints or questions.

Social Media Marketing: All expenditures for social media marketing on Web sites or other online services or communities, including but not limited to social networking sites, microblogging sites, content-sharing sites, and blogs.

All Other: Advertising and promotional expenditures not covered by another category.



Federal Trade Commission Smokeless Tobacco Report for 2009 and 2010

ISSUED: 2012

9

I. INTRODUCTION

This report is the latest in a series on smokeless tobacco sales, advertising, and promotion that the Federal Trade Commission ("Commission") has prepared since 1987.[1] The statistical tables contained within this report provide information on domestic smokeless tobacco sales and advertising and promotional activities. Commission staff prepared these tables using information collected, pursuant to compulsory process, from the parent companies of the major manufacturers of smokeless tobacco products in the United States: Altria Group, Inc.;[2] North Atlantic Trading Company, Inc.; Reynolds American, Inc.;[3] Swedish Match North America, Inc.; and Swisher International Group, Inc. The 2009 figures also include sales and expenditure data for a joint venture between Swedish Match North America and Lorillard Tobacco Company.

II. TOTAL SMOKELESS TOBACCO SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES

The figures in Table 1A show that the total amount of smokeless tobacco sold by manufacturers to wholesalers and retailers declined from 119.92 million pounds in 2008 to 117.69 million pounds in 2009. Sales rose in 2010 to 120.52 million pounds.

Sales revenues received by the manufacturers from wholesalers and retailers followed the same pattern, declining from $2.76 billion in 2008 to $2.61 billion in 2009, before rising to $2.78 billion in 2010.

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[1] Some 1985 data are included. The 1985 data are less detailed than those from 1986 forward because they were collected retrospectively and were meant to serve as baseline data.

[2] In 2009, Altria Group, Inc. acquired UST, Inc., which is now known as UST LLC.

[3] In 2010, Reynolds American, Inc. subsidiary Conwood Company, LLC changed its name to American Snuff Company, LLC.

The manufacturers spent a total of $492.1 million on advertising and promotion in 2009, down from the $547.9 million spent in 2008. Advertising and promotional expenditures fell again in 2010 to $444.2 million.

Table 2 shows the number of units of smokeless tobacco the companies sold and gave away in packages of various size (*e.g.*, less than 1 ounce, from 2 ounces to less than 5 ounces, or 15 ounces or more). In both 2009 and 2010 – as in the previous years for which these data are available – more packages weighing 1 ounce to less than 2 ounces were sold than any other size package. More packages weighing 1 ounce to less than 2 ounces were given away in 2009 than any other size package, but in 2010, packages weighing 2 ounces to less than 5 ounces were given away the most.

III. SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY[4]

Magazine advertising declined from to $17.1 million in 2008 to $7.9 million in 2009; it then rose to $11.1 million in 2010.[5] Spending on outdoor advertising rose from $219,000 in 2008 to $980,000 in 2009, before declining to $386,000 in 2010.[6] The companies reported

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[4] Detailed definitions of the expenditure categories appear in the Appendix to this report. If only one company reported spending money on a particular type of advertising or promotion, that category is shown as "N/A" on Table 3G and the expenditures are included in the "All Others" category, to avoid potential disclosure of individual company data. For this reason, the Commission is not identifying the amounts spent on newspaper advertising, promotional allowances paid to persons other than retailers and wholesalers, general audience public entertainment, branded specialty items, endorsements, or sponsorships for one or both of the years covered by this report.

[5] Beginning with data for the years 2002-2005, the Commission has permitted the companies to report expenditures in thousands of dollars, rather than in actual dollars, as had previously been required. However, if companies provide expenditure data in actual dollars, those figures are reported as such.

[6] The Commission's orders for the years since 2002 have defined "outdoor" advertising to

spending no money on audio-visual advertising and, as they have each year since the Commission began collecting these data, they reported no expenditures for transit advertising.

In 2009, the companies reported spending $9.6 million on direct mail advertising, an increase from the $7.6 million spent in 2008. Direct mail spending declined in 2010 to $8.9 million.

Point-of-sale advertising remained relatively unchanged from 2008 ($55.3 million) to 2009 ($55.1 million), before declining to $45.6 million in 2010.

The companies reported spending $160.3 million on price discounts (payments made to smokeless tobacco retailers or wholesalers in order to reduce the price of smokeless tobacco to consumers) in 2009 and $95.0 million in 2010. Although these amounts were substantially less than the $324.6 million spent in 2008, price discounts remained the single largest expenditure category in both years (accounting for 32.6 percent of total 2009 spending, and 21.4 percent of 2010 spending).

Spending on promotional allowances (intended to facilitate the sale or placement of smokeless tobacco) paid to smokeless tobacco retailers and wholesalers increased from their 2008 levels: $6.4 million (retailers) and $18.6 million (wholesalers). The companies reported spending $24.1 million in 2009 and $41.5 million in 2010 on promotional allowances paid to smokeless tobacco retailers, and $40.5 million (2009) and $51.3 million (2010) on promotional allowances paid to wholesalers.

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mean billboards; signs and placards in arenas, stadiums, and shopping malls (whether they are open air or enclosed); and any other ads placed outdoors, regardless of their size, including those on the property of smokeless tobacco retailers. Prior to 2002, "outdoor" advertising was not precisely defined. In particular, it was not clear that signs in arenas, stadiums, shopping malls, or on retailer property were to be reported in this category.

When these three promotional allowance categories are combined, they account for 45.7 percent of total 2009 spending and 42.3 percent of total 2010 spending; in 2008, they accounted for 63.8 percent of total spending. The companies also reported spending $54,674 in 2010 on promotional allowances paid to persons other than retailers and wholesalers. The Commission is not separately reporting the amount spent in 2009.

The companies reported spending $39.7 million in 2009 and $21.0 million in 2010 to give smokeless tobacco samples to the public ("sampling"). The Commission's definitions of "sampling" and "coupons" make clear that when coupons are distributed for free smokeless tobacco products and no purchase is required to obtain the coupon or to redeem it for the smokeless tobacco, such activities are to be reported as "sampling." In 2008, the companies reported spending $29.9 million on sampling.

Since 2002, the specialty item distribution category has been broken down into two sub-categories: branded and non-branded.[7] In 2009, $13.5 million was spent on non-branded specialty item distribution; that figure declined to $6.1 million in 2010. The Commission is not separately reporting spending on branded specialty items.

Expenditures for public entertainment in adult-only facilities (*e.g.*, bar nights or concerts) rose from $14.3 million in 2008 to $22.3 million in 2009, and then to $32.4 million in 2010. The Commission is not separately reporting the amounts spent in 2009 and 2010 on general-audience public entertainment.

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[7] This expenditure category covers items (such as T-shirts, caps, sunglasses, key chains, calendars, lighters, and sporting goods) distributed through the mail, at promotional events, or by any means other than at the point of sale with the purchase of smokeless tobacco. Specialty items provided at retail with smokeless tobacco products (*e.g.*, "buy three, get a free key chain") are deemed retail-value-added.

The companies reported coupon expenditures of $31.2 million in 2009, up from $29.5 million in 2008. Coupon expenditures in 2010 were $34.5 million.

Retail-value-added expenditures are the costs associated with offers such as "buy one, get one free" and "buy three, get a free T-shirt," where the bonus item is distributed at retail when the smokeless tobacco product is purchased. Since 2002, the retail-value-added category has been broken into two categories – one where the bonus item is additional smokeless tobacco and one where the bonus item is not smokeless tobacco. In 2009, the companies spent $28.7 million on retail-value-added involving free smokeless tobacco products, an increase from the $10.5 million spent in 2008; that figure rose to $44.1 million in 2010. They also spent $2.5 million in 2009 (down from the $4.5 million spent in 2008) on retail-value-added involving free non-smokeless tobacco items; in 2010, the companies spent $4.1 million on retail-value-added involving free non-smokeless tobacco items.

In 2008, the companies reported spending $2.1 million on advertising on their websites and $2.5 million on Internet advertising other than on their own websites. In 2009, the companies reported spending $6.1 million and $2.3 million, respectively, on those two forms of advertising. In 2010, those figures were $8.5 million and $1.3 million, respectively.

The compulsory process orders issued by the Commission in 2011 for 2009 and 2010 data for the first time asked specifically for spending on "social media marketing on Web sites or other online services or communities, including but not limited to social networking sites, microblogging sites, content-sharing sites, and blogs." The companies reported spending no money in this category in either 2009 or 2010.

Since 1992, the Commission has required the manufacturers to report the total amount of money they spent advertising and promoting sports and sporting events.[8] This question is separate from, and duplicative of, the reporting of the individual various advertising and promotion categories. For example, money spent on a magazine advertisement promoting a smokeless tobacco-branded sports tournament open to those of all ages is reported under the category "general-audience public entertainment" and is also reported as an expenditure on "sports and sporting events." Similarly, expenditures on sponsorship of sports teams and individual athletes are reported under the category "sponsorship" and are also reported as "sports and sporting events." These expenditures are only counted once, however, in computing the industry's total advertising and promotional expenditures. Expenditures for sports and sporting events rose from $14.6 million in 2008 to $15.2 million in 2009, before declining to $9.0 million in 2010.

Only one company reported spending money in 2009 and 2010 on advertisements directed to youth or their parents that were intended to reduce youth use of smokeless tobacco products.[9]

Smokeless tobacco manufacturers reported that neither they nor anyone working for them or on their behalf paid money or any other form of compensation in connection with the production or filming of any motion picture or television show in 2009 or 2010, or paid money

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[8] This includes expenditures for: (1) the sponsoring, advertising, or promotion of sports or sporting events; support of an individual, group, or sports team; and purchase of or support for equipment, uniforms, sports facilities, and/or training facilities; (2) advertising in the name of the smokeless tobacco company or any of its brands in a sports facility, on a scoreboard, or in conjunction with the reporting of sports results; and (3) all expenditures for functional promotional items (clothing, hats, etc.) connected with a sporting event.

[9] These expenditures are not included in the figures reported in Table 3G.

or any other form of compensation to anyone engaged in product placement in motion pictures or television shows. Most of the companies also reported that neither they nor anyone working for them or on their behalf: sought, solicited, granted approval, or otherwise gave permission for the appearance of any smokeless tobacco product or smokeless tobacco brand imagery in any motion picture, television show, or video appearing on the Internet. One company, however, did have videos on company websites that were restricted to its employees, contractors, and retailers.

IV. SMOKELESS TOBACCO SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES BY TOBACCO TYPE

The Commission historically has reported sales and advertising expenditures for several different types of smokeless tobacco products, including dry snuff, moist snuff, plug/twist, and loose leaf chewing tobacco. In 2008, the Commission also required the companies to provide data for snus and dissolvable smokeless tobacco products. Tables 4A through 4E present details on sales and advertising and promotional expenditures by type of smokeless tobacco, including snus (Table 4E).[10]

The number of pounds of loose leaf/chewing tobacco, plug/twist, and scotch/dry snuff sold all fell from 2008 to 2009, and then again from 2009 to 2010. In contrast, the number of pounds of both moist snuff and snus sold rose in both years. As it has for years, moist snuff sales exceeded the combined sales of all other kinds of smokeless tobacco.

Moist snuff also continued to generate more revenue than any other type of smokeless tobacco. In 2009, sales of moist stuff were $2.19 billion, representing 83.9 percent of total

[10] The Commission is not separately reporting data on dissolvables because only one company reported selling these products.

smokeless tobacco sales. In 2010, the companies sold $2.34 billion of moist snuff (84.3 percent of total sales).

Tables 4A through 4D also indicate that moist snuff continued to receive the greatest advertising and promotional support in both 2009 and 2010. In 2009, the companies spent $313.7 million on moist snuff. In 2010, they spent $257.9 million advertising and promoting moist snuff, compared to $21.4 million for loose leaf/chewing tobacco, $500,592 for plug/twist, $999,586 for scotch/dry snuff, and $57.4 million for snus.

The companies also reported spending $16.8 million in 2009 and $14.0 million in 2009 on smokeless tobacco brands that encompass more than one type of product (*e.g.*, moist snuff and snus).[11] These amounts are included in the total set forth in Table 3G, but not in Tables 4A through 4E. Table 3G also includes amounts spent on smokeless tobacco products for which no product type classification was reported.

Tables 5A through 5D present details about the number of units sold in packages of various sizes for each type of smokeless tobacco product. For plug/twist, scotch/dry snuff, and moist snuff, more packages weighing 1 ounce to less than 2 ounces were sold in 2009 and 2010 than any other size. For loose leaf/chewing tobacco, more packages weighing 2 ounces to less than 5 ounces were sold in both years than any other size. More packages of snus weighing less than 1 ounce were sold in both 2009 and 2010 than any other size.

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[11] The Commission now allows the companies to report marketing expenditures at the brand level, rather than at the variety level. For those smokeless tobacco brand families that encompass more than one type of product (*e.g.*, moist snuff and plug/twist), marketing expenditures are thus available only at the brand level, and not for each individual type of product within the brand family.

TABLE 1

TOTAL SMOKELESS TOBACCO SALES

AND ADVERTISING AND PROMOTIONAL EXPENDITURES

FOR 1985 - 2006

Year	Sales in Pounds	Sales in Dollars	Advertising and Promotional Expenditures
1985	121,449,115	$730,618,970	$80,068,229
1986	118,778,334	$797,777,885	$76,676,706
1987	116,540,281	$852,717,347	$67,777,044
1988	114,433,782	$901,654,382	$68,223,671
1989	116,440,365	$981,637,304	$81,200,611
1990	117,415,326	$1,091,170,201	$90,101,327
1991	120,110,686	$1,237,961,670	$104,004,040
1992	118,372,693	$1,361,360,729	$115,346,708
1993	115,888,785	$1,475,460,518	$119,230,826
1994	115,495,201	$1,612,098,989	$125,972,408
1995	116,387,464	$1,735,840,489	$127,323,282
1996	116,404,222	$1,790,406,160	$123,877,458
1997	113,975,148	$1,817,508,055	$150,426,310
1998	110,036,380	$1,886,328,217	$145,486,899
1999	109,401,055	$1,940,736,017	$170,213,761
2000	111,741,335	$1,988,875,535	$224,582,757
2001	112,193,550	$2,127,520,387	$236,676,917
2002	112,148,366	$2,362,166,931	$234,645,000
2003	112,924,505	$2,489,501,857	$242,514,000
2004	116,768,672	$2,617,388,686	$231,084,000
2005	116,197,005	$2,611,292,547	$250,792,000
2006	115,818,739	$2,593,436,592	$354,123,000

TABLE 1A

TOTAL SMOKELESS TOBACCO SALES

AND ADVERTISING AND PROMOTIONAL EXPENDITURES

FOR 2007 - 2010

Year	Sales in Pounds	Sales in Dollars	Advertising and Promotional Expenditures
2007	118,234,763	$2,695,462,138	$411,309,000
2008	119,915,125	$2,757,087,244	$547,873,100
2009	117,693,273	$2,611,908,686	$492,104,100
2010	120,522,070	$2,780,437,133	$444,248,600

TABLE 2
NUMBER OF UNITS SOLD AND GIVEN AWAY – BY PACKAGE SIZE
FOR 2002 - 2010

		Less than 1 oz.	1 oz. to less than 2 oz.	2 oz. to less than 5 oz.	5 oz. to less than 10 oz.	10 oz. to less than 15 oz.	15 oz. or more
2002	sold	25,394,260	887,095,347	216,169,305	6,628,408	15,735	36,200
	given away	915,205	22,123,561	3,792,001	0	0	0
2003	sold	37,883,014	918,733,530	203,567,697	7,848,051	15,936	353,436
	given away	2,663,753	14,474,790	2,352,034	0	0	0
2004	sold	42,705,741	959,223,302	191,040,358	8,645,329	15,456	2,118,017
	given away	7,422,914	15,859,744	2,247,914	0	0	24
2005	sold	47,107,372	980,089,404	175,013,057	7,902,121	14,064	2,275,388
	given away	5,952,331	17,059,852	1,983,417	48	0	0
2006	sold	49,584,382	994,410,045	161,133,012	7,136,052	14,575	2,552,377
	given away	4,699,963	19,699,034	9,632,177	0	0	2,280
2007	sold	63,590,228	1,056,392,109	158,097,486	1,679,601	6,350	2,687,159
	given away	6,746,905	10,922,306	9,489,740	72	0	5,616
2008	sold	77,241,248	1,072,780,163	138,515,458	5,740,339	53,012	2,826,765
	given away	6,580,518	15,120,663	9,962,337	12	750	5,626
2009	sold	121,886,357	1,098,116,188	125,774,684	4,696,041	511,174	2,917,282
	given away	5,670,008	12,050,068	9,903,059	252	9,726	1,012
2010	sold	165,174,728	1,148,099,256	111,399,859	4,791,115	1,193,327	3,087,246
	given away	4,195,615	5,991,661	9,985,116	144	10,794	246

TABLE 3A

SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY FOR 1985

Television & Radio Advertising	$26,584,731
Total Print	$8,719,379
All Other	$44,764,119
Total	**$80,068,229**

TABLE 3B

SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY FOR 1986 AND 1987

	1986	1987
Newspapers	$626,979	$1,452,710
Magazines	$6,226,654	$9,237,988
Outdoor	$2,722,557	$8,321,315
Television & Radio*	$16,067,211	$0
Audio, Visual	$2,579,268	$0
Transit	$0	$0
Point-of-Sale	$4,234,207	$5,789,436
Promotional Allowances	$8,231,580	$7,554,592
Sampling	$13,699,156	$13,877,923
Distribution Bearing Names	$2,353,816	$4,312,094
Direct Mail	$20,844	$48,979
Public Entertainment	$13,823,266	$14,844,425
Endorsements	$435,710	$245,105
All Other	$5,655,458	$2,092,477
TOTAL	**$76,676,706**	**$67,777,044**

* Expenditures allocated for television and radio advertising on electronic media subject to Federal Communications Commission ("FCC") regulations cover approximately six months of 1986 because the statutory broadcast ban became effective on August 28, 1986.

TABLE 3C

SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY FOR 1988 - 1991

	1988	1989	1990	1991
Newspapers	$940,256	$449,918	$880,629	$1,109,503
Magazines	$5,778,582	$6,410,401	$10,214,280	$9,652,958
Outdoor	$4,801,955	$2,913,074	$2,650,471	$1,644,287
Audio, Visual	$0	$0	$0	$0
Transit	$0	$0	$0	$0
Point-of-Sale	$7,436,270	$9,693,996	$10,320,657	$10,749,602
Promotional Allowances	$6,360,041	$8,327,225	$9,936,022	$14,771,597
Sampling	$12,345,180	$15,019,174	$13,461,932	$13,959,101
Distribution Bearing Names	$4,055,180	$4,611,457	$2,854,289	$3,866,263
Direct Mail	$623,731	$935,370	$78,000	$893,000
Public Entertainment	$17,501,791	$19,638,397	$20,272,355	$21,116,095
Endorsements	$260,539	$292,290	$264,484	$344,000
Coupons & Retail-value-added*	$4,655,429	$9,689,049	$16,438,440	$23,306,499
All Other	$3,463,919	$3,220,210	$2,729,768	$2,591,135
TOTAL	**$68,223,671**	**$81,200,611**	**$90,101,327**	**$104,004,040**

* One company reported no expenditures for this category because its accounting records were not maintained to allow calculation of these expenditures. Instead, these expenditures were reported to the Commission in the Point-of-Sale or Promotional Allowances categories.

TABLE 3D

SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY FOR 1992 - 1995

	1992	1993	1994	1995
Newspapers	$269,032	$274,738	$128,849	$142,562
Magazines	$9,258,297	$8,040,702	$10,261,201	$11,533,093
Outdoor	$694,388	$855,643	$1,112,524	$1,474,121
Audio, Visual	$0	$0	$0	$0
Transit	$0	$0	$0	$0
Point-of-Sale	$12,133,489	$13,465,302	$13,555,569	$15,170,713
Promotional Allowances	$11,397,882	$13,073,381	$10,244,241	$8,304,066
Sampling	$15,975,134	$15,794,391	$14,279,127	$15,748,393
Distribution Bearing Names	$2,609,348	$4,246,353	$10,368,596	$9,915,589
Direct Mail	$1,289,000	$1,099,000	$103,000	$253,000
Public Entertainment	$21,511,594	$22,912,765	$25,397,969	$26,749,679
Endorsements	$155,000	$215,000	$160,000	$160,000
Coupons & Retail-value-added*	$31,524,486	$32,297,431	$36,687,092	$33,701,379
All Other	$8,529,058	$6,956,120	$3,674,240	$4,170,687
TOTAL	**$115,346,708**	**$119,230,826**	**$125,972,408**	**$127,323,282**
Sports & Sporting Events	$20,970,580	$22,742,986	$24,521,715	$25,863,187

* One company reported no expenditures for this category because its accounting records were not maintained to allow calculation of these expenditures. Instead, these expenditures were reported to the Commission in the Point-of-Sale or Promotional Allowances categories.

TABLE 3E

SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY FOR 1996 - 2001

	1996	1997	1998	1999	2000	2001
Newspapers	$236,765	$1,642,347	$2,807,281	$3,306,548	$2,413,104	$1,825,748
Magazines	$13,362,100	$11,874,395	$18,389,758	$18,436,630	$13,890,399	$21,963,961
Outdoor	$3,544,994	$4,991,256	$2,228,381	$7,258	$6,987	$10,522
Audio, Visual	$0	$0	$0	$0	$0	$0
Transit	$0	$0	$0	$0	$0	$0
Point-of-Sale	$13,568,572	$14,712,560	$25,202,972	$26,092,942	$15,179,555	$17,412,893
Promotional Allowances	$12,722,615	$14,692,865	$14,959,694	$30,756,608	$45,393,210	$60,866,870
Sampling	$12,640,816	$11,155,411	$17,439,990	$17,884,888	$15,761,075	$17,888,963
Distribution Bearing Names	$11,728,976	$17,999,555	$3,768,161	$3,161,884	$347,124	$324,694
Direct Mail	$314,599	$808,247	$6,948,300	$5,620,844	$17,015,856	$16,340,203
Public Entertainment	$22,736,345	$28,940,337	$25,426,519	$22,136,453	$11,223,945	$18,063,522
Endorsements	$162,500	$165,000	$165,000	$130,000	$230,000	$255,000
Coupons	$3,446,225*	$3,447,124*	$10,965,387	$24,221,899	$32,746,769	$31,526,860
Retail-value-added	$22,390,838*	$34,938,115*	$11,204,800*	$11,135,604*	$64,883,152	$43,235,466
Internet	$0	$0	$0	$0	$155,405	$262,296
All Other	$4,397,683	$5,059,097	$5,980,656	$7,322,203	$5,336,176	$6,699,919
TOTAL	**$123,877,458**	**$150,426,310**	**$145,486,899**	**$170,213,761**	**$224,582,757**	**$236,676,917**
Sports & Sporting Events	$19,784,813	$25,751,503	$26,620,636	$23,401,714	$11,026,204	$17,866,620

* One company reported no expenditures for this category because its accounting records were not maintained to allow calculation of these expenditures. Instead, these expenditures were reported to the Commission in the Point-of-Sale or Promotional Allowances categories.

TABLE 3F

SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY FOR 2002 - 2005

	2002	2003	2004	2005
Newspapers	$722,000	$262,000	$285,000	$453,000
Magazines	$23,142,000	$22,838,000	$25,002,000	$20,996,000
Outdoor	$117,000	$101,000	$184,000	$207,000
Audio, Visual	$7,000	$139,000	$7,000	$119,000
Transit	$0	$0	$0	$0
Direct Mail	$7,073,000	$5,982,000	$5,670,000	$8,237,000
Point-of-Sale	$16,894,000	$20,874,000	$23,120,000	$20,748,000
Price Discounts	$99,000,000	$106,531,000	$86,977,000	$99,699,000
Promotional Allowances – Retailers	$3,245,000	$5,103,000	$4,285,000	$3,406,000
Promotional Allowances – Wholesalers	$16,755,000	$12,632,000	$11,222,000	$12,550,000
Promotional Allowances – Other	$41,000	$29,000	$9,000	$29,000
Sampling	$25,754,000	$22,483,000	$25,156,000	$28,180,000
Specialty Item Distribution – Branded	$419,000	$45,000	$22,000	$119,000
Specialty Item Distribution – Non-Branded	$0	$0	$0	$36,000
Public Entertainment – Adult Only	$0	$0	$7,000	$73,000
Public Entertainment – General Audience	$1,453,000	$1,640,000	$1,349,000	$215,000
Endorsements & Testimonials	$130,000	$355,000	$355,000	$355,000
Sponsorships	$8,864,000	$8,170,000	$9,018,000	$4,192,000
Coupons	$12,156,000	$11,524,000	$10,686,000	$28,622,000
Retail-value-added – Bonus Smokeless Tobacco Product	$13,686,000	$16,004,000	$14,950,000	$9,310,000
Retail-value-added – Non-Smokeless Tobacco Bonus	$466,000	$556,000	$2,650,000	$4,430,000
Company Websites	$18,000	$15,000	$877,000	$272,000
Internet – Other	$54,000	$25,000	$16,000	$413,000
Telephone	$169,000	$374,000	$231,000	$120,000
All Other	$4,480,000	$6,832,000	$9,006,000	$8,011,000
TOTAL	**$234,645,000**	**$242,514,000**	**$231,084,000**	**$250,792,000**
Sports & Sporting Events	$21,063,000	$16,942,000	$20,649,000	$15,749,000

TABLE 3G

SMOKELESS TOBACCO ADVERTISING AND PROMOTIONAL EXPENDITURES BY CATEGORY FOR 2006-2010

	2006	2007	2008	2009	2010
Newspapers	N/A	N/A	N/A	N/A	N/A
Magazines	$16,591,000	$13,913,173	$17,121,980	$7,866,333	$11,110,920
Outdoor	$166,000	$334,000	$219,000	$980,000	$386,000
Audio, Visual	N/A	N/A	$0	$0	$0
Transit	$0	$0	$0	$0	$0
Direct Mail	$9,574,000	$12,205,426	$7,578,568	$9,607,007	$8,891,589
Point-of-Sale	$20,824,000	$29,318,474	$55,294,980	$55,123,380	$45,547,830
Price Discounts	$203,692,000	$249,509,598	$324,647,400	$160,255,600	$94,994,150
Promotional Allowances – Retailers	$3,731,000	$5,349,323	$6,415,563	$24,106,440	$41,497,110
Promotional Allowances – Wholesalers	$9,047,000	$12,382,780	$18,577,976	$40,548,160	$51,253,070
Promotional Allowances – Other	N/A	N/A	N/A	N/A	$54,674
Sampling	$41,979,000	$35,113,367	$29,935,510	$39,720,340	$21,033,310
Specialty Item Distribution – Branded	N/A	N/A	$508,550	N/A	N/A
Specialty Item Distribution – Non-Branded	$34,000	N/A	$3,079,000	$13,505,000	$6,062,000
Public Entertainment – Adult Only	$0	N/A	$14,300,000	$22,263,000	$32,432,000
Public Entertainment – General Audience	$144,000	N/A	N/A	N/A	N/A
Endorsements & Testimonials	N/A	N/A	N/A	N/A	$0
Sponsorships	N/A	$10,462,200	$9,319,000	$10,505,000	N/A
Coupons	$16,133,000	$15,451,687	$29,473,550	$31,221,730	$34,490,620
Retail-value-added – Bonus Smokeless Tobacco Product	$12,047,000	$8,496,586	$10,464,260	$28,734,180	$44,144,000
Retail-value-added – Non-Smokeless Tobacco Bonus	$1,406,000	$626,122	$4,513,724	$2,504,308	$4,116,402
Company Websites	$891,000	$3,109,935	$2,084,642	$6,121,145	$8,524,455
Social Media	--	--	--	$0	$0
Internet – Other	$944,000	$2,050,000	$2,538,000	$2,290,000	$1,344,000
Telephone	N/A	N/A	$0	$0	$0
All Others	$16,920,000	$12,917,397	$11,802,426	$36,752,410	$38,367,468
TOTAL	**$354,123,000**	**$411,239,067**	**$547,873,100**	**$492,104,100**	**$444,248,600**
Sports & Sporting Events	$16,912,000	$17,903,200	$14,647,590	$15,191,000	$9,030,000

** Expenditures denoted "N/A" are included in the "All Others" category to avoid potential disclosure of individual company data.

TABLE 4A

SMOKELESS TOBACCO SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES BY TOBACCO TYPE FOR 1986 - 2010

LOOSE LEAF/CHEWING TOBACCO

Year	Pounds Sold	Dollar Sales	Advertising and Promotional Expenditures
1986	65,697,634	$255,668,419	$32,249,750
1987	64,634,524	$267,766,776	$28,403,536
1988	60,648,126	$264,298,268	$26,198,078
1989	61,869,625	$281,701,402	$34,057,050
1990	60,896,991	$295,462,446	$35,194,561
1991	62,177,203	$321,458,416	$38,190,095
1992	58,850,933	$320,085,975	$42,820,544
1993	55,912,562	$319,672,867	$46,032,905
1994	54,242,322	$316,888,405	$44,807,716
1995	54,605,149	$323,156,639	$43,842,237
1996	54,204,655	$325,533,391	$36,387,774
1997	51,831,834	$330,903,053	$45,573,616
1998	46,887,918	$317,087,609	$26,780,236
1999	44,531,612	$278,670,311	$21,219,600
2000	44,077,019	$275,356,571	$15,592,978
2001	42,396,301	$278,982,298	$16,659,755
2002	40,703,148	$288,895,090	$17,211,000
2003	39,105,547	$294,705,352	$17,476,000
2004	39,183,779	$310,329,793	$18,218,000
2005	36,410,287	$307,026,071	$16,746,000
2006	34,692,990	$310,525,106	$18,910,000
2007	32,600,747	$310,662,579	$21,009,334
2008	30,128,176	$298,082,506	$24,024,138
2009	26,951,575	$298,444,031	$22,529,447
2010	24,700,060	$285,192,598	$21,424,534

TABLE 4B

SMOKELESS TOBACCO SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES BY TOBACCO TYPE FOR 1986 - 2010

PLUG/TWIST CHEWING TOBACCO

	Pounds Sold	Dollar Sales	Advertising and Promotional Expenditures
1986	8,835,200	$44,870,900	$896,821
1987	8,351,803	$44,267,561	$559,597
1988	7,282,206	$40,429,972	$868,954
1989	6,308,415	$35,132,105	$1,787,775
1990	6,557,216	$41,316,133	$1,655,886
1991	5,913,172	$42,379,173	$1,326,216
1992	5,389,336	$42,625,799	$1,722,361
1993	4,778,107	$40,702,849	$1,367,877
1994	4,410,333	$39,102,541	$936,993
1995	4,156,158	$37,996,428	$1,032,856
1996	3,096,708	$29,469,575	$653,511
1997	2,800,859	$27,434,794	$682,887
1998	3,180,093	$33,610,369	$1,216,474
1999	2,824,198	$30,733,775	$1,583,271
2000	2,718,653	$26,905,139	$1,164,235
2001	2,543,800	$26,775,821	$1,284,627
2002	2,191,910	$28,178,852	$1,159,000
2003	2,023,068	$27,044,811	$179,000
2004	1,876,461	$27,059,654	$121,000
2005	1,712,921	$25,970,711	$72,000
2006	1,488,380	$24,830,985	$4,000
2007	1,371,114	$24,352,589	$8,330
2008	1,322,324	$24,122,598	$2,000
2009	1,037,946	$22,435,650	$515,734
2010	912,443	$20,978,572	$500,592

TABLE 4C

SMOKELESS TOBACCO SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES BY TOBACCO TYPE FOR 1986 - 2010

SCOTCH/DRY SNUFF

	Pounds Sold	Dollar Sales	Advertising and Promotional Expenditures
1986	8,110,168	$58,951,001	$181,977
1987	7,255,296	$56,709,742	$263,482
1988	7,069,754	$57,221,662	$501,543
1989	7,244,911	$62,155,826	$654,591
1990	6,185,410	$56,601,390	$472,404
1991	5,833,210	$56,881,288	$517,145
1992	5,623,404	$57,657,911	$354,774
1993	4,996,957	$54,302,829	$313,659
1994	4,814,130	$55,574,320	$272,038
1995	4,490,094	$53,885,040	$486,280
1996	4,218,705	$53,858,106	$437,339
1997	4,063,630	$54,725,929	$522,260
1998	3,781,891	$53,292,750	$155,484
1999	3,572,339	$53,229,345	$61,516
2000	3,463,705	$54,205,273	$54,878
2001	3,364,601	$56,339,020	$68,552
2002	3,077,100	$56,344,777	$79,000
2003	2,853,516	$56,087,685	$69,000
2004	2,656,336	$54,672,024	$125,000
2005	2,402,904	$52,986,545	$103,000
2006	2,170,341	$51,895,254	$191,000
2007	2,003,974	$50,423,814	$173,763
2008	4,280,152	$48,712,026	$179,000
2009	1,635,448	$48,481,932	$977,009
2010	1,498,125	$47,588,846	$999,586

TABLE 4D

SMOKELESS TOBACCO SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES BY TOBACCO TYPE FOR 1986 - 2010

MOIST SNUFF

	Pounds Sold	Dollar Sales	Advertising and Promotional Expenditures
1986	36,135,332	$438,287,565	$43,348,158
1987	36,298,658	$483,973,268	$38,550,429
1988	39,433,696	$539,704,480	$40,655,096
1989	41,017,414	$602,647,971	$44,701,195
1990	43,775,709	$697,790,232	$52,778,476
1991	46,187,101	$817,242,793	$63,970,584
1992	48,509,020	$940,991,044	$70,449,029
1993	50,201,159	$1,060,781,973	$71,516,385
1994	52,028,416	$1,200,533,723	$79,955,661
1995	53,136,063	$1,320,802,382	$81,961,909
1996	54,884,154	$1,381,544,888	$86,398,835
1997	55,278,825	$1,404,444,279	$103,647,547
1998	56,186,478	$1,482,337,489	$117,334,705
1999	58,472,906	$1,578,102,586	$147,349,374
2000	61,481,958	$1,632,408,551	$207,770,666
2001	63,888,848	$1,765,423,249	$218,663,983
2002	66,176,208	$1,988,748,212	$209,278,000
2003	68,942,374	$2,111,664,009	$211,070,000
2004	73,052,096	$2,225,327,215	$194,396,000
2005	75,670,894	$2,225,309,220	$210,430,000
2006	77,437,057	$2,206,085,179	$308,456,000
2007	82,236,628	$2,306,606,093	$350,621,243
2008	84,014,810	$2,377,001,759	$287,315,149
2009	87,582,722	$2,192,418,669	$313,710,617
2010	92,591,210	$2,344,536,640	$257,879,187

TABLE 4E

SMOKELESS TOBACCO SALES AND ADVERTISING AND PROMOTIONAL EXPENDITURES BY TOBACCO TYPE FOR 2008 - 2010

SNUS

	Pounds Sold	Dollar Sales	Advertising and Promotional Expenditures
2008	170,527	$9,148,659	$58,763,000
2009	482,909	$49,807,528	$106,415,066
2010	818,913	$81,786,519	$57,394,000

TABLE 5A

NUMBER OF UNITS SOLD – BY PACKAGE SIZE
FOR 2002 - 2010

LOOSE LEAF/CHEWING TOBACCO

	Less than 1 oz.	1 oz. to less than 2 oz.	2 oz. to less than 5 oz.	5 oz. to less than 10 oz.	10 oz. to less than 15 oz.	15 oz. or more
2002	0	699,115	203,476,178	5,426,568	0	2,800
2003	0	658,495	191,761,704	6,750,937	0	286,274
2004	0	542,335	180,401,587	7,586,542	0	2,002,084
2005	0	448,644	165,667,992	6,859,556	0	2,157,700
2006	0	376,297	156,832,421	6,163,226	684	2,507,750
2007	365,706	317,120	150,399,964	5,039,908	164	2,615,539
2008	265,853	259,488	134,883,519	4,896,761	(1,440)	2,783,493
2009	0	237,408	119,369,974	3,967,490	0	2,884,625
2010	0	229,811	105,990,232	4,161,772	0	3,073,317

TABLE 5B

NUMBER OF UNITS SOLD – BY PACKAGE SIZE
FOR 2002 - 2010

PLUG/TWIST CHEWING TOBACCO

	Less than 1 oz.	1 oz. to less than 2 oz.	2 oz. to less than 5 oz.	5 oz. to less than 10 oz.	10 oz. to less than 15 oz.	15 oz. or more
2002	0	9,789,738	8,013,482	0	0	0
2003	3,960	9,057,230	7,417,331	0	0	1,184
2004	172,596	8,121,211	6,825,354	0	0	7,591
2005	229,638	7,388,766	6,041,214	0	0	7,848
2006	219,732	6,382,398	1,275,303	0	0	1,518
2007	0	6,113,798	1,107,983	0	0	3,991
2008	(2,976)	5,723,997	1,093,135	0	0	3,353
2009	170,808	4,623,964	3,599,939	0	0	2,001
2010	37,932	4,080,855	3,150,940	0	0	616

TABLE 5C

NUMBER OF UNITS SOLD – BY PACKAGE SIZE FOR 2002 - 2010

SCOTCH/DRY SNUFF

	Less than 1 oz.	1 oz. to less than 2 oz.	2 oz. to less than 5 oz.	5 oz. to less than 10 oz.	10 oz. to less than 15 oz.	15 oz. or more
2002	833,184	17,320,899	4,679,645	1,201,840	15,735	33,400
2003	800,640	16,092,214	4,388,662	1,097,114	15,936	34,994
2004	764,064	15,023,756	3,813,417	1,058,787	15,456	49,512
2005	734,976	13,637,790	3,303,851	1,042,565	14,064	47,134
2006	655,712	12,376,413	3,025,288	972,826	13,891	16,356
2007	1,676,174	10,804,273	2,531,367	697,253	0	23,213
2008	598,464	10,557,468	2,538,033	844,505	0	21,147
2009	535,212	9,470,599	2,254,555	728,551	(1)	18,411
2010	245,548	8,927,259	2,116,879	629,343	0	9,955

TABLE 5D

NUMBER OF UNITS SOLD – BY PACKAGE SIZE FOR 2002 - 2010

MOIST SNUFF

	Less than 1 oz.	1 oz. to less than 2 oz.	2 oz. to less than 5 oz.	5 oz. to less than 10 oz.	10 oz. to less than 15 oz.	15 oz. or more
2002	24,561,076	859,285,595	0	0	0	0
2003	37,078,414	892,925,591	0	0	0	30,984
2004	41,769,081	935,536,000	0	0	0	58,830
2005	46,142,758	958,614,204	0	0	0	62,706
2006	48,576,464	975,274,937	0	0	0	26,753
2007	60,274,128	1,039,156,919	612	0	6,186	44,416
2008	71,986,220	1,056,217,422	771	0	54,452	18,772
2009	89,001,023	1,083,725,965	550,216	0	511,175	12,245
2010	103,531,063	1,134,785,681	141,808	0	1,193,327	3,358

TABLE 5E

NUMBER OF UNITS SOLD – BY PACKAGE SIZE
FOR 2008 - 2010

SNUS

	Less than 1 oz.	1 oz. to less than 2 oz.	2 oz to less than 5 oz.	5 oz. to less than 10 oz.	10 oz to less than 15 oz.	15 oz. or more
2008	4,385,317	21,788	0	0	0	0
2009	31,838,153	58,252	0	0	0	0
2010	61,204,305	75,650	0	0	0	0

APPENDIX

2009 and 2010 Advertising and Promotional Expenditure Categories

Newspapers: Newspaper advertising; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Magazines: Magazine advertising; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Outdoor: Billboards; signs and placards in arenas, stadiums, and shopping malls, whether they are open air or enclosed; and any other advertisements placed outdoors, regardless of their size, including those on smokeless tobacco retailer property; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Audio-visual: Audio-visual or video advertising on any medium of electronic communication not subject to the Federal Communications Commission's jurisdiction, including screens at motion picture theaters, video cassettes or DVDs, and monitors in stores; but excluding expenditures in connection with Internet advertising.

Transit: Advertising on or within private or public vehicles and all advertisements placed at, on, or within any bus stop, taxi stand, transportation waiting area, train station, airport, or any other transportation facility; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Direct Mail: Direct mail advertising; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, retail-value-added, and Internet advertising.

Point-of-Sale: Point-of-sale advertisements; but excluding expenditures in connection with outdoor advertising, sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

Price Discounts: Price discounts paid to smokeless tobacco retailers or wholesalers in order to reduce the price of smokeless tobacco to consumers, including off-invoice discounts, buy downs, voluntary price reductions, and trade programs; but excluding retail-value-added expenditures for promotions involving free smokeless tobacco and expenditures involving coupons.

Promotional Allowances – Retail: Promotional allowances paid to smokeless tobacco retailers in order to facilitate the sale or placement of any smokeless tobacco product, including payments for stocking, shelving, displaying and merchandising brands, volume rebates, incentive payments, and the cost of smokeless tobacco product given for free to retailers for subsequent sale to consumers; but excluding expenditures in connection with newspapers, magazines, outdoor, audio-visual, transit, direct mail, point-of-sale, and price discounts.

Promotional Allowances – Wholesale: Promotional allowances paid to smokeless tobacco wholesalers in order to facilitate the sale or placement of any smokeless tobacco product, including payments for volume rebates, incentive payments, value added services, promotional execution and satisfaction of reporting requirements; but excluding expenditures in connection with newspapers, magazines, outdoor, audio-visual, transit, direct mail, point-of-sale, price discounts, and retail promotional allowances.

Promotional Allowances – Other: Promotional allowances paid to any persons other than retailers, wholesalers, and full-time company employees who are involved in the smokeless tobacco distribution and sales process in order to facilitate the sale or placement of any smokeless tobacco product; but excluding expenditures in connection with newspapers, magazines, outdoor, audio-visual, transit, direct mail, point-of-sale, price discounts, and retail and wholesale promotional allowances.

Sampling: Sampling of smokeless tobacco products, including the cost of the smokeless tobacco, all associated excise taxes, and the costs of organizing, promoting, and conducting sampling. Sampling includes the distribution of smokeless tobacco products for consumer testing or evaluation when consumers are able to use the smokeless tobacco outside of a facility owned or operated by the Company, but not the cost of actual clinical testing or market research associated with such smokeless tobacco distributions. Sampling also includes the distribution of coupons for free smokeless tobacco, when no purchase or payment is required to obtain the coupons or the smokeless tobacco product.

Specialty Item Distribution – Branded: All costs of distributing any item (other than smokeless tobacco products, items the sole function of which is to advertise or promote smokeless tobacco products, or written or electronic publications), whether distributed by sale, redemption of coupons, or otherwise, that bears the name, logo, or an image of any portion of the package of any brand or variety of smokeless tobacco product, including the cost of the items distributed but subtracting any payments received for the item. The costs associated with distributing non-smokeless tobacco items in connection with sampling or retail-value-added programs are reported in those categories, not as specialty item distribution.

Specialty Item Distribution – Non-Branded: All costs of distributing any item (other than smokeless tobacco products, items the sole function of which is to advertise or promote smokeless tobacco products, or written or electronic publications), whether distributed by sale, redemption of coupons, or otherwise, that does not bear the name, logo, or an image of any portion of the package of any brand or variety of smokeless tobacco product, including the cost of the items distributed but subtracting any payments received for the item. The costs associated with distributing non-smokeless tobacco items in connection with sampling or retail-value-added programs are reported in those categories, not as specialty item distribution.

Public Entertainment – Adult-Only: Public entertainment events bearing or otherwise displaying the name or logo or an image of any portion of the package of any of the Company's smokeless tobacco products or otherwise referring or relating to smokeless tobacco, which take place in an adult-only facility, including all expenditures made by the Company in promoting and/or sponsoring such events.

Public Entertainment – General-Audience: Public entertainment events bearing or otherwise displaying the name or logo or an image of any portion of the package of any of the Company's smokeless tobacco products or otherwise referring or relating to smokeless tobacco, which do not take place in an adult-only facility, including all expenditures made by the Company in promoting and/or sponsoring such events.

Endorsements & Testimonials: Endorsements, testimonials, and product placement.

Sponsorships: Sponsorships of sports teams or individual athletes, but excluding endorsements.

Coupons: All costs associated with coupons for the reduction of the retail cost of smokeless tobacco products, whether redeemed at the point of sale or by mail, including all costs associated with advertising or promotion, design, printing, distribution, and redemption. However, when coupons are distributed for free smokeless tobacco and no purchase or payment is required to obtain the coupons or the smokeless tobacco, these activities are considered to be sampling and not couponing.

Retail-value-added – Bonus Smokeless Tobacco: Retail-value-added expenditures for promotions involving free smokeless tobacco products (*e.g.*, buy two, get one free), whether or not the free smokeless tobacco products are physically bundled together with the purchased smokeless tobacco products, including all expenditures and costs associated with the value added to the purchase of smokeless tobacco products (*e.g.*, excise taxes paid for the free smokeless tobacco product).

Retail-value-added – Non-Smokeless Tobacco Bonus: Retail-value-added expenditures for promotions involving free non-smokeless tobacco items (*e.g.*, buy two packs, get free key chain), including all expenditures and costs associated with the value added to the purchase of smokeless tobacco products.

Company Website: All expenditures associated with advertising on any company Internet website that can be accessed by computers located in the United States.

Internet – Other: Internet advertising other than on the Company's own Internet website, including on the World Wide Web, on commercial on-line services, and through electronic mail messages; but excluding social media marketing.

Telephone: Telephone advertising, including costs associated with the placement of telemarketing calls or the operation of incoming telephone lines that allow consumers to participate in any promotion or hear pre-recorded product messages; but excluding costs associated with having customer service representatives available for responding to consumer complaints or questions.

Social Media Marketing: All expenditures for social media marketing on Web sites or other online services or communities, including but not limited to social networking sites, microblogging sites, content-sharing sites, and blogs.

All Other: Advertising and promotional expenditures not covered by another category.

Sports and Sporting Events: All costs associated with sponsoring, advertising, or promotion of sports or sporting events, including football, weight lifting, sailing, rodeo, automobile, race car, funny car, motorcycle, bicycle, truck, monster truck, tractor-pull, fishing, and hunting events, competitions, tournaments, and races. This category is duplicative of expenditures for other categories.

Addiction
RESEARCH REPORT
doi:10.1111/j.1360-0443.2009.02714.x

Smoker sensitivity to retail tobacco displays and quitting: a cohort study

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ABSTRACT

Aims To assess whether sensitivity to point of sale (POS) cigarette displays influences quitting behaviour. **Design** Prospective cohort study. **Setting** Victoria, Australia. **Participants** A total of 222 adult smokers were surveyed at baseline in 2006 and followed-up 18 months later. **Measurements** Baseline sensitivity to POS displays, which included the frequency of 'noticing displays', 'impulse purchasing behaviour' and 'deciding on brand based on POS displays'; smoking status at follow-up. **Findings** At follow-up, 17.0% were no longer smokers. After adjusting for covariates, compared to those with low POS display sensitivity, smokers who had a medium or high level of sensitivity to POS displays were significantly less likely to have quit at follow-up [odds ratio (OR) = 0.32, 95% confidence interval (CI) = 0.14–0.74; OR = 0.27, 95% CI = 0.08–0.91, respectively]. **Conclusions** The presence of cigarette pack displays in stores may make it more difficult for smokers to quit smoking successfully.

Keywords Adults, cohort study, marketing, retail, smoking cessation.

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Submitted 18 March 2009; initial review completed 26 May 2009; final version accepted 17 June 2009

INTRODUCTION

Over the past decade in Australia, the marketing of tobacco products has become increasingly restricted, with the banning of traditional in-store advertising and limitations on the size of point-of-sale (POS) displays. The tobacco industry has managed to overcome these obstacles successfully by designing tobacco displays and attractive cigarette packs to attract the attention of shoppers. Previous research has demonstrated that in-store tobacco displays help to normalize smoking behaviour as well as to create a perception among adolescents that it is easy to purchase tobacco [1–3].

Although the literature examining the influence of POS advertising and promotion on adolescent smoking behaviour is well established [1,3–5], the effect of POS tobacco displays on adult tobacco purchasing and smoking behaviour is relatively unexplored. Survey research has shown that product displays are associated with a greater likelihood of unplanned purchases, and are more likely to occur when they are located near the cash register or at the end of shopping aisles [6]. Early store exit interview research conducted for the tobacco industry in 1986 suggested that more than half of cigarette purchases were unplanned, and that this was more likely when cigarette displays were present [7]. A recent store exit interview study conducted in Western Australia demonstrated that more than one-fifth of smokers had made an unplanned tobacco purchase. In this study, POS displays were four times more likely to be cited by smokers as being a factor driving their unplanned tobacco purchases, compared to planned tobacco purchases [8].

A study of the influence of POS displays on adult tobacco purchasing behaviour by our group in 2006, using a cross-sectional survey design, found that one-quarter of smokers perceived that the presence of in-store cigarette displays had prompted them to purchase cigarettes on impulse, and one-third of recent quitters said they had experienced an urge to buy cigarettes as a result of seeing the retail cigarette display [9]. The retrospective nature of this study meant that people were asked to make inferences about factors that may have influenced their past quitting behaviour. To examine more rigorously the impact of POS displays on smoking behaviour, the current study used a prospective design, following-up smokers who had provided baseline information about

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their sensitivity to POS displays, in order to assess the influence of POS display sensitivity on subsequent quitting behaviour.

METHOD

A prospective cohort study design was used, in which smokers who were interviewed at baseline as part of a representative population survey in the state of Victoria, Australia, were followed-up 18 months later to examine their subsequent quitting behaviour. The baseline survey was conducted by telephone in November/December 2006 and included 2996 adults, 457 of whom were smokers of factory-made cigarettes and who purchased their cigarettes from a supermarket, convenience store, petrol station and/or tobacconist. In this baseline survey, smokers were asked about their cigarette purchasing behaviour and opinions about in-store cigarette displays. This baseline sample was used originally to examine the influence of POS displays in a cross-sectional study reported by Wakefield *et al.* [9]. Within this baseline sample, 402 smokers (88%) agreed in principle to be involved in future research. These respondents were then re-contacted by telephone in June 2008, and a total of 222 respondents completed a follow-up interview: 49% of the original sample eligible for follow-up surveyed in 2006.

Baseline survey

A standard tobacco use question [10] was used to determine smoking status at baseline. Respondents were considered to be smokers of manufactured cigarettes if they reported smoking manufactured cigarettes daily, weekly or less than weekly. Cigarette consumption was also measured at this stage by asking smokers: 'On average, how many manufactured cigarettes do you smoke per day or each week?'.

As part of the baseline survey conducted in 2006, sensitivity to POS cigarette displays was measured by asking smokers: (i) 'when you are in a supermarket, convenience store, petrol station or tobacconist, how often do you notice the cigarette pack display near the cash register?'; (ii) 'when shopping for something other than cigarettes, how often do you decide to buy cigarettes as a result of seeing the cigarette pack display in the store?'; and (iii) 'when buying cigarettes, how often do you decide what brand or type of cigarettes to buy, based on the cigarette pack display in the store?', with response options ranging from 1 = always, 2 = often, 3 = sometimes, 4 = rarely or 5 = never. A small number ($n = 10$) of respondents answered 'don't know/can't say' to either one of the above questions. 'Don't know/can't say' responses were coded further as 'never', as the data indicated these participants were more likely to respond 'never' to the other outcome measures. For each question, the above responses were collapsed into three categories: 'always/often' = 2; 'sometimes/rarely' = 1; and 'never' = 0, with scores reflecting level of sensitivity to POS displays. For the purpose of analysis, responses from the above three outcome variables were combined to create an overall POS sensitivity variable, with scores of 0 and 1 indicating 'low sensitivity', 2 and 3 indicating 'medium sensitivity', and 4, 5 and 6, indicating 'high sensitivity'.

Respondents' demographic information was also collected at baseline, including age, sex and socio-economic status (SES). Socio-Economic Index for Areas (SEIFA) indices classify respondents into socio-economic groups based on 2006 Census data of the area in which they live [11]. The Index of Socio-Economic Disadvantage (one of five SEIFA indices) was used, which is based on respondents' residential postcodes. This index ranks areas on a continuum of disadvantage (from most disadvantaged to least disadvantaged), taking into consideration characteristics that may enhance or reduce socio-economic conditions of the area, such as income, education, occupation and housing. For the purpose of analysis we classified respondents into two groups based on this scale: (1) the lower SES group (1st and 2nd SEIFA quintiles) comprises people who live in areas with a SEIFA score in the bottom 40% of Victoria's distribution (this represents a higher level of disadvantage relative to others); and (2) the higher SES group (3rd, 4th and 5th SEIFA quintiles) includes those whose SEIFA score is 41% or above (reflecting the lowest level of disadvantage relative to others).

Follow-up survey

In March 2008, 18 months after the baseline interview, participants were asked whether they currently smoked manufactured cigarettes, roll-your-own cigarettes, cigars, pipes or any other tobacco products either daily, at least weekly, less than weekly or not at all. Respondents were considered to have quit if they reported 'not at all' to smoking each of the tobacco products mentioned. Those still smoking were asked whether they had made a quit attempt in the 18 months since they were surveyed originally.

Statistical analyses

Preliminary multivariate logistic regression analyses examined demographic differences between baseline smokers who were followed-up, compared with those lost to follow-up. Results indicated that participants who were followed-up were significantly older (mean = 42.6 years) than those lost to follow-up (mean = 36.9 years) ($P < 0.001$). However, those lost to follow-up did not



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differ from participants in terms of sex (49% of dropouts versus 46% of respondents were male, $P > 0.05$), SES (38% versus 36% were low SES, respectively, $P > 0.05$), cigarettes per day (mean of 12.0 cigarettes for dropouts versus 12.5 cigarettes for respondents, $P > 0.05$) and POS sensitivity (26% of dropouts had low sensitivity versus 32% of respondents, $P > 0.05$).

Multivariate logistic regression analyses were conducted to examine the strength of association between baseline sensitivity to POS displays and quitting behaviour. Baseline measures of age, sex, SES and cigarette consumption were included as covariates in the logistic regression models. Cigarette consumption data were missing for 24 respondents, and these respondents were subsequently assigned the mean cigarette consumption for the total sample (13.9 cigarettes per day).

RESULTS

Sample characteristics

The majority (55%) of the 222 respondents were female and the mean age of the sample was 42.6 years. Just over one-third of respondents (36%) lived in areas of low SES. All 222 respondents were smokers of factory-made cigarettes at baseline, with 81% being daily smokers, 12% being weekly smokers and 7% smoking less than weekly.

At baseline, just under one-third (32%) of respondents had a low level of sensitivity to POS displays, while 50% had medium sensitivity and 18% had high sensitivity. Analyses of variance (ANOVAs) and χ^2 analyses indicated no difference in baseline POS sensitivity between males and females, by SES or by average daily cigarette consumption. However, baseline sensitivity levels varied by age ($\beta = -0.008$, $P = 0.014$), with younger respondents more POS-sensitive than older respondents.

Quitting behaviour at follow-up

At the 18-month follow-up, 17.0% were no longer smokers. As displayed in Table 1, multivariate logistic regression analyses indicated that, compared with those who had low sensitivity to displays, respondents with a medium [odds ratio (OR) = 0.32, 95% confidence interval (CI) = 0.14–0.74] or high level (OR = 0.27, 95% CI = 0.08–0.91) of POS sensitivity at baseline were significantly less likely to be quit at follow-up. Higher cigarette consumption at baseline also reduced significantly the likelihood of being quit at follow-up, with each additional cigarette smoked decreasing the odds of quitting by approximately 7% (OR = 0.93). Quitting was unrelated to other covariates.

Although age was a significant predictor of POS sensitivity at baseline, there was no interaction between age and POS sensitivity in predicting quitting at follow-up. Among respondents who were still smoking at follow-up ($n = 184$), 50% had made at least one quit attempt in the previous 18 months. No association was found between POS display sensitivity and quit attempts made in the past 18 months.

DISCUSSION

Our study suggests that the presence of cigarette pack displays in stores may make it more difficult for smokers to quit smoking successfully. Smokers who were more sensitive to POS cigarette displays were less likely not to be smoking at follow-up. These results extend the findings of

Table 1 Predictors of quitting at follow-up: multivariate logistic regression analysis.

	Quitting status at follow-up					
	n	*Quit*	*Not quit*	*Adjusted OR*	*95% CI*	*P*
POS sensitivity						
Low	72	27.8	72.2	1		
Medium	111	12.6	87.4	0.32	0.14–0.74	0.007
High	39	10.3	89.7	0.27	0.08–0.91	0.035
Sex						
Male	101	13.9%	86.1%	1		
Female	121	19.8%	80.2%	1.47	0.68–3.15	0.329
Socio-economic status (SES)						
Low SES	79	13.9%	86.1%	1		
High SES	143	18.9%	81.1%	1.54	0.69–3.46	0.295
Mean age in years (SD)		41.6 (15.0)	42.8 (13.8)	0.99	0.97–1.02	0.588
Mean cigarette consumption per day (SD)		9.8 (8.3)	14.6 (9.2)	0.93	0.89–0.98	0.011

OR: odds ratio; CI: confidence interval; POS: point-of-sale; SD: standard deviation.

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cross-sectional surveys [8,9] and meet the call for cohort studies [4] in demonstrating that POS displays may undermine the success of smoking cessation attempts. The effect of tobacco displays is not insubstantial, with the odds of quitting among medium to highly sensitive respondents being more than three times less likely in the 18-month follow-up period than among respondents who had low sensitivity to displays.

Outside the actual retail environment, laboratory-based cue-exposure studies suggest that individual differences between smokers can influence responsiveness to smoking-related cues such as those introduced by POS cigarette displays. For example, an association between impulsivity and difficulty in quitting smoking has been suggested by several cue-exposure studies. Smokers who scored highly on an impulsivity scale experienced greater difficulty refraining from smoking immediately after being exposed to smoking cues [12,13]. More generally, however, when smokers are exposed experimentally to smoking stimuli, including pictures of rows of cigarette packs, their craving for cigarettes increases [14]. This indicates that craving-related reactions to the sight of cigarette packs are relatively common. These types of study provide an understanding of the pathway by which cigarette displays might be expected to influence purchasing behaviour and, ultimately, quitting success. Cross-sectional studies from Australia where retail stores have cigarette displays at the POS but no POS advertising suggest that the occurrence of unplanned cigarette purchase is relatively high, with at least one-fifth of purchases being attributed by smokers to have been prompted by the cigarette display [8,9]. The findings from our cohort study, along with this wider body of research, suggest that removal of POS cigarette displays from the line of sight would benefit those trying to quit smoking.

A number of study limitations should be mentioned. First, our follow-up rate from baseline of 49% was less than ideal, with respondents who completed follow-up being significantly older than those who did not. However, this follow-up rate is not unexpected for an 18-month period, and we found no differences between the two groups in terms of display sensitivity or other demographic differences. None the less, the power of the study was reduced by the smaller sample available for analysis, increasing the possibility of missing real effects (i.e. a Type 2 error). A second limitation was that a retrospective self-report measure of display sensitivity was used. Because unplanned purchases are not mindful, use of this method may have resulted in an underestimate of unplanned purchases. In addition, we had no measure of test–retest reliability of our POS sensitivity measure and future studies could assess usefully the reliability of POS sensitivity over time. Finally, there may have been other unmeasured differences between those who were and were not sensitive to POS displays that could have accounted for differences in quitting over time, and additional longitudinal research studies might investigate this possibility further. However, we noted that the rate of *attempts* to quit over the 18-month period of follow-up did not differ by POS sensitivity.

Despite the limitations of the study, the pattern of findings emerged from a relatively small sample size. In addition, our study was conducted in Australia, where in-store tobacco marketing is limited to POS displays. In countries where traditional forms of advertising still remain in stores, our findings suggest that unrestricted POS environments could present an even greater obstacle to successful quitting. We encourage the use of further cohort studies in countries yet to ban tobacco displays to examine the relationship between tobacco POS displays and quitting behaviour.

A number of countries, such as Canada, Ireland and Thailand, have taken the lead in removing POS cigarette displays, with some Australian states, and most recently Scotland and England, passing similar legislation to restrict further the promotion of tobacco products. Our study suggests that these countries will remove an important and frequently encountered barrier for smokers trying to quit.

Declaration of interest

None.

Acknowledgements

This study was funded by Quit Victoria and the Cancer Council Victoria. Melanie Wakefield was supported by a National Health and Medical Research Council Principal Research Fellowship. The authors thank Mohammad Siahpush for his assistance with statistical analyses.

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Judicial review challenges against legislation prohibiting the display of tobacco products in the United Kingdom

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Second supplemental report.

Submitted by:

David Hammond, PhD

University of Waterloo, Canada

December 12, 2011

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see p. 31, 33, 40

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1.0 BACKGROUND AND REPORT INTRODUCTION

Qualifications

1.1 My name is Professor David Hammond. I am a professor in the School of Public Health & Health Systems at the University of Waterloo in Ontario, Canada.

1.2 I am the author of a report dated 19 December, 2010 titled, *Judicial review challenges against legislation prohibiting the display of tobacco products in the United Kingdom: Expert Report* (hereafter referred to as the *2010 Hammond Report*) prepared in conjunction with current judicial review challenges against legislation prohibiting the display of tobacco products in the United Kingdom (UK).

1.3 I am also the author of a supplemental report dated 30January, 2011 titled, *Judicial review challenges against legislation prohibiting the display of tobacco products in the United Kingdom: Supplemental Report* (hereafter referred to as the *2011A Hammond Report*).

1.4 My expert credentials are presented in Section 2 of the 2010 Hammond Report and my curriculum vitae is presented in Annex D of the 2010 Report.

Summary of Instructions

1.5 I have been asked by the Department of Health ("the Department") to provide a second supplemental report for the current judicial review challenges against legislation prohibiting the display of tobacco products in the United Kingdom (UK).[1] I have been asked to comment on the following reports:

a) Third Report concerning Consumer Survey materials relevant to the Display Ban Requirement in England, by Dr. Warren Keegan, 28 November 2011.

b) Economic Analysis of a Display Ban Requirement in England: Further Supplemental Report by Dr. Andrew Lilico, 28 November 2011.

[1] Throughout this report the term "Display" will be used to refer to the display of tobacco products in retail outlets and "Display Ban" will refer to legislation prohibiting the display of tobacco products in retail outlets. Also note that the term "point of sale" will be used interchangeably with retail outlet.

2.0 RESPONSE TO KEEGAN SUPPLEMENTAL REPORT

2.1 I have reviewed the Third Report concerning Consumer Survey materials relevant to the Display Ban Requirement in England, by Dr. Warren Keegan (hereafter referred to as the 2011B Keegan Report). In the course of my response, I will also make reference to Dr. Keegan's previous supplemental report dated January 10, 2011 (hereafter referred to as the 2011A Keegan Report).[2]

Henriksen et al. (2010)[3]

2.2 A summary of the Henriksen et al. (2010) paper is included in the 2010 Hammond Report (see Annex A, p.49-50). Very briefly, a school-based survey was conducted with 1681 adolescents (aged 11–14 years) who had never smoked, with follow up at 12 and 30-months. Several measures of exposure to point-of-sale marketing were assessed, including: 1) the frequency of visiting types of stores that contain the most cigarette advertising and 2) a more detailed measure that combined data about visiting stores near schools with observations of cigarette advertisements and pack displays in those stores. Primary outcome measures included the transition from never to ever smoking. Multilevel modeling was used to test the primary associations between exposure to retail marketing and smoking behaviour to account for clustering of students, adjusting for a range of demographic covariates. The findings indicate that exposure to retail cigarette marketing was prospectively associated with smoking initiation among youth for all three measures of exposure. The following sections review Dr. Keegan's critique provided in his 2011B Report.

Inconsistent results

2.3 The first limitation identified in the 2011B Keegan Report is described as "inconsistent results" and refers to the pattern of results for the three different measures used to assess exposure to POS marketing:

> *The authors found that "the most detailed exposure measure, cigarette brand impressions per week, was not a substantially better predictor of smoking initiation than the 3-item measure of shopping frequency."6 The data also showed that the third and most direct measure of exposure, perceived exposure, was the weakest predictor of ever smoking in this sample....*

[2] Keegan WJ. A. Supplemental Report in light of the Secretary of State for Health's Reply Evidence on the Retail Display of Tobacco. Keegan & Company LLC. January 10 2011.

[3] Henriksen L, Schleicher NC, Feighery EC, Fortmann SP. A longitudinal study of exposure to retail cigarette advertising and smoking initiation. Pediatrics 2010;126:232-238.

2.4 Dr. Keegan's primary criticism is that the three measures of exposure performed equally well: all three measures significantly predicted smoking initiation at follow-up. It strikes me as somewhat odd to characterize the consistency across measures as "inconsistent" results. Nor do I follow the logic that because all of the measures significantly predicted future smoking behaviour that "something other than exposure to retail displays and advertising results" must account for the associations with increased smoking at follow-up.

2.5 For example, the detailed measure of exposure took account of direct measures of the quantity of tobacco marketing in each store, such as the amount of shelf space dedicated to tobacco marketing, as well as the frequency of visits reported by participants. The analysis tested three groups categorized in terms of the total number of cigarette brand impressions per week: low (less than 60 impressions), moderate (60-259 impressions) and high (more than 260 impressions). This measure was significantly associated with future smoking behaviour, although no more so than the general measure of frequency of store visits. Dr. Keegan suggests that this pattern of results essentially negates the association between POS marketing and future smoking behaviour:

> *...if point of sale exposure to retail displays and advertising was the cause of the respondents' increase in experimenting with smoking one would expect the more detailed and direct measures of exposure to show a greater correlation to the behavior than the broader indicator—i.e., store visits. This study does not support that hypothesis, and therefore it can be concluded that factors other than point of sale exposure influenced respondents' experimentation with smoking. (P.5, Sec18)*

2.6 The fact that the frequency of store visits predicted future smoking equally well as the cigarette brand impressions measure simply indicates that the actual volume of marketing in each store may not have a stronger effect than simply determining whether youth were exposed or not. This is not surprising given that all stores included in this study at baseline had POS marketing, and were found to have an average of 22 branded marketing materials on display. The most appropriate interpretation of these findings is that it may not matter precisely how much shelf space or what specific number of marketing materials are on display, but whether they are on display at all. It does not follow, as Dr. Keegan suggests, that the association between exposure to POS marketing and future smoking behaviour should be rejected as spurious.

Failure to Re-Measure Key Variables

2.7 The Keegan 2011B Report cites the study's failure to re-measure exposure to retail cigarette advertising as a limitation of the study:

> *A student's exposure to retail cigarette advertising is assessed while that student is in middle school. Two and a half years later that student is contacted again and asked about smoking behavior, but not about his/her exposure to retail cigarette advertising. Even though the student's lifestyle and shopping habits could be significantly altered since the baseline study, this is not accounted for when follow-up occurs years later... Given that this study is fundamentally based on this baseline measurement of exposure, the lack of reliability in this measurement years later negatively impacts the overall reliability of the results.* (p.5-6, Sec 20/22)[4]

2.8 The practice of measuring exposure to stimuli at baseline and predicting an outcome at follow-up is one of the most conventional research designs for cohort studies. The frequency with which exposure is measured depends entirely on the phenomena under study. With respect to POS marketing, using only baseline measures of exposure establishes temporal order: because all participants were "never smokers" at baseline, the baseline measure of exposure ensures that exposure occurred prior to smoking initiation at follow-up. The extent to which exposure to POS marketing may have varied during the follow up period would have the effect of introducing measurement error and would bias the analysis towards a "null" finding. Despite this handicap, the baseline measures of exposure were significant predictors of future smoking behaviour after adjusting for a range of covariates.

Focus on Wrong Group

2.9 The Keegan 2011B Report criticizes the study for "excluding" regular smokers and focusing on the "wrong group":

> *This study concerned itself with a particular set of respondents based on their smoking status—i.e., baseline "never smokers" who had then smoked "at least a puff at follow-up" but were not regular smokers. Those who became regular smokers were excluded from the analysis because of what the authors characterize as the low incidence of smoking..... Smoking is the behavior with which the authors are concerned.[11] The authors use the category of "ever smoked" but not "currently smoking" as an indicator of those that will*

[4] Third Report concerning Consumer Survey materials relevant to the Display Ban Requirement in England, by Dr. Warren Keegan, 28 November 2011.

smoke. However, this indicator is not necessary. This study has a group at follow-up that is "currently smoking". To exclude this group from the analysis when this is the exact behavior being reviewed is an inexplicable anomaly. Given that the authors would have this data at hand, the absence of this group in the authors' analysis is significant.(p.6, Sec 23/25)[5]

2.10 It would appear that Dr. Keegan has misread the methodology of the paper. Current smokers were not excluded from the study; in fact, they were included in the "ever smoking" group, as the paper describes on page 233: "The primary outcome was smoking initiation, defined as the transition from never smoking to ever smoking at either follow-up. This study did not examine current smoking as a separate outcome because the incidence of smoking in the previous 30 days was quite low: 4.1% at 12 months and 7.9% at 30 months." I have confirmed with the author that current smokers were, in fact, included in the analysis. Therefore, Dr. Keegan's criticisms on this point are not relevant.

Summary

2.11The Henriksen et al. (2010) paper has a very strong research design, including multiple follow up waves of 12 and 30 months, capable of examining transition from never to ever smoking. The large sample of young adolescents is a strength, as is the range of measures used to evaluate exposure to point of sale advertising, and the consistency of the findings. Although this study is not specific to Displays, it establishes an important association between retail marketing more generally and prospective smoking behaviour using similar measures of exposure as studies more specific to Displays. In my opinion, Dr. Keegan's criticisms of this paper are based either on a misunderstanding of the research design and inappropriate interpretations of the findings, and his view that the study does not constitute "credible and methodologically sound evidence" is not supported.

Paynter and Edwards (2009)[6]

2.12 This paper consists of a systematic review of the impact of Displays on smoking-related outcomes using published findings between 1992 and 2007. Dr. Keegan rejects this paper on the basis that it is a secondary source. In the 2010 Hammond Report, I indicated that my opinions were not based on

[5] Third Report concerning Consumer Survey materials relevant to the Display Ban Requirement in England, by Dr. Warren Keegan, 28 November 2011.

[6] Paynter J, Edwards R. The impact of tobacco promotion at point of sale: A systematic review. Nicotine & Tobacco Research 2009;11(1):25-35.

the conclusions of this systematic review given that I had the opportunity to review all of the primary data sources included in the Paynter and Edwards (2009) paper.

Germain et al. (2009)[7]

2.13 A summary of the Germain et al. (2009) paper is included in the 2010 Hammond Report (see Annex A, p.44). Briefly, a prospective cohort study was conducted to examine the association between responses to Displays and cessation behaviour. Smokers were surveyed at baseline in 2006 and again at 18-month follow-up. Multivariate logistic regression analyses were conducted to examine the strength of association between baseline sensitivity to Displays and quitting behaviour, adjusting for socio-demographic factors and cigarette consumption at baseline. Greater sensitivity to Displays, in terms of noticing and self-reported impact, was associated with lower rates of smoking cessation in a prospective cohort study at 18-month follow-up.

Failure to Re-Measure Key Variables

2.14 The Keegan 2011B Report cites the study's failure to re-measure exposure to retail cigarette advertising as a limitation of the study:

> *Critical to the authors' analysis is the POS sensitivity variable ranking assigned to each respondent, which is central to the authors' conclusions regarding smoking status based on POS sensitivity. This variable, however, was derived in the baseline study and was not measured again in this follow-up study 18 months later.21 It therefore is unknown whether POS sensitivity, as calculated by the authors, varies over time in individuals... In fact, POS sensitivity could fluctuate over time, and not be at all reliable as an indicator of future POS sensitivity. Whether this is the case is left unknown, however, because the authors did not re-measure this critical variable at follow-up (even though it would have been easy to do so as it is derived from just three questions). The authors' lack of verification of POS sensitivity, and their reliance on this variable as a central component of their analysis and conclusions, results in a fundamental lack of reliability in the data and the findings of this study.* (p.8-9, Sec 33-36)[8]

2.15 As described in above in section 2.14, the practice of measuring exposure to stimuli at baseline and predicting an outcome at follow-up is one of the most conventional research designs for cohort studies. The frequency with which exposure is measured depends entirely on the phenomena under

[7] Germain D, McCarthy M, Wakefield M. Smoker sensitivity to retail tobacco displays and quitting: a cohort study. Addiction 2009;105:159-163.
[8] Third Report concerning Consumer Survey materials relevant to the Display Ban Requirement in England, by Dr. Warren Keegan, 28 November 2011.

study. With respect to POS Sensitivity, using only baseline measures of exposure established temporal order: because all participants were current smokers at baseline, the baseline measure of exposure ensures that exposure occurred prior to the smoking cessation at follow-up. The extent to which exposure to POS Sensitivity may have varied during the follow up period would have the effect of introducing measurement error and would bias the analysis towards a "null" finding. Despite this handicap, the baseline measures of exposure were significant predictors of future cessation behaviour after adjusting for a range of covariates.

Leading Baseline Questions

2.16 The 2011B Keegan Report restates concerns raised in the 2011A Keegan Report regarding the survey items used in this survey. In particular, Dr. Keegan notes the lack of a timeframe for measures related to POS Sensitivity:

> *...by not assigning a timeframe to the questions (e.g., How many times in the past month...) the retail display questions essentially ask the respondent to summarize there and then the whole of their lifetime shopping behavior for cigarettes. This is an unrealistic task that incites the respondent to guess about past behaviors. The result is a high likelihood of recall bias.*
>
> *It is also notable that three out of five of the answer choices to the retail display questions presented to the respondent are affirmative ("always," "often," and "sometimes" versus "rarely" and "never"). This answer set is inherently unbalanced. A balanced, and therefore more objective, answer set could have been used. An objective scale, for example, could have included the following options: "always," "sometimes," "rarely," "never," and "don't know." This scale presents two affirmative options ("always" and "sometimes"), two negative options ("rarely" and "never") and a neutral option ("don't know"). However, such a scale was not used, resulting in a study skewed to yield affirmative answers.* (p.9-10, Sec 39)

2.17 The purpose of a measure such as those used in the Germain et al. (2009) study is to examine the variability or differences in POS sensitivity across respondents. The items at issue used a 5-point Likert scale, which is conventional practice for this type of measure. Dr. Keegan's criticism appears to focus on the use of term "often" as one of the response options in the 5-point scale. Dr. Keegan's suggestion to remove "often" and to add "Don't Know" is not constructive. First, respondents were already provided with a "Don't Know" option for this question as should be the case for all such survey questions. "Don't Know" responses cannot be analyzed in this type of scale and would need to be categorized as "missing" data in the analysis. Second, there are important methodological

advantages to 5-point Likert scales relative to the type of 4-point scale proposed by Dr. Keegan, which are not recommended practice. Authoritative texts on survey design define Likert scales as follows: "A Likert scale entails a five-, seven-, or nine-point rating scale in which the attitude for the responses is measured on a continuum from highly favorable to highly unfavorable, or vice versa, with an equal number of positive and negative response possibilities and one middle or neutral category." (p.59)[9] When measuring exposure, such as in the current study, it is not possible to have a "bi-polar" scale with "negative" exposure. Therefore, the challenge is to identify 5 response categories including an option that serves as the "middle" or "neutral" category. The use of the term "sometimes" is a reasonable option in the current case. Overall, Dr. Keegan's suggestion to remove one of the response categories and replace it with a "Don't Know" option betrays a lack of familiarity with the basis of survey design, and both the nature of his criticisms and the importance he affords them are misguided in my opinion.

Biased Coding

2.18 Dr. Keegan also raises concern over the way in which the POS Sensitivity measures were coded for data analysis:

> *...the authors took the responses to the unreliable questions described above, and collapsed them from five possible answer options ("always," "often," "sometimes," "rarely," "never") to three condensed categories ("always/often," "sometimes/rarely," "never"). This categorization is inherently unbalanced, with 80 percent of potential answers favoring a finding that POS displays are noticed by smokers.*
> *The authors then further codify the data, constructing a POS sensitivity variable by assigning numeric values to the condensed variables discussed above. In this exercise, the authors assigned a value of 2 to the "always/often" answer option, a value of 1 to the "sometimes/rarely" answer option, and a value of 0 to the "never" answer category. By adding up the numeric values of the respondents' answers to the three questions of interest, the authors assigned respondents a POS sensitivity rating based on the following scale:*
>
> *0 and 1: 'low sensitivity'*
> *2 and 3: 'medium sensitivity'*
> *4, 5 and 6: 'high sensitivity'*
>
> *In addition to being arbitrary, this scale is also biased toward the higher sensitivity ratings, with five of the seven values assigned to those categories. It was difficult, based on this coding protocol, for a respondent to fall into the low sensitivity category.*

[9] Rea LM, Parker RA. Desiging and conducting survey research: A comprehensive guide. 2nd ed. San Francisco: John Wiley & Sons; 1997.

....Had the authors employed an objective coding methodology for these variables, the resulting data may have been materially different from what is reported in the current study. For this reason, and in my expert opinion, these results cannot be viewed as any indication of any actual impact of POS displays on consumers. (p.10, Sec 41)

2.19 First, the suggestion that coding was biased towards categorizing respondents in the "higher POS Sensitivity category is inconsistent with the findings: one third (32%) of the sample were categorized in the "low sensitivity" group, compared to 18% in the "high sensitivity" group. Second, participants in both the "medium" and "high" sensitivity groups were significantly less likely to successfully quit smoking at following compared to the "low sensitivity" group. Therefore, if the POS Sensitivity measure was recoded to shift or "balance" the scoring (such as placing respondents who scored a "4" into the "medium" group), the pattern of results would remain unchanged: the low sensitivity group would remain significantly different from the other two. Thus, while Dr. Keegan might have a preferred coding scheme, in practice the result of rebalancing the medium and high groups would have no material effect on the findings or conclusions.

Direction of Relationship Unknown

2.20 The 2011B Keegan Report questions the direction of the association between POS Sensitivity and quitting behaviour:

In fact, the directional relationship between respondents' POS sensitivity, as defined by the authors, and quitting behavior is actually unknown. The authors have simply assumed this relationship to be in a direction favoring their conclusion, even though the reverse relationship—i.e., those who successfully quit smoking fall into the low-sensitivity group because they are actively engaged in quitting and therefore have less interest in the product category—is, in my view, equally plausible.(p.11-12, Sec 46)

2.21 Dr. Keegan's point would be appropriate for a cross-sectional study in which both POS Sensitivity and quitting behaviour were measured at the same time point. However, the suggestion that quitting behaviour may have led to low POS Sensitivity disregards the temporal order of these variables which was established through the study design: as described above, all respondents in the cohort study were current smokers at baseline, the point at which POS Sensitivity was measured. Dr. Keegan's suggestion is therefore illogical: by definition of being a current smoker, none of the respondents were "actively engaged in quitting" during the time at which POS Sensitivity was measured. In addition, POS Sensitivity was not associated with intentions to quit at baseline—one of the strongest

predictors of cessation behaviour.[10] The multivariate analyses also adjusted for the number of cigarettes smoked per day at baseline, which is also a strong predictor of sustained abstinence from smoking after making a quit attempt. Consistent with this, cigarettes per day was significantly associated with quitting at follow-up. Therefore, POS Sensitivity was a significant predictor of quit success at follow-up after adjusting for potential confounders. Overall, Dr. Keegan's suggestion that it is "equally plausible" that quitting behaviour may have led to lower POS Sensitivity is simply not credible and is inconsistent with the basic design principles of a cohort study.

Summary

2.22 Dr. Keegan's criticisms of the Germain et al. (2009) paper are inconsistent with basic principles of study design and survey methodology. The conclusion that the Germain et al. (2009) study does not provide "reliable evidence" is not credible in my opinion.

Summary

2.23 The 2011B Keegan Report includes critiques of two new studies— the Henriksen et al. (2010) and Germain et al. (2009) papers—and comments on a systematic review included in the 2011A Keegan Report. Dr. Keegan rejects both the Henriksen et al. (2010) and the Germain et al. (2009) as "unreliable". I have reviewed Dr. Keegan's criticisms of these studies and I have a materially different opinion on the quality of these studies. Both studies have used prospective cohort designs—among the strongest designs possible. Both studies report survey measures that are appropriate to answer the research questions and the analytical approach is sound. In several cases, Dr. Keegan appears to have misread or misinterpreted the study design. In other cases, his criticisms are inconsistent with standard research practices with respect to survey design. Overall, I see no basis for Dr. Keegan's rejection of these studies.

[10] Wakefield M, Germain D, Henriksen L. The effect of retail cigarette pack displays on impulse purchase. Addiction 2008;103(2):322-8.

3.0 RESPONSE TO LILICO FURTHER SUPPLEMENTAL REPORT

3.1 I have reviewed the Further Supplemental report of Dr Andrew Lilico dated 28 November 2011, hereafter referred to as the 2011B Lilico Report.[11] I will also be referring to two previous reports prepared by Dr. Lilico, which I will refer to as the 2011A Lilico Report[12] and the 2010 Lilico Report[13].

3.2 The 2011B Lilico Report focuses on the impact of Display Bans implemented in 10 Canadian provinces between the period of 2004 and 2010.[14] Dr. Lilico has conducted statistical analyses using data from the Canadian Tobacco Use Monitoring Survey (CTUMS), a nationally representative survey conducted on behalf of the Canadian government with 20,000 respondents surveyed each year since 1999.[15] The primary conclusions of Dr. Lilico's 2011B Report are that, "the presence of the display ban has no statistical correlation with the extent of smoking prevalence for the general population in Canada" and "the display ban is strongly and materially correlated with increased prevalence amongst 15-19 year olds." (p.7, Sec 1.26)

Statistical Approach used in 2010 Hammond Report

3.3 The primary objective of the statistical models included in the 2010 Hammond Report was to determine whether prevalence was significantly higher or lower after the implementation of Display Bans.[16] The analyses in the 2010 Hammond Report have been updated in the current report with the most recent CTUMS data available for the year 2010—see Annex B.[17] The pattern of results after including the 2010 CTUMS data remained the same as the earlier findings described in the 2010 Hammond Report:

> *...smoking prevalence and consumption levels among daily smokers significantly declined following provincial Display Bans among all age groups: youth aged 15-19, young adults aged 15-24, and adults aged 18+.[18] The age of smoking initiation (the age at which*

[11] Lilico A. Economic analysis of a display ban requirement in England: Further supplemental report by Dr Andrew Lilico of Europe economics. 28 November 2011

[12] Lilico A. Economic analysis of a display ban requirement in England: supplemental report by Dr Andrew Lilico of Europe economics. 11 January 2011.

[13] Lilico A. Economic analysis of a display ban requirement in England. A report by Dr. Andrew Lilico of Europe Economics. April 2010.

[14] A summary of implementation dates is provided in Annex B of the 2010 Hammond Report on page 6, as well as page 12.

[15] Health Canada. Canadian Tobacco Use Monitoring Survey. Available at: http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/ctums-esutc_2010-eng.php

[16] See Annex B of the 2010 Hammond Report, see pages 13-18.

[17] See Annex B, Tables 2 to 8 of the 2011B Hammond Report.

[18] See Annex B, Section 4.14 –please refer to "Pooled analyses."

respondents smoked their first cigarette) among 15 – 19 year olds significantly increased following Display Bans in Canada. (p.6, Sec 4.5)

3.4 In addition to updating the earlier analyses, the pooled models examining changes across all provinces have been re-run to incorporate measures of price and GDP.[19] As shown in Table 9 to 15, the findings of the original models changed very little after adjusting for price and GDP: smoking behaviour among 15-19 year olds and among 15-24 year olds was significantly lower in the "Post-Ban" period, the number of cigarettes per day among smokers was significantly lower in the "Post-Ban" period among all age groups, and 15-19 year olds reported higher mean age of smoking initiation in the "Post-Ban" period. The one notable difference was that smoking prevalence was no longer significantly lower in the "Post-Ban" period among those aged 18 years of age and older.

3.5 I would interpret these updated findings in the current report within the same context as the findings from the 2010 Hammond Report:

> *It is important to note that the changes observed in smoking prevalence cannot necessarily be attributed to the Display Bans alone. Smoking behaviour has multiple determinants, and a range of other interventions have been implemented during both the "Pre-ban" and "Post-ban" periods in all jurisdictions. Therefore, although there are statistically significant decreases in youth and adult smoking behaviour in Canada ....following Display Bans, it remains unclear whether a causal association exists between Display Bans and changes in smoking behaviour. However, the evidence is consistent with a causal association. (p.7, Section 4.9)*

The use of a "time trend" in statistical models

3.6 The 2011B Lilico report stresses the importance of including a "time trend" in statistical models and provides an example of the "Charles & Camilla Effect" to illustrate his point.

> *Professor Hammond's approach does not control for an underlying time trend (i.e. the underlying decline, over time, of smoking prevalence in Canada). Professor Hammond's approach therefore does not include a time trend variable or any variable proxying for a time trend.2 The failure to control for an underlying time trend is the key driver of his statistical results.* P.3, Sec 1.12

[19] See Annex B, Tables 9 to 15, including a description of how price and GDP were calculated. It would appear that GDP and Price have been calculated the same was as described in the 2011B Lilico Report, although this cannot be confirmed without directly comparing the two datasets.

3.7 Dr. Lilico has re-run models presented in the 2010 Hammond Report with the addition of a "time trend" variable to demonstrate that POS Bans become associated with an increase, rather than a decrease in smoking among 15-19 year olds. Dr. Lilico uses a similar, but slightly different approach in his "preferred" models upon which he bases his conclusions. These models are known as "first differences" models.[20] In lay terms, these models essential subtract the prevalence of the "Post Ban" period from the "Pre Ban" period.

3.8 Dr. Lilico's use of the "first difference" models is meant to adjust or "control" for the "Pre-Ban" time period. This is a reasonable approach for modelling changes over time in outcomes that have only one primary determinant, or in cases where the outcome may have multiple determinants if those determinants can be measured and incorporated into the model. Neither of these conditions applies to the case at hand.

3.9 Between 1999 and 2004, the period that falls within the "Pre-Ban" period for all provinces in Dr. Lilico's models, smoking prevalence declined in Canada from 25.2% to 19.6%: an absolute reduction of 5.6%, or 22.2% of the smoking population in 1999.[21] This reduction represents the largest decline in smoking prevalence ever recorded over a 5-year period in Canada since data collection began in 1965. This "Pre-Ban" period included a number of landmark tobacco control policies and regulations, including: 1) comprehensive restrictions on tobacco advertising and marketing, 2) implementation of the world's first pictorial health warnings that covered 50% of front and back of packages, 3) implementation of comprehensive smoke-free restrictions in workplaces in the vast majority of provincial and municipal jurisdictions, 4) implementation of Canada's Federal Tobacco Control Strategy with major increases in both national and provincial level funding, including for mass media campaigns.

3.10 The magnitude of decline in the "Pre-Ban" period was also atypical of other jurisdictions during this time. For example, in the United States, which had strikingly similar patterns of tobacco use to

[20] I refer to the models in the 2011B Lilico Report described on pages 15-16 and presented in the subsequent sections.
[21] Based on CTUMs data reported in: Reid JR, Hammond D. Tobacco use in Canada: Patterns and Trends (2011 Edition). Propel Centre for Population Health Impact. January 2011. Available at: www.tobaccoreport.ca

Canada in the decades prior to this period, prevalence dropped only 2.8% in the entire decade following 1999: half of the decline observed in Canada between 1999 and 2004.[22]

3.11 By using the "first difference" approach (or including a "time trend" variable), Dr. Lilico's models establish the reductions during this "Pre-Ban" period as the "baseline" and assume that this rate of decline would continue in the absence of the Display Ban. In other words, it takes the historic declines in this Pre-Ban period to be the "secular trend" in smoking prevalence. As described above, there is no justification for assuming that the historic declines in smoking prevalence represent an "underlying time trend" that would continue in the absence of new interventions such as Display Bans. Indeed, if the prevalence in Canada continued to decline at the same rate as the "Pre-Ban" period of 1999 to 2004, there would be no smokers in Canada in 2021, which is not plausible even by the most optimistic estimates.

3.12 The assumptions regarding time trends embedded in Dr. Lilico's models have fundamentally important consequences for the pattern of results. For Display Bans to be statistically significant in these models, prevalence in the "Post-Ban" period would need to decline significantly more than 5.6%. If this is not the case, the conclusion is that Display Bans are ineffective. If prevalence decreases by significantly less than 5.6%, the conclusion is that Display Bans are counter-productive and associated with an increase in smoking prevalence. This is true even if there is a significant decline in youth smoking but it is statistically less than 5.6%. This is precisely the case for prevalence among 15-19 year olds in Canada following the implementation of Display Bans: smoking prevalence among 15-19 year olds was lower in 9 of 10 provinces after Display Bans were implemented compared to the "Pre-Ban" period— a decrease that was statistically significant for 5 of the 9 provinces and for all Canada when provinces are "pooled" in the same analysis.[23] Nevertheless, because the decline in smoking among 15-19 year olds was not as great as the historic decline

[22] (1) National Center for Health Statistics (U.S. Department of Health and Human Services), "National Health Interview Survey: Questionnaires, Datasets and Related Documentation, 1997 to the Present," available at http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm
(2)National Center for Health Statistics, "Health, United States, 2005, (Table 63)," Hyattsville, MD: National Center for Health Statistics, 2005, available at http://www.cdc.gov/nchs/data/hus/hus05.pdf. Note: no US data was collected in 2004. I used the mid-point for the years 2003 and 2005 to estimate 2004 prevalence (21.0%).

[23] See Table 2 in Annex B of the current report. This is fact that Dr. Lilico does not dispute, although he characterizes it as a spurious correlation as described on page 2 of the 2011B Lilico Report.

observed in the "Pre-Ban" period, he concludes that Display Bans are "materially correlated" with increases in smoking among this age group.

3.13 Ultimately, Dr. Lilico's analytical approach completely ignores the major interventions that were implemented during the "Pre-Ban" period in all Canadian provinces. An analogy may help to illustrate this point. Consider a scenario in which the government were to apply a wide range of policy measures to stimulate the economy over a given period (such as between 1999 and 2004). During this period, economic growth increased by an unprecedented rate of 10% annually. Following this period, the government introduced an additional policy measure and the economy grew by 5% over the next five years (e.g., between 2005 and 2009). Would this be evidence that the stimulus introduced in 2005 reduced economic growth by 5%? This would be the conclusion of Dr. Lilico's model, which fails to account for the introduction of any other measures during the period of study.

Price

3.14 The 2011A Lilico Report places considerable importance on other "explanatory" variables such as price when assessing the association between Display Bans and smoking behaviour.[24] Indeed, there is a large evidence base demonstrating that price has the greatest impact on smoking behaviour of any policy measure implemented by governments. For example, a review published by the International Agency for Research on Cancer (IARC), part of the World Health Organization and an international authority, concluded that increased price reduces the prevalence of adult tobacco use, tobacco consumption among continuing smokers, as well as uptake of tobacco use among young people.[25] The report also concluded that young people are more responsive to changes in prices than adults.

3.15 It is important to note that Dr. Lilico's models fail to detect a significant effect of price on cigarette consumption among any age group, or for smoking prevalence among 15-19 year-olds. Dr. Lilico presents three different models for prevalence among 15-19 year-olds to demonstrate the "robustness" of his findings: none of these models indicate that price is significantly associated with youth smoking.[26] Given that price is the most reliable predictor of changes in cigarette consumption

[24] For example, see page 8 Sections 3.6 and 3.7.
[25] IARC. IARC Handbooks of Cancer Prevention: Tobacco Control. Volume 14. Effectiveness of Price and Tax Policies for Control of Tobacco. Lyon, France: International Agency for Research on Cancer. In press.
[26] See Tables A3.8, A3.9, and A3.10 on pages 20 and 22 of the 2011B Lilico Report.

and smoking prevalence, the failure of Dr. Lilico's models to detect price effects raises serious questions about the integrity of his model. This is particularly true given that the same models for 15 to 19 year olds are ostensibly detecting an increase in prevalence attributed to Display Bans. I am unaware of any publication, scientist or even proponent of Display Bans who has suggested that POS Bans would have a greater impact than price. This is an implausible suggestion, yet Dr. Lilico's models lead to this conclusion. This pattern of results indicates that there is a fundamental flaw with respect to Dr. Lilico's analytical approach.

"Monthly" versus "Annual" Data

3.16 The CTUMS survey is conducted throughout the year with the exception of the month of January. CTUMS data can be accessed and analysed according to the month. This allows researchers the opportunity to tailor analyses to more specific time periods. For example: instead of being restricted to the calendar year, one could determine the smoking prevalence beginning in July 2009 to July 2010, for example. As described in the 2010 Hammond Report, this has clear advantages given that many of the provincial Display Bans in Canada were implemented mid-year. Therefore, the "Pre-Ban" and "Post-Ban" time periods used in statistical models can be properly aligned with actual implemented dates using the "monthly" data.

3.17 The analyses presented in the 2010 and 2011A Lilico Reports are based on "annual" data organized by calendar year. In other words, the analyses use the average prevalence for the entire calendar year as the primary outcome. The 2010 Hammond Report highlighted the limitations of using annual data that does not align with the implementation date of Display Bans:

> *This is a significant limitation given that the implementation of Display Bans occurred during the year (rather than at the start of the year) in six of the eight provinces analyzed. For example, the Display Ban in the Canadian province of Prince Edward Island was implemented in June 2006. The statistical approach used in the Lilico report assumes that the Display Ban was implemented at the beginning of that year, six months earlier. In other words, the analysis places the six months prior to the ban in the "Post-ban" period for the purposes of the analysis. This "misclassification" essentially "dilutes" any impact of the ban by attributing prevalence estimates that occurred prior the Display Ban to the "Post-ban" period.* (p.10 Annex B)

3.18 Dr. Lilico argues in the 2011B Lilico Report that it is inappropriate to use "monthly" data:

In the case of some variables, Health Canada regards its surveying techniques as allowing it to produce robust semi-annual estimates.9 In the case of other variables, Health Canada regards the semi-annual data as being subject to "High sampling variability" and states that "data should be suppressed".10 By contrast, the annual data for smoking prevalence are not suppressed for any province for any age-group. Because even the semi-annual data for some variables were regarded by Health Canada as not being sufficiently robust to be quoted, whilst the annual data were always regarded as adequate, in my previous reports I have used the annual CTUMS dataset as the basis of my modelling, after analysis and correction by Canadian statisticians. (p.9, Sec A1.5)

My understanding is that this variable is not intended by CTUMS to be interpreted as the basis for a monthly variable, and that a dataset constructed upon that variable cannot be regarded as robust monthly data.11 The statistical methods employed in CTMUS are not directed at producing robust monthly data.12 (p.10, Sec A1.6)

3.19 Dr. Lilico's understanding of the CTUMS data is correct in so far as monthly estimates for individual provinces do not serve as robust point estimates of smoking prevalence. On their own, monthly prevalence estimates suffer from high variability because of the lower sample sizes. In other words, one should not report the smoking prevalence for March 2010 for the province of Ontario given the high coefficient of variation, which is a reflection of the relatively low number of participants surveyed in Ontario during the month of March. However, Dr. Lilico fails to note the important distinction between the use of a single point estimate (such as the prevalence value for a given month) and the use of monthly data to model changes over many months for the purposes of hypothesis testing. None of the analysis presented in the 2010 Hammond Report or the analyses presented in the current report rely upon a single month of data. Dr. Lilico's description of "monthly" analyses described in footnote 12 on page 10, in which he refers to sample sizes of 50 and 200 individuals is a mischaracterization of these analyses. Rather, I have used monthly data in two ways:

1) Analyses within province, for which data across all time periods leading up to the month of the Display Ban were aggregated and compared with data aggregated across all time periods during the "Post-Ban" period, as described in section 3.5 of the 2011A Hammond Report. These "within province" analyses include a minimum of 2000 respondents in each of the Pre-Ban and Post-Ban periods.

2) Linear regression models to examine the "pooled effects" across all provinces. These models include data from 1,320 months or "observations"—10 provinces for all months between 1999 and 2010 with the exception of January, during which the survey is not conducted— and tens of thousands of respondents.

3.20 Neither of these analytical approach violates the recommendations regarding the use CTUMS from Heath Canada or Statistics Canada in any way.

3.21 From a purely statistical perspective, there are pros and cons to using the monthly versus annual data in the types of "pooled" models which would include Dr. Lilico's models. On the one hand, monthly data is subject to greater coefficients of variation than annual estimates due to the lower sample sizes. The higher variability makes it more difficult to achieve statistical significance in statistical tests. Therefore, the analyses are biased towards "null finding" and concluding "no effect". This phenomenon was noted in the 2010 Hammond Report with respect to the data from Finland reported in the 2011 Padilla Report.[27] In contrast, analyses using the annual estimates produce lower coefficients of variation for each point estimates, which is desirable. However, using annual data also provides far fewer observation points, which also has the effect of reducing statistical power to detect significant differences over time.

3.22 There is an additional—and fundamentally important—limitation to using the annual data that Dr. Lilico has yet to adequately address. As described in the 2011A Hammond Report and in Section 3.6 above, using annual data based on the calendar year misclassifies the presence of Display Bans. This is particularly problematic given the relatively short follow-up periods for several of the Canadian provinces, in which Display Bans were implemented since 2008. For these provinces, a significant proportion of the follow-up period may be incorrectly classified in terms of whether a Display Ban was present or absent in Dr. Lilico's models. In my opinion, this remains a fundamental and substantive limitation that Dr. Lilico has failed to address in either the 2011A Lilico Report or the 2011B Lilico Report.

[27] See page 21, Section 5.8 of the 2010 Hammond Report.

3.23 Overall, I would strongly disagree with Dr. Lilico's statement that, "Professor Hammond's 'monthly dataset' cannot, on my understanding of the view of the Canadian government statisticians that produce the data, be regarded as robust monthly data"[28]. Dr. Lilico's position on this issue indicates a lack of understanding either of the nature of the CTUMS dataset or the way in which it has been analysed in the 2010 Hammond Report. It should be noted that I have confirmed this opinion with two Canadian statisticians both of whom have extensive familiarity with the CTUMS data set.

3.24 In order to illustrate the potential effect of using monthly versus annual data, I have run a "first differences" model using "monthly" data using the same analytical approach as Dr. Lilico has employed to estimate associations with smoking prevalence among 15 to 19 year olds. The model with "monthly data" also included the same set of covariates used by Dr. Lilico (price and per capita GDP).[29] The results of this model are presented in Table 1 of Annex B. The results show a statistically significant association between the implementation of Display Bans and reduced smoking prevalence among 15-19 year olds. The model also indicates that increased price was also associated with lower smoking prevalence among 15 to 19 year olds: a very important test of the model given the well-established association between price increases and reduced smoking among young people described earlier in this section. I would like to reiterate that, in my opinion, "first differences" models are not an appropriate analytical approach in the current situation for the reasons described in Sections 3.6 to3.13. Nevertheless, the findings from the "first differences" model using "monthly" data demonstrate the advantages of using monthly data and produce a far more plausible set of findings, particularly with respect to the effects of price.

Plausibility of statistical models

3.25 The 2010 Hammond Report and 2011A Hammond Report highlighted the importance of having a conceptual or theoretical framework for developing an analytical plan and interpreting the statistical findings:

> *The [Lilico] report concludes that Display Bans led to an increase in smoking prevalence among 15 to 19 year olds, despite the fact that smoking prevalence was significantly lower in provinces following Display Bans (see Section 4.18 of the current report). In my opinion,*

[28] 2011B Lilico Report, Page 2, section 1.8

[29] I am not able to replicate Dr. Lilico's model without additional detail regarding his analysis. However, the general analystic approach and variables included in the model are the same.

there is no plausible argument as to why Display Bans would increase smoking behaviour: the practice of presenting statistical results in the absence of any theoretical or conceptual model to explain these findings casts further doubt upon the analytical approach underlying these conclusions. (p.32, 2010 Hammond Report)

3.26 Dr. Lilico responded in the 2011A Lilico Report as follows:

In my expert opinion, the practice of identifying statistical correlations without seeking to suggest causal explanations is widespread and obviously valid. If, for example, a political opinion poll finds that living in Texas is statistically correlated with voting Republican, are its statistical methods invalid unless it offers a causal explanation of why living in Texas makes people vote Republican? (p.13)

3.27 As described in the 2011A Hammond Report, Dr. Lilico's analysis amount to more than conducting a political opinion poll and reporting a correlation between two variables. Indeed, Dr. Lilico explains that he has selected a "richer" set of "explanatory" variables, which by definition seek to explain differences in smoking behaviour. (p.8 2011A Lilico Report) One of the important differences between polling firms and researchers operating in the scientific community is that researchers bear a responsibility to provide a plausible account of their findings. This is particularly important with respect to counter-intuitive findings such as those produced by Dr. Lilico's models.

3.28 Dr. Lilico's illustration of the "Charles & Camilla Effect" in the 2011B Lilico Report underscores the importance of interpretation and plausibility of findings. As Dr. Lilico has illustrated, it possible to run statistically models that may be valid in so far as their calculations and results are concerned, but which obscure or even mislead regarding causal association between variables. Dr. Lilico's use of the "Charles & Camilla Effect" is meant to highlight the limitations of not including a time trend, as was the case for data presented in the 2010 Hammond Report. Unlike the Charles & Camilla Effect, there is ample evidence for the conclusion that the significant declines in smoking prevalence are consistent with a causal association given findings from consumer surveys, clinical evidence on smoking cues and relapse, as well as the evidence on the impact of tobacco marketing in general, all of which are described in the 2010 Hammond Report.

Summary

3.29 Overall, Dr. Lilico's 2011 Report does not change the conclusion presented in the 2010 Hammond Report and the 2011A Hammond Report. In my opinion, there are fundamental limitations to Dr. Lilico's statistical models that undermine the credibility of his analyses. These limitations include:

- The use of annual rather than monthly data and "misclassification" of implementation dates for Display Bans in Canada,

- Inappropriate use of "first differences" model and time trends, and the failure to account for other tobacco control interventions in the "Pre-Ban" period,

- The failure of his models to identify an effect of price,

- Failure to provide a plausible account of counter-intuitive findings with respect to his conclusion that Display Bans are "materially correlated" with smoking behaviour among 15-19 year olds, despite a decrease in youth smoking over this period.

4.0 CONCLUSIONS

4.1 For the reasons set out above, I conclude the following:

4.2 I have a materially different opinion on the methodological quality and "reliability" of the consumer survey evidence reviewed by Dr. Keegan. My opinion of Dr. Keegan's standard and general quality of review is unchanged from the 2011A Hammond Report: I do not find Dr. Keegan's methodological review to be credible, nor do I find his conclusion that all of the published consumer survey studies are "unreliable" to be credible.

4.3 The conclusion in the 2011B Keegan Report that "there is no reliable consumer survey evidence to demonstrate that the Display Ban will achieve its objectives"[30] continues to disregard large bodies of evidence on the impact of tobacco advertising and retail marketing, clinical evidence, and additional consumer research related to beliefs and attitudes, identified in the 2011A Hammond Report.

4.4 In my opinion, Dr. Lilico's analysis of Display Bans implemented in Canada suffers from serious limitations. In particular, Dr. Lilico's failure to identify an effect of increased price on consumption and prevalence among youth, combined with the implausible finding that Display Bans have increased smoking, raise serious concerns about the integrity of his findings.

4.5 I have not been asked to review a subsequent report from Dr. Padilla. Therefore, my opinion of Dr. Padilla's 2011 Report[31] remains unchanged: the report includes basic errors associated with his analytical model and his understanding of core methodological concepts, such that they raise concerns about the general integrity of his findings.

4.6 In summary, I remain of the opinion that there is sufficient evidence to conclude beyond a reasonable doubt that the Display Ban would help to achieve the Department's public health primary aims of protecting children and young people from unsolicited promotion of tobacco through product displays, so reducing youth uptake of smoking, and of supporting adults who wish to quit smoking.

[30] 2011B Keegan Report, p.12
[31] Padilla J. The effectiveness of display bans: the case of Iceland. Supplemental Report. LECG Europe. January 11 2011.

5.0 STATEMENT OF TRUTH

5.1 I understand my duty to the court and have complied with that duty. I am aware of the requirements of Part 35 of the Civil Procedure Rules 1998, Practice Direction 35 to the Civil Procedure Rules 1998 and the Protocol for Instruction of Experts to give Evidence in Civil Claims.

5.2 "I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer."

David Hammond, PhD

University of Waterloo

Signed: 

Date: December 12, 2011

6.0 ANNEX A: SUPPLEMENTAL REVIEW OF INDIVIDUAL STUDIES

The following section provides a brief methodological overview of the three papers addressed in the 2011B Keegan Report.

6.1 Henriksen L, Schleicher NC, Feighery EC, Fortmann SP. A longitudinal study of exposure to retail cigarette advertising and smoking initiation. *Pediatrics* 2010;126:232-238.

Purpose	To examine the association between exposure to retail tobacco advertising and smoking behaviour in a longitudinal study.	
Methods		
Study design	A school-based survey was conducted on 1681 adolescents (aged 11–14 years) who had never smoked, with follow up at 12 and 30-months. Several measures of exposure to point-of-sale advertising were assessed, including: 1) the frequency of visiting types of stores that contain the most cigarette advertising and 2) a more detailed measure that combined data about visiting stores near schools with observations of cigarette advertisements and pack displays in those stores. Primary outcome measures included smoking behaviour at following, including the transition from never to ever smoking.	
Sample	Baseline N=1681	Youth aged 11-14 at Wave 1.
	Follow-up N=1356	Those who responded to Wave 2 and/or Wave 3.
Location	California, USA	
Analysis	Multilevel modeling was used to test the primary associations between exposure to retail marketing and smoking behaviour to account for clustering of students within schools. In the final models, all covariates were also treated as fixed effects, and the intercept randomly varied across schools. Separate multilevel models examined smoking shopping frequency and cigarette brand impressions per week with smoking initiation at 12-month and 30- month follow-ups. All models adjusted for demographics, exposure to smoking by parents and peers, risk-taking behaviour, exposure to smoking on television or in movies, self-reported grades in school, and unsupervised time after school.	
Results	At 12-month follow-up, 18% of adolescents had initiated smoking. Incidence of initiation was 29% among students who visited convenience, liquor, or small grocery stores at least twice per week and 9% among those who reported the lowest visit frequency (less than twice per month). Adjusting for multiple risk factors, the odds of initiation remained significantly higher (odds ratio: 1.64 [95% confidence interval: 1.06 –2.55]) for adolescents who reported moderate visit frequency (0.5–1.9 visits per week), and the odds of initiation more than doubled for those who visited ≥2 times per week (odds ratio: 2.58 [95% confidence interval: 1.68 –3.97]). Similar associations were observed for the more detailed exposure measure and were similar at 30-months.	

Conclusions	Exposure to retail cigarette marketing was prospectively associated with smoking initiation among youth.

6.2 Paynter J, Edwards R. The impact of tobacco promotion at point of sale: A systematic review. *Nicotine & Tobacco Research* 2009;11(1):25-35.

Purpose	To systematically review the evidence on the impact of Displays on smoking-related outcomes.
Methods	
Study design	Systematic review of studies published between 1992 and 2007, including both qualitative and quantitative research.
Analysis	Standardized criteria for study inclusion and review. Six criteria were used to evaluate whether the evidence supported a causal association between Displays and smoking behaviour: strength and consistency of association, evidence of dose-response and reversibility of effect, evidence of a clear temporal relationship, and biological plausibility.
Results	12 peer-reviewed studies were identified, 10 of which were focused on children. Seven of 8 observational studies reported statistically significant associations between exposure to tobacco promotion at the point-of-sale and smoking initiation or susceptibility to smoking. Two experimental studies of children reported statistically significant associations between exposure to point-of-sale tobacco promotions and beliefs about ease of getting tobacco and smoking prevalence among their peers. An experimental study with adults found that a picture of a collection of tobacco packs elicited cravings for cigarettes among smokers. A cross-sectional study found that 25% of adult smokers reported impulse purchasing and a third of recent ex-smokers reported urges to start smoking after seeing tobacco displayed."
Conclusions	The authors conclude that there is evidence that Displays can influence smoking behaviour; however, "more prospective studies are needed to clarify the temporal relationship between exposure to PoS tobacco and outcome." In addition, "due to limitations in the available studies, several of the criteria for causality were met only partially or were not met."

6.3 Germain D, McCarthy M, Wakefield M. Smoker sensitivity to retail tobacco displays and quitting: a cohort study. *Addiction* 2009;105:159-163.

Purpose	To assess responses to Displays is associated with cessation behaviour.
Methods	
Study design	Prospective cohort study. Smokers were surveyed at baseline in 2006 and again at 18-month follow-up. Baseline measures included smoking status, demographic information, "noticing displays", "impulse purchasing behaviour", and "deciding on brand based on POS displays". These measures were combined to create a measure of "sensitivity" to Displays. Follow-up measures: smoking status and number of quit attempts among those still smoking.
Sample	N=222 Adults smokers.
Location	Australia
Analysis	Multivariate logistic regression analyses were conducted to examine the strength of association between baseline sensitivity to POS displays and quitting behaviour.
Results	At follow-up, 17.0% of smokers at baseline reported abstinence. 28% smokers identified as having "low sensitivity to product displays" at baseline had quit at follow-up compared to 10% of those with "high sensitivity." Differences in quitting were statistically significant after adjusting for age, sex, SES and cigarette consumption in a multivariate regression model.
Conclusions	Greater sensitivity to Displays, in terms of noticing and self-reported impact, was associated with lower rates of smoking cessation in a prospective cohort study at 18-month follow-up.

7.0 ANNEX B: SUPPLEMENTAL ANALYSES ON THE CANADIAN DISPLAY BAN

Table 1. "First difference" model using monthly data

Model Information	
Data Set	WORK.POSDATA2
Distribution	Normal
Link Function	Identity
Dependent Variable	lagdaily_1519

Number of Observations Read	1320
Number of Observations Used	1310
Missing Values	10

Class Level Information		
Class	Levels	Values
year	12	1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Criteria For Assessing Goodness Of Fit			
Criterion	DF	Value	Value/DF
Deviance	1306	4.5812	0.0035
Scaled Deviance	1306	1310.0000	1.0031
Pearson Chi-Square	1306	4.5812	0.0035
Scaled Pearson X2	1306	1310.0000	1.0031
Log Likelihood		1845.7523	
Full Log Likelihood		1845.7523	
AIC (smaller is better)		-3681.5046	
AICC (smaller is better)		-3681.4586	
BIC (smaller is better)		-3655.6157	

Analysis Of Maximum Likelihood Parameter Estimates								
Parameter		DF	Estimate	Standard Error	Wald 95% Confidence Limits		Wald Chi-Square	Pr > ChiSq
Intercept		1	0.3456	0.0120	0.3222	0.3691	835.77	<.0001
pos	After	1	-0.0143	0.0041	-0.0224	-0.0062	11.93	0.0006
pos	Before	0	0.0000	0.0000	0.0000	0.0000	.	.
lagr_cig_price		1	-0.0016	0.0001	-0.0017	-0.0014	326.37	<.0001
lagGDP_cap		1	-0.0000	0.0000	-0.0000	-0.0000	20.33	<.0001
Scale		1	0.0591	0.0012	0.0569	0.0614		

*Note the scale parameter was estimated by maximum likelihood.

Original Analysis on Canadian Display Bans

7.1 In order to verify the credibility of previous analyses conducted using Canadian data, I have conducted an independent review of the data, using the most recent data set for the Canadian Tobacco Use Monitoring Survey (CTUMS). The tables below summarize changes in smoking behaviour before and after Display Bans in each province.

7.2 The data summarized below includes data on smoking behaviour for between 1999 and 2010. In addition, monthly rather than annual estimates were used. This allows greater precision when defining the Pre- and Post-Ban time periods with respect to actual implementation dates.

7.3 Data is shown for three age groups: 15 to 19 year-olds, 15 to 24 year-olds, and all adults 18 years and over. The prevalence of daily smoking and daily cigarette consumption (CPD) among smokers is shown for all three age groups. Data is also provided for the mean age of initiation for the 15 to 19 year-old age group on the basis that Display Bans may alter the trajectory of smoking initiation. For each age group and outcome, changes over time were tested within individual provinces, as well as the "pooled effect" of Display Bans in all provinces combined. To calculate

this "pooled effect", a linear regression model was fitted in which all ten provinces were entered along with a "dummy" variable corresponding to the Display Ban.[32] When testing for differences within provinces, the "Pre-ban" and "Post-ban" time periods were balanced in length to ensure an equivalent amount of time on either side of the Display Ban implementation. In other words, the period of "Pre-ban" data was matched to the availability of "Post-ban" data. For example, if 24 months of data were available in Province "X" following the implementation of the Display Ban, the "Pre-ban" period for Province "X" included 24 months of data immediately prior to the ban.

Smoking prevalence

7.4 Results for smoking prevalence are shown in Tables 2 to 4. Mean daily smoking prevalence among 15-19 year-olds (Table 2) and 15-24 year-olds (Table 3) decreased significantly post-Display Ban in five provinces: Manitoba, Saskatchewan, PEI, Nova Scotia, and Alberta. Among the 18+ age group, mean daily smoking prevalence decreased significantly post-Display Ban in three provinces: Manitoba, Saskatchewan, and PEI (see Table 4). No significant differences were observed in the other provinces for any of the age groups. The regression models with all provinces combined ("the pooled analysis") indicated a significant decrease post-Display Ban in mean daily smoking prevalence for each of the three age groups: 15-19, 15-24 and 18+ ($p<0.0001$ for each of the three groups).

[32] Methodological notes: (1) The number of months listed for the "pre-" and "post-" ban periods includes the total number of months covered for each time period, including the month of January when it falls within the relevant time period. Note, however, that the CTUMS survey does not collect data in the month of January, so there are no January observations in the analyses. (2) The "Pre-ban" and "Post-ban" time periods were balanced in length to ensure an equivalent amount of time on either side of the Display Ban implementation. This balance was not possible in the "pooled effect" analysis since the ban date was different in each province; in this case, all time points were included. (3) Note that in Saskatchewan, a Display Ban was initially implemented in March 2002, but the law was struck down in October 2003. The Ban was reinstated in January 2005, and we have used this as the implementation date in this analysis, given that Displays were present in stores prior to this date. (4) CTUMS data are not collected in the Yukon, the Northwest Territories or Nunavut. As a result, these territories have been excluded from the analyses. (5) Monthly means for the outcomes were used as observation points in the analyses. The precise number of individuals contributing to these means varies for each particular month and province. The CTUMS survey includes a sample of 20,000 respondents in each year (10,000 aged 15-24, and 10,000 aged 25 and over), evenly distributed across the ten provinces (i.e., approximately 2,000 respondents from each province, half from each age group). More information on CTUMS is available at: http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getInstanceList&SurvId=4440&SurvVer=1&InstaId=16040&SDDS=4440&lang=en&db=imdb&adm=8&dis=2.

Table 2. Mean daily smoking prevalence among youth (age 15-19), by province

Province	Pre-/Post-Ban Period* (Months)	Pre-Ban prevalence Mean (SD)	Post-Ban prevalence Mean (SD)	Prevalence change (Post – Pre)	P value**
Manitoba	55	18.1 (7.0)	11.4 (5.6)	-6.7	**p<0.0001**
Saskatchewan	66	19.8 (8.0)	11.9 (5.3)	-7.9	**p<0.0001**
PEI	50/51	11.7 (5.0)	7.5 (5.1)	-4.2	**p<0.0001**
Nova Scotia	41/42	10.1 (4.6)	8.1 (3.4)	-2.0	**p=0.02**
British Columbia	30/31	6.5 (3.0)	7.2 (4.3)	+0.7	p=0.47
Ontario	28/29	7.5 (3.8)	6.1 (3.7)	-1.4	p=0.15
Quebec	28/29	10.9 (4.5)	10.7 (4.2)	-0.2	p=0.85
Alberta	27/28	11.8 (4.6)	7.1 (3.6)	-4.7	**p<0.0001**
New Brunswick	22	11.6 (4.8)	9.8 (6.2)	-1.8	p=0.28
Newfoundland	11	11.7 (4.9)	9.1 (4.2)	-2.6	p=0.20

*Number of months in each of the pre-Ban and post-Ban periods. See footnote 12 in 2010 Hammond Report for further details.

**For difference in means post- vs. pre-Ban in a regression model for that province

Table 3. Mean daily smoking prevalence among young adults (age 15-24), by province

Province	**Pre-/Post-Ban Period** (n Months)	**Pre-Ban prevalence** Mean (SD)	**Post-Ban prevalence** Mean (SD)	**Prevalence change (Post – Pre)**	**P value***
Manitoba	55	21.9 (5.5)	16.0 (5.6)	-5.9	**p<0.0001**
Saskatchewan	66	23.2 (5.7)	16.5 (5.1)	-6.7	**p<0.0001**
PEI	50/51	18.6 (5.8)	12.5 (5.0)	-6.1	**p<0.0001**
Nova Scotia	41/42	16.8 (5.4)	14.0 (5.7)	-2.8	**p=0.02**
British Columbia	30/31	9.9 (4.3)	9.5 (3.9)	-0.4	p=0.69
Ontario	28/29	11.2 (3.5)	9.8 (3.9)	-1.4	p=0.17
Quebec	28/29	16.2 (3.6)	15.1 (4.1)	-1.1	p=0.27
Alberta	27/28	16.0 (4.8)	12.7 (3.8)	-3.3	**p<0.05**
New Brunswick	22	15.7 (4.4)	16.0 (5.3)	+0.3	p=0.86
Newfoundland	11	16.2 (4.9)	17.2 (5.7)	+1.0	p=0.65

* For difference in means post- vs. pre-Ban in a regression model for that province

Table 4. Mean daily smoking prevalence among adults (age 18+), by province

Province	**Pre-/Post-Ban Period** (n Months)	**Pre-Ban prevalence** Mean (SD)	**Post-Ban prevalence** Mean (SD)	**Prevalence change** **(Post – Pre)**	**P value***
Manitoba	55	19.2 (4.1)	16.3 (3.6)	-2.9	**p=0.0001**
Saskatchewan	66	20.6 (4.7)	18.2 (3.3)	-2.4	**p<0.001**
PEI	50	18.4 (3.8)	15.1 (4.2)	-3.3	**p<0.0001**
Nova Scotia	41/42	17.4 (3.4)	17.4 (3.5)	0.0	p=0.91
British Columbia	30/31	11.7 (2.2)	11.2 (2.9)	-0.5	p=0.43
Ontario	28/29	13.3 (3.0)	12.0 (2.8)	-1.3	p=0.10
Quebec	28/29	16.9 (2.9)	16.0 (4.4)	-0.9	p=0.38
Alberta	27/28	16.8 (3.1)	15.3 (3.3)	-1.5	p=0.08
New Brunswick	22	17.8 (3.6)	17.2 (3.2)	-0.6	p=0.52
Newfoundland	11	16.7 (3.0)	17.1 (3.0)	+0.4	p=0.76

* For difference in means post- vs. pre-Ban in a regression model for that province

Cigarettes per day

7.5 Results for mean daily cigarette consumption (CPD) among smokers are shown in Tables 5 to 7. Mean cigarettes per day among smokers aged 15-19 (Table 5) decreased significantly post-Display Ban in two provinces: Saskatchewan, and New Brunswick. In addition, the decrease observed in Manitoba was of borderline significance (p=0.054). Mean cigarettes per day among smokers aged 15-24 (Table 6) and 18+ (Table 7) decreased significantly post-Display Ban in four provinces: Manitoba, Saskatchewan, PEI, and Alberta. No significant differences were observed in the other provinces for any of the age groups. The regression models with all provinces combined (the "pooled" analysis) indicated a significant decrease post-Display Ban in mean CPD among current smokers in each of the three age groups: 15-19, 15-24 and 18+ ($p<0.0001$ for each of the three groups).

Table 5. Mean cigarettes per day (CPD) among youth smokers* (age 15-19), by province

Province	Pre-/Post-Ban Period (n Months)	Pre-Ban prevalence Mean (SD)	Post-Ban prevalence Mean (SD)	CPD change (Post – Pre)	P value**
Manitoba	55	9.1 (2.6)	8.1 (2.8)	-1.0	p=0.05
Saskatchewan	66	9.4 (2.7)	7.9 (3.7)	-1.5	**p=0.007**
PEI	50/51	11.0 (4.3)	9.8 (4.4)	-1.2	p=0.18
Nova Scotia	41/42	10.3 (3.6)	9.3 (4.2)	-1.0	p=0.22
British Columbia	30/31	7.7 (4.3)	7.3 (4.9)	-0.4	p=0.73
Ontario	28/29	7.9 (4.0)	8.2 (4.2)	+0.3	p=0.82
Quebec	28/29	8.3 (3.1)	8.6 (3.1)	+0.3	p=0.74
Alberta	27/28	8.8 (3.7)	7.1 (3.5)	-1.7	p=0.08
New Brunswick	22	12.3 (4.6)	9.0 (4.8)	-3.3	**p=0.02**
Newfoundland	11	10.8 (4.7)	9.4 (5.6)	-1.4	p=0.53

*All current daily and non-daily smokers

** For difference in means post- vs. pre-Ban in a regression model for that province

Table 6. Mean cigarettes per day (CPD) among young adult smokers* (age 15-24), by province

Province	Pre-/Post-Ban Period (n Months)	Pre-Ban prevalence Mean (SD)	Post-Ban prevalence Mean (SD)	CPD change (Post – Pre)	P value**
Manitoba	55	10.0 (2.0)	8.6 (2.1)	-1.4	**p<0.001**
Saskatchewan	66	10.6 (2.5)	9.1 (2.6)	-1.5	**p<0.001**
PEI	50/51	11.7 (2.7)	10.3 (2.7)	-1.4	**p=0.02**
Nova Scotia	41/42	10.8 (2.4)	10.6 (2.6)	-0.2	p=0.78
British Columbia	30/31	8.5 (3.3)	7.5 (2.6)	-1.0	p=0.21
Ontario	28/29	9.1 (2.9)	8.6 (2.4)	-0.5	p=0.44
Quebec	28/29	9.7 (2.0)	9.9 (2.6)	+0.2	p=0.75
Alberta	27/28	10.1 (2.0)	8.6 (2.8)	-1.5	**p=0.03**
New Brunswick	22	11.6 (2.7)	11.3 (2.8)	-0.3	p=0.65
Newfoundland	11	10.0 (3.4)	10.4 (3.3)	+0.4	p=0.80

*All current daily and non-daily smokers

** For difference in means post- vs. pre-Ban in a regression model for that province

Table 7. Mean cigarettes per day (CPD) among adult smokers* (age 18+), by province

Province	**Pre-/Post-Ban Period*** (n Months)	**Pre-Ban prevalence** Mean (SD)	**Post-Ban prevalence** Mean (SD)	**CPD change (Post – Pre)**	**P value****
Manitoba	55	13.9 (2.0)	12.1 (1.8)	-1.8	**p<0.0001**
Saskatchewan	66	14.2 (2.1)	12.7 (1.9)	-1.5	**p<0.0001**
PEI	50/51	14.6 (2.0)	13.5 (2.3)	-1.1	**p=0.01**
Nova Scotia	41/42	13.6 (2.5)	14.1 (1.8)	+0.5	p=0.26
British Columbia	30/31	12.7 (2.3)	11.9 (2.0)	-0.8	p=0.13
Ontario	28/29	12.5 (2.1)	12.2 (2.6)	-0.3	p=0.65
Quebec	28/29	13.6 (2.1)	12.9 (2.3)	-0.7	p=0.21
Alberta	27/28	13.5 (1.8)	12.1 (1.9)	-1.4	**p=0.006**
New Brunswick	22	14.7 (2.4)	14.7 (2.4)	0.0	p=0.97
Newfoundland	11	13.5 (2.3)	12.9 (2.2)	-0.6	p=0.57

*All current daily and non-daily smokers

** For difference in means post- vs. pre-Ban in a regression model for that province

Age of initiation

7.6 Results for age of initiation are shown in Table 8. Mean age of initiation among youth aged 15-19 years increased significantly post-Display Ban in seven provinces: Manitoba, Saskatchewan, PEI, Nova Scotia, British Columbia, Ontario, and Quebec. That is, youth began smoking *later*. Although age of initiation appeared to increase in all other provinces as well, no significant differences were observed. The regression model with all provinces combined indicated a significant ($p<0.0001$) increase post-Display Ban in the mean age of initiation among youth ages 15-19.

Table 8. Mean age of initiation among youth (age 15-19), by province*

Province	**Pre-/Post-Ban Period** (n Months)	**Pre-Ban prevalence** Mean (SD)	**Post-Ban prevalence** Mean (SD)	**Age change (Post – Pre)** Years	**P value****
Manitoba	55	13.5 (0.5)	14.2 (0.6)	+0.7	**p<0.0001**
Saskatchewan	66	13.5 (0.6)	14.3 (0.7)	+0.8	**p<0.0001**
PEI	50/51	13.9 (0.6)	14.5 (0.8)	+0.6	**p<0.0001**
Nova Scotia	41/42	13.8 (0.8)	14.5 (0.7)	+0.7	**p<0.0001**
British Columbia	30/31	14.1 (1.0)	14.6 (0.6)	+0.5	**p=0.04**
Ontario	28/29	14.6 (0.7)	15.1 (0.7)	+0.5	**p=0.02**
Quebec	28/29	13.7 (0.5)	14.1 (0.5)	+0.4	**p=0.006**
Alberta	27/28	14.5 (0.7)	14.6 (0.8)	+0.1	p=0.48
New Brunswick	22	13.8 (0.7)	14.1 (0.9)	+0.3	p=0.26
Newfoundland	11	14.2 (0.9)	14.4 (0.5)	+0.2	p=0.44

*Response to the question "At what age did you smoke your first cigarette?" among all youth who reported ever smoking a whole cigarette

** For difference in means post- vs. pre-Ban in a regression model for that province

Summary of Canadian analyses

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7.7 For each of the three outcomes examined—smoking prevalence, cigarettes per day and age of initiation—there was a significant impact of Display Bans in all age groups in the pooled models. For the analyses conducted for each province individually, there was a consistent pattern whereby the Bans implemented earlier were associated with the greatest decline in prevalence and cigarette consumption among current smokers, and the greatest increase in the age of smoking initiation. This suggests that the impact of Display Bans accumulate over time. It is important to note that the changes in smoking behaviour cannot necessarily be attributed to the Display Bans alone; however, the findings are consistent with a causal association between Display Bans and reductions in smoking behaviour.

"Pooled" Models including Price and GDP

7.8 The following measures were calculated to determine price and GDP:

1. Price: Statistics Canada CANSIM: Base (2002=100)
2. Core Consumer Price Index (CPI) (Bank of Canada: Bases 2002=100)
3. Real price= Cig_price/CPI*100
4. GDP_per_capita= GDP/pop_tot

Table 9. Prevalence of Daily Smoking: Ages 15 to 19 (GLM Procedure)

Class Level Information		
Class	Levels	Values
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Number of Observations Read	1320
Number of Observations Used	1320

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	2.63981658	0.21998471	71.07	<.0001
Error	1307	4.04581287	0.00309550		
Corrected Total	1319	6.68562944			

R-Square	Coeff Var	Root MSE	daily_1519 Mean
0.394849	42.84134	0.055637	0.129868

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pos	1	0.77723046	0.77723046	251.08	<.0001
prov	9	0.77941769	0.08660197	27.98	<.0001
r_cig_price	1	1.02484842	1.02484842	331.08	<.0001
GDP_cap	1	0.05832001	0.05832001	18.84	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pos	1	0.06342520	0.06342520	20.49	<.0001
prov	9	0.55110808	0.06123423	19.78	<.0001
r_cig_price	1	0.34563697	0.34563697	111.66	<.0001
GDP_cap	1	0.05832001	0.05832001	18.84	<.0001

Parameter	Estimate		Standard Error	t Value	Pr > |t|
Intercept	0.3806805648	B	0.02968096	12.83	<.0001
pos After	-.0191937450	B	0.00424027	-4.53	<.0001
pos Before	0.0000000000	B	.	.	.
prov 10	0.0470878695	B	0.00734743	6.41	<.0001
prov 11	0.0030834391	B	0.01040451	0.30	0.7670
prov 12	0.0228278471	B	0.00958587	2.38	0.0174
prov 13	0.0253437663	B	0.00904357	2.80	0.0051
prov 24	0.0557865408	B	0.00715501	7.80	<.0001
prov 35	0.0406773035	B	0.00805791	5.05	<.0001
prov 46	0.0466504361	B	0.00747428	6.24	<.0001
prov 47	0.0812023618	B	0.00725440	11.19	<.0001
prov 48	0.0976983489	B	0.01671845	5.84	<.0001
prov 59	0.0000000000	B	.	.	.
r_cig_price	-.0012123590		0.00011473	-10.57	<.0001
GDP_cap	-.0000044644		0.00000103	-4.34	<.0001

Table 10. Prevalence of Daily Smoking: Ages 15 to 24 (GLM Procedure)

Class Level Information		
Class	Levels	Values
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	2.64269361	0.22022447	89.31	<.0001
Error	1307	3.22295319	0.00246592		
Corrected Total	1319	5.86564680			

Number of Observations Read	1320
Number of Observations Used	1320

R-Square	Coeff Var	Root MSE	daily_1524 Mean
0.450537	28.15576	0.049658	0.176369

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pos	1	0.72011836	0.72011836	292.03	<.0001
prov	9	0.94935376	0.10548375	42.78	<.0001
r_cig_price	1	0.92055331	0.92055331	373.31	<.0001
GDP_cap	1	0.05266818	0.05266818	21.36	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pos	1	0.05611788	0.05611788	22.76	<.0001
prov	9	0.72812823	0.08090314	32.81	<.0001
r_cig_price	1	0.31000056	0.31000056	125.71	<.0001
GDP_cap	1	0.05266818	0.05266818	21.36	<.0001

Parameter		Estimate		Standard Error	t Value	Pr > |t|
Intercept		0.3982507258	B	0.02649123	15.03	<.0001
pos	After	-.0180542481	B	0.00378458	-4.77	<.0001
pos	Before	0.0000000000	B	.	.	.
prov	10	0.0717983719	B	0.00655782	10.95	<.0001
prov	11	0.0302368508	B	0.00928636	3.26	0.0012
prov	12	0.0471093441	B	0.00855570	5.51	<.0001
prov	13	0.0455438861	B	0.00807168	5.64	<.0001
prov	24	0.0666730987	B	0.00638608	10.44	<.0001
prov	35	0.0452323419	B	0.00719194	6.29	<.0001
prov	46	0.0565013749	B	0.00667104	8.47	<.0001
prov	47	0.0884183567	B	0.00647479	13.66	<.0001
prov	48	0.1077975913	B	0.01492176	7.22	<.0001
prov	59	0.0000000000	B	.	.	.
r_cig_price		-.0011481599		0.00010240	-11.21	<.0001
GDP_cap		-.0000042425		0.00000092	-4.62	<.0001

Table 11. Prevalence of Daily Smoking: Ages 18+ (GLM Procedure)

Class Level Information		
Class	Levels	Values
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Number of Observations Read	1320
Number of Observations Used	1320

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1.37450171	0.11454181	86.53	<.0001
Error	1307	1.73014577	0.00132375		
Corrected Total	1319	3.10464749			

R-Square	Coeff Var	Root MSE	daily_18plus Mean
0.442724	20.43293	0.036383	0.178063

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pos	1	0.22219931	0.22219931	167.86	<.0001
prov	9	0.67714344	0.07523816	56.84	<.0001
r_cig_price	1	0.46389965	0.46389965	350.44	<.0001
GDP_cap	1	0.01125932	0.01125932	8.51	0.0036

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pos	1	0.00275386	0.00275386	2.08	0.1494
prov	9	0.55210369	0.06134485	46.34	<.0001
r_cig_price	1	0.18783203	0.18783203	141.89	<.0001
GDP_cap	1	0.01125932	0.01125932	8.51	0.0036

Parameter	Estimate		Standard Error	t Value	Pr > |t|
Intercept	0.2932978196	B	0.01940959	15.11	<.0001
pos After	-.0039994425	B	0.00277289	-1.44	0.1494
pos Before	0.0000000000	B	.	.	.
prov 10	0.0653849472	B	0.00480478	13.61	<.0001
prov 11	0.0447399059	B	0.00680393	6.58	<.0001
prov 12	0.0653659384	B	0.00626859	10.43	<.0001
prov 13	0.0586841688	B	0.00591396	9.92	<.0001
prov 24	0.0573523643	B	0.00467895	12.26	<.0001
prov 35	0.0353991432	B	0.00526939	6.72	<.0001
prov 46	0.0440914177	B	0.00488774	9.02	<.0001
prov 47	0.0700028893	B	0.00474395	14.76	<.0001
prov 48	0.0722526519	B	0.01093287	6.61	<.0001
prov 59	0.0000000000	B	.	.	.
r_cig_price	-.0008937292		0.00007503	-11.91	<.0001
GDP_cap	-.0000019616		0.00000067	-2.92	0.0036

Table 12. Cigarettes per Day: Ages 15-19 (GLM Procedure)

Class Level Information		
Class	Levels	Values
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Number of Observations Read	1320
Number of Observations Used	1320

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	2001.15496	166.76291	12.80	<.0001
Error	1307	17034.23529	13.03308		
Corrected Total	1319	19035.39025			

R-Square	Coeff Var	Root MSE	cpd_1519 Mean
0.105128	37.66386	3.610136	9.585147

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pos	1	828.3220620	828.3220620	63.56	<.0001
prov	9	876.2989418	97.3665491	7.47	<.0001
r_cig_price	1	278.5396174	278.5396174	21.37	<.0001
GDP_cap	1	17.9943384	17.9943384	1.38	0.2402

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pos	1	141.4706745	141.4706745	10.85	0.0010
prov	9	803.5494199	89.2832689	6.85	<.0001
r_cig_price	1	231.4877478	231.4877478	17.76	<.0001
GDP_cap	1	17.9943384	17.9943384	1.38	0.2402

Parameter		Estimate		Standard Error	t Value	Pr > |t|
Intercept		9.313768101	B	1.92591196	4.84	<.0001
pos	After	-0.906487885	B	0.27513910	-3.29	0.0010
pos	Before	0.000000000	B	.	.	.
prov	10	2.432692027	B	0.47675332	5.10	<.0001

Parameter	Estimate		Standard Error	t Value	Pr > |t|
prov 11	3.019839515	B	0.67511835	4.47	<.0001
prov 12	2.505361152	B	0.62199958	4.03	<.0001
prov 13	2.698205547	B	0.58681111	4.60	<.0001
prov 24	0.767966225	B	0.46426779	1.65	0.0983
prov 35	0.678361293	B	0.52285423	1.30	0.1947
prov 46	0.326857398	B	0.48498452	0.67	0.5005
prov 47	0.192160098	B	0.47071707	0.41	0.6832
prov 48	-0.544283289	B	1.08481163	-0.50	0.6159
prov 59	0.000000000	B	.	.	.
r_cig_price	-0.031375101		0.00744466	-4.21	<.0001
GDP_cap	0.000078419		0.00006674	1.18	0.2402

Table 13. Cigarettes per Day: Ages 15-24(GLM Procedure)

Class Level Information		
Class	Levels	Values
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Number of Observations Read	1320
Number of Observations Used	1320

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	2140.394423	178.366202	31.42	<.0001
Error	1307	7419.749645	5.676932		
Corrected Total	1319	9560.144067			

R-Square	Coeff Var	Root MSE	cpd_1524 Mean
0.223887	22.97908	2.382631	10.36870

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pos	1	620.357125	620.357125	109.28	<.0001
prov	9	1074.384647	119.376072	21.03	<.0001
r_cig_price	1	444.693932	444.693932	78.33	<.0001
GDP_cap	1	0.958718	0.958718	0.17	0.6812

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pos	1	44.4670179	44.4670179	7.83	0.0052
prov	9	953.1132707	105.9014745	18.65	<.0001
r_cig_price	1	224.0179212	224.0179212	39.46	<.0001
GDP_cap	1	0.9587177	0.9587177	0.17	0.6812

Parameter		Estimate		Standard Error	t Value	Pr > |t|
Intercept		12.88342696	B	1.27107078	10.14	<.0001
pos	After	-0.50821537	B	0.18158736	-2.80	0.0052
pos	Before	0.00000000	B	.	.	.
prov	10	2.28115082	B	0.31464949	7.25	<.0001
prov	11	2.73775353	B	0.44556720	6.14	<.0001
prov	12	2.56087734	B	0.41050968	6.24	<.0001
prov	13	2.91065783	B	0.38728585	7.52	<.0001
prov	24	1.32328420	B	0.30640924	4.32	<.0001
prov	35	1.27553272	B	0.34507535	3.70	0.0002
prov	46	0.38811426	B	0.32008195	1.21	0.2255
prov	47	1.13328492	B	0.31066567	3.65	0.0003
prov	48	1.53847606	B	0.71595815	2.15	0.0318
prov	59	0.00000000	B	.	.	.
r_cig_price		-0.03086473		0.00491335	-6.28	<.0001
GDP_cap		-0.00001810		0.00004405	-0.41	0.6812

Table 14. Cigarettes per Day: Ages 18+ (GLM Procedure)

Class Level Information		
Class	Levels	Values
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Number of Observations Read	1320
Number of Observations Used	1320

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	1945.126097	162.093841	36.49	<.0001
Error	1307	5805.571683	4.441906		
Corrected Total	1319	7750.697781			

R-Square	Coeff Var	Root MSE	cpd_18plus Mean
0.250961	15.24514	2.107583	13.82462

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pos	1	600.8961114	600.8961114	135.28	<.0001
prov	9	726.8027338	80.7558593	18.18	<.0001
r_cig_price	1	596.5596297	596.5596297	134.30	<.0001
GDP_cap	1	20.8676223	20.8676223	4.70	0.0304

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pos	1	27.2682653	27.2682653	6.14	0.0133
prov	9	562.4102363	62.4900263	14.07	<.0001
r_cig_price	1	225.8816092	225.8816092	50.85	<.0001
GDP_cap	1	20.8676223	20.8676223	4.70	0.0304

Parameter		Estimate		Standard Error	t Value	Pr > |t|
Intercept		19.10010395	B	1.12433985	16.99	<.0001
pos	After	-0.39797661	B	0.16062513	-2.48	0.0133
pos	Before	0.00000000	B	.	.	.
prov	10	1.01112592	B	0.27832672	3.63	0.0003

Parameter		Estimate		Standard Error	t Value	Pr > |t|
prov	11	1.38614159	B	0.39413145	3.52	0.0005
prov	12	1.69381314	B	0.36312092	4.66	<.0001
prov	13	1.97051295	B	0.34257803	5.75	<.0001
prov	24	1.50417755	B	0.27103772	5.55	<.0001
prov	35	1.21755369	B	0.30524025	3.99	<.0001
prov	46	-0.04630493	B	0.28313206	-0.16	0.8701
prov	47	0.94389230	B	0.27480278	3.43	0.0006
prov	48	1.80933455	B	0.63330878	2.86	0.0043
prov	59	0.00000000	B	.	.	.
r_cig_price		-0.03099285		0.00434616	-7.13	<.0001
GDP_cap		-0.00008445		0.00003896	-2.17	0.0304

Table 15. Mean age of initiation: Ages 15-19 (GLM Procedure)

Class Level Information		
Class	Levels	Values
pos	2	After Before
prov	10	10 11 12 13 24 35 46 47 48 59

Number of Observations Read	1320
Number of Observations Used	1320

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	12	239.6860923	19.9738410	45.83	<.0001
Error	1307	569.6022679	0.4358089		
Corrected Total	1319	809.2883602			

R-Square	Coeff Var	Root MSE	age_ini_1519 Mean
0.296169	4.742198	0.660158	13.92093

Source	DF	Type I SS	Mean Square	F Value	Pr > F
pos	1	146.2865729	146.2865729	335.67	<.0001
prov	9	57.1798655	6.3533184	14.58	<.0001
r_cig_price	1	33.0851504	33.0851504	75.92	<.0001
GDP_cap	1	3.1345035	3.1345035	7.19	0.0074

Source	DF	Type III SS	Mean Square	F Value	Pr > F
pos	1	50.96136462	50.96136462	116.94	<.0001
prov	9	29.33993582	3.25999287	7.48	<.0001
r_cig_price	1	9.44262952	9.44262952	21.67	<.0001
GDP_cap	1	3.13450347	3.13450347	7.19	0.0074

Parameter		Estimate		Standard Error	t Value	Pr > |t|
Intercept		11.90682732	B	0.35217698	33.81	<.0001
pos	After	0.54406316	B	0.05031261	10.81	<.0001
pos	Before	0.00000000	B	.	.	.
prov	10	0.17788421	B	0.08718028	2.04	0.0415
prov	11	0.31622921	B	0.12345380	2.56	0.0105
prov	12	0.07963328	B	0.11374037	0.70	0.4840
prov	13	-0.03049896	B	0.10730572	-0.28	0.7763
prov	24	-0.14436165	B	0.08489715	-1.70	0.0893
prov	35	0.25656817	B	0.09561041	2.68	0.0074
prov	46	0.00559682	B	0.08868546	0.06	0.9497
prov	47	-0.18201414	B	0.08607648	-2.11	0.0347
prov	48	-0.21771636	B	0.19837131	-1.10	0.2726
prov	59	0.00000000	B	.	.	.
r_cig_price		0.00633677		0.00136135	4.65	<.0001
GDP_cap		0.00003273		0.00001220	2.68	0.0074

Association of Retail Tobacco Marketing With Adolescent Smoking

Lisa Henriksen, PhD, Ellen C. Feighery, RN, MS, Yun Wang, MS, and Stephen P. Fortmann, MD

A survey of 2125 middle-school students in central California examined adolescents' exposure to tobacco marketing in stores and its association with self-reported smoking. Two thirds of sixth-, seventh-, and eighth-grade students reported at least weekly visits to small grocery, convenience, or liquor stores. Such visits were associated with a 50% increase in the odds of ever smoking, even after control for social influences to smoke. Youth smoking rates may benefit from efforts to reduce adolescents' exposure to tobacco marketing in stores. (*Am J Public Health*. 2004;94:2081–2083)

The tobacco industry spends more on point-of-purchase marketing than on all other forms of cigarette advertising combined ($9.5 billion vs $1.7 billion in 2001).[1] Since the ban on billboard advertising, promotional materials for tobacco have increased significantly on store windows and around the counter.[2,3] Three out of 4 teenagers shop at a convenience store at least once a week,[4] staying an average of 16 minutes per visit—twice as long as adults.[5] In recent surveys, all 15- and 16-year-olds reported seeing point-of-purchase marketing for cigarettes,[6] and teenaged smokers preferred whichever brand (Marlboro or Camel) was advertised most heavily in the convenience store nearest their school.[7] Experimental studies suggest that retail tobacco marketing exposure distorts adolescents' perceptions about the availability, use, and popularity of tobacco[8,9]—normative beliefs that are precursors of smoking.[10–12]

The only study to correlate adolescents' self-reported smoking with exposure to retail tobacco marketing found that experimentation was 38% more likely for seventh-grade students who said that they visited a convenience, liquor, or small grocery store at least weekly and remembered seeing advertisements for cigarettes sometimes or a lot.[13] Because cigarette advertising is more noticeable to experimenters than to abstinent youths,[14,15] this finding may be attributable to perceived exposure alone. Alternatively, store exposure may be associated with smoking for reasons other than the influence of advertising, such as a propensity for risk taking or lack of after-school supervision, which are established risk factors for smoking.[11,16,17] After we controlled for such risk factors and social influences to smoke, we examined whether adolescent smoking is associated with exposure to stores that contain widespread tobacco marketing.

METHODS

We administered the Survey of Teen Opinions about Retail Environments (STORE Study) in all 3 middle schools in Tracy, Calif (population 62 500), in spring 2003. Of the initial sample of sixth-, seventh-, and eighth-grade students (N=2731), 396 students did not return parental consents, 95 were absent for the survey, and 115 parents refused permission, yielding a response rate of 78%. The final sample (N=2125) was 53% female and 42% Hispanic, 27% White, 11% Asian, 6% African American, 1% American Indian, 1% Pacific Islander, and 12% multiethnic.

Each survey included photographs and addresses of 12 retail tobacco outlets in the school catchment area that were identified by student focus groups as popular destinations for purchasing snacks. Exposure to retail tobacco marketing was coded for students who reported at least weekly visits to convenience, liquor, or small grocery stores, either in response to questions about the pictured stores or in response to questions about visiting any such stores in the past month. Exposure to other forms of tobacco marketing was coded for students who reported owning a cigarette promotional item, sometimes or often seeing tobacco advertisements in magazines in the past week, or sometimes or often seeing people smoking on television or in movies in the past week. Exposure to family and peer smoking was coded, separately, for students who reported having a parent or other household member who currently smokes and for students who reported having at least one friend who currently smokes. The survey also included self-reported grades, a 3-item risk-taking measure,[11] and 4 items of the Authoritative Parenting Index[18] that measure maternal supervision.

We used GLIMMIX for SAS, Version 8.0 (SAS Institute Inc, Cary, NC), to examine the potential effect of school clustering with multilevel modeling, but results did not differ from the standard multiple regression reported here. Odds ratios were computed to test the association between adolescents' exposure to retail tobacco marketing and ever smoking a cigarette, even just a puff. This was the primary study outcome because the prevalence of current smoking was quite small: 2.6% of sixth-, 6.0% of seventh-, and 7.6% of eighth-grade students reported any cigarette smoking in the past 30 days.

RESULTS AND DISCUSSION

Two thirds of the students said that they visited a convenience, liquor, or small grocery store on their way to or from school at least weekly (Table 1); about one fourth of the students reported visiting such stores practically every day. Exposure to retail tobacco marketing was more prevalent among boys; Latino youths; and students who reported low maternal supervision, high risk taking, exposure to social influences to smoke, and exposure to other forms of tobacco marketing.

Table 2 summarizes the bivariate and multivariate associations of ever smoking with de-

mographic attributes and psychosocial risk factors. After we controlled for all other variables in the model, weekly or more frequent exposure to retail tobacco marketing was associated with a 50% increase in the odds of ever smoking—nearly as much as the effect of exposure to a parent or household member who smokes. Although Latino youths were more likely to be exposed to retail tobacco marketing, they had no greater risk for smoking when other variables were controlled.

Because we controlled for confounders such as risk taking, maternal supervision, and self-reported grades, the association between adolescents' store visits and their smoking behavior appears more likely an effect of advertising exposure than an artifact of idle hands or hanging out with the wrong crowd. Relative to other forms of tobacco marketing, retail marketing exposure was second only to owning a cigarette promotional item in increasing the odds of ever smoking. However, the smaller association observed for exposure to cigarette advertisements in magazines and no association for depictions of smoking on television or in movies may be an artifact of redundancy within exposure measures.

This cross-sectional study could not confirm a causal role for retail tobacco marketing in the uptake of smoking but provided stronger evidence for causality than previous studies have by controlling several potential confounds.

The effect of retail tobacco marketing on adolescent smoking may be particularly potent in states with comprehensive tobacco control programs where tobacco advertisements and promotions are more numerous at the point of sale.[19,20] Because the tobacco industry has relatively few regulations on advertising in stores,[21–25] further research, including longitudinal studies, is needed to determine how the proliferation of tobacco marketing in stores affects youths. ■

TABLE 1—Characteristics of Study Participants and Prevalence of Exposure to Retail Tobacco Marketing: 2125 Middle-School Students, Tracy, Calif, 2003

	% of Full Sample (N = 2125)	Prevalence of Exposure to Retail Tobacco Marketing, %	Unadjusted OR (95% CI)
Grade			
6th[a]	33.2	68.0	
7th	29.8	66.1	0.9 (0.7, 1.2)
8th	37.0	65.2	0.9 (0.7, 1.1)
Gender			
Female[a]	53.3	63.9	
Male	46.7	69.1	1.3 (1.1, 1.5)
Ethnicity			
Not Latino or Hispanic[a]	57.9	59.6	
Latino or Hispanic	42.1	76.0	2.2 (1.8, 2.6)
Self-reported grades			
Above median[a]	52.6	60.2	
Below median	47.4	73.1	1.8 (1.5, 2.2)
Parent or household smoking			
No[a]	55.5	60.3	
Yes	44.5	74.0	1.9 (1.6, 2.3)
At least 1 friend smokes			
No[a]	72.3	61.9	
Yes	27.7	77.9	2.2 (1.7, 2.7)
Maternal supervision			
Above mean[a]	50.6	62.7	
Below mean	49.4	70.0	1.4 (1.2, 1.7)
Risk taking			
Below mean[a]	46.3	56.6	
Above mean	53.7	74.6	2.3 (1.9, 2.7)
Own cigarette promotional item			
No[a]	84.8	63.5	
Yes	15.2	82.8	2.8 (2.0, 3.7)
See cigarette advertisements in magazines			
Never or rarely[a]	48.8	55.4	
Sometimes or often	51.2	76.9	2.7 (2.2, 3.2)
See smoking on television or in movies			
Never or rarely[a]	32.0	55.9	
Sometimes or often	68.0	71.4	2.0 (1.6, 2.4)
Exposure to retail tobacco marketing			
< Once/week[a]	33.8	...	...
At least once/week	66.2	...	...

Note. OR = odds ratio; CI = confidence interval.
[a]Reference category.

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This brief was accepted January 2, 2004.

Contributors

L. Henriksen helped design the study and supervised all aspects of its implementation. E. C. Feighery helped design the study and supervised store advertising surveys. Y. Wang assisted with the study and data analyses. S. P. Fortmann helped design the study. All authors helped to interpret findings and review drafts of the brief.

Acknowledgments

This study was funded by Public Health Service grant CA67850 from the National Cancer Institute.

We are grateful to Amanda Dauphinee for managing the data collection and project administration; to Harry Haladjian for managing the store observations; to Matthew Barton, Christopher Doyle, Allyson Fish, Shannon Quinlan Hurtz, Dominique Johnson, Lani Ream, and Diana Wu for collecting the data; and to the principals and teachers who supported the study.

Human Participant Protection

All students were required to return signed parental consent forms in order to participate in this study.

TABLE 2—Unadjusted and Adjusted Odds Ratios (ORs) From Stepwise Logistic Regression for Ever Smoking: 2125 Middle-School Students, Tracy, Calif, 2003

	Unadjusted OR	CI	Adjusted OR[a]	CI
Grade				
6th[b]				
7th	2.7	2.0, 3.7	2.0	1.4, 2.9
8th	4.5	3.3, 6.1	3.0	2.1, 4.3
Gender				
Female[b]				
Male	1.1	0.9, 1.4	NS	
Ethnicity				
Not Latino or Hispanic[b]				
Latino or Hispanic	1.4	1.1, 1.7	NS	
Self-reported grades				
Above median[b]				
Below median	2.7	2.2, 3.4	1.5	1.2, 2.0
Parent or household smoking				
No[b]				
Yes	2.6	2.1, 3.2	1.8	1.4, 2.3
At least 1 friend smokes				
No[b]				
Yes	6.6	5.2, 8.3	3.1	2.4, 4.0
Maternal supervision				
Above mean[b]				
Below mean	1.9	1.5, 2.4	1.5	1.1, 1.9
Risk taking				
Below mean[b]				
Above mean	6.7	5.1, 8.9	3.4	2.5, 4.7
Own cigarette promotional item				
No[b]				
Yes	6.0	4.7, 7.8	2.7	2.0, 3.6
See cigarette advertisements in magazines				
Never or rarely[b]				
Sometimes or often	2.5	2.0, 3.1	1.4	1.1, 1.8
See smoking on television or in movies				
Never or rarely[b]				
Sometimes or often	2.2	1.7, 2.8	NS	
Exposure to retail tobacco marketing				
< Once/week[b]				
At least once/week	2.8	2.1, 3.6	1.5	1.1, 2.1

Note. CI = confidence interval; NS = not selected by stepwise selection method.
[a]Adjusted OR controls for school differences and all other model variables simultaneously.
[b]Reference category.

The parental consent forms explained the study protocol and participant rights. Students also were given a consent form to read and sign before survey administration. The use of human subjects was approved by the human subjects panel of Stanford University.

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RESEARCH PAPER

Reaching youth at the point of sale: cigarette marketing is more prevalent in stores where adolescents shop frequently

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Tobacco Control 2004;13:315–318. doi: 10.1136/tc.2003.006577

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Received 3 November 2003
Accepted 23 May 2004

Objective: Although numerous studies describe the quantity and nature of tobacco marketing in stores, fewer studies examine the industry's attempts to reach youth at the point of sale. This study examines whether cigarette marketing is more prevalent in stores where adolescents shop frequently.
Design, setting, and participants: Trained coders counted cigarette ads, products, and other marketing materials in a census of stores that sell tobacco in Tracy, California (n = 50). A combination of data from focus groups and in-class surveys of middle school students (n = 2125) determined which of the stores adolescents visited most frequently.
Main outcome measures: Amount of marketing materials and shelf space measured separately for the three cigarette brands most popular with adolescent smokers and for other brands combined.
Results: Compared to other stores in the same community, stores where adolescents shopped frequently contained almost three times more marketing materials for Marlboro, Camel, and Newport, and significantly more shelf space devoted to these brands.
Conclusions: Regardless of whether tobacco companies intentionally target youth at the point of sale, these findings underscore the importance of strategies to reduce the quantity and impact of cigarette marketing materials in this venue.

Since the Master Settlement Agreement (MSA), concern about tobacco marketing targeting youth has focused on magazines.[1–3] Less is known about the industry's attempt to reach youth at the point of sale. In 2001, US cigarette companies spent $173 million on magazine advertising compared to $9.5 billion on retail marketing.[4] These expenditures pay for traditional signs and functional items (such as branded clocks, hand baskets, and counter mats), price reductions for consumers ("Buy two, get one free") and incentives for retailers to display cigarettes in prime locations, especially around the counter.[5] A US survey of approximately 3000 stores in 163 school neighbourhoods found some form of tobacco advertising at 84% of stores and at least one branded functional item in 69%.[6] The amount of money US tobacco companies spend on retail marketing has more than doubled since the 1998 MSA.[4] One effect of this spending has been observed in California's stores, where the average number of cigarette marketing materials increased 31% from 2000 to 2002.[7]

With a preponderance of tobacco ads and products located near candy and around the counter area,[8–10] it stands to reason that retail tobacco marketing makes a clear impression on young consumers. In a survey of teens from northeast England, all of the 629 15 and 16 year olds reported seeing point-of-purchase marketing for cigarettes.[11] In the USA, adolescents who reported at least weekly exposure to retail tobacco marketing were more likely to have experimented with smoking,[12 13] and teen smokers preferred whichever brand (Camel or Marlboro) was advertised most heavily in the convenience store closest to school.[14]

The problem of widespread ads and promotions for cigarettes is not unique to US stores.[15–18] For example, after countries such as Australia, Canada, Ireland, and New Zealand banned point-of-sale ads for cigarettes, traditional signs were replaced by "power walls" of cigarette packs in quantities greater than necessary to supply consumers.[19] Exposure to such displays may distort adolescents' perceptions about the availability, use, and popularity of cigarettes.[20]

Whether or not tobacco companies intentionally target adolescents at the point of sale, some studies suggest they may be disproportionately exposed to this form of cigarette marketing. In metropolitan settings such as Boston, Massachusetts and San Jose, California, significantly more cigarette advertising was found on store windows within 300 metres of schools than on stores farther away from school.[8 10] Combining data from store observations and school based surveys, this study is the first to examine whether cigarette marketing materials are more prevalent in stores where adolescents frequently shop.

METHODS

In February, 2002, observations were conducted in a census of stores that sold cigarettes in Tracy, California—a central valley community (population 62 500) approximately 100 km east of San Francisco. In 2000, the Tracy population was 65% white, 8% Asian, 6% African American, 1% American Indian, 20% other or multiple categories, and 28% of all residents were of Hispanic origin—quite comparable to the state population.[21] An address list for all Tracy businesses that paid tobacco taxes was obtained from the California Tobacco Control Section and verified with telephone directories and neighbourhood canvassing. Two tobacco-only stores that neither sold snack foods nor permitted entrance to youth under 18 were excluded from the store population, yielding a total of 50 stores.

Two young adults with substantial experience conducting observations of retail marketing were trained to use an established protocol for counting and categorising tobacco marketing materials in stores.[22] Given concern about the role of cigarette packaging as a vehicle for advertising,[23 24] the protocol was expanded to measure shelf space allocated to cigarettes, as well. Branded signs, shelving units, product

Abbreviations: FCTC, Framework Convention on Tobacco Control; ICC, intraclass correlation coefficient; MSA, Master Settlement Agreement; STORE, Survey of Teen Opinions about Retail Environments

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displays, and functional items such as counter mats and shopping baskets were counted separately for the three cigarette brands most popular with youth in the USA (Marlboro, Camel, and Newport)[25] and for other cigarette brands combined. Shelf space for cigarettes was measured by counting product facings, defined as space allocated to cigarette packs on the front row of shelves and displays.[26] Cigarette cartons stacked with the longest side facing front were counted as five; cartons stacked with the shortest side facing front were counted as two.

For comparison, coders also counted branded signs, shelving units, product displays, and functional items for three of the most heavily advertised beer brands in the USA (Budweiser, Miller, and Heineken).[27] Marketing materials for other beer brands were not counted because the sheer volume made it impossible for coders to complete the protocol in a reasonable amount of time.

Coders counted signs indicating that identification is required to purchase tobacco products that are supplied by the tobacco industry, such as the "We Card" sign from Philip Morris. Coders also rated the visual impact of cigarette advertising inside and outside each store using a four point scale adapted from Wakefield and colleagues.[28] The scale values ranged from 0 = no advertising to 3 = everywhere/"in your face". Store observations were completed before determining which stores were popular among adolescents, thus, the coders were blind to the assignment of stores to this category.

Stores were categorised by type: convenience, drug store/pharmacy, grocery/deli, liquor, supermarket.[22] Retail and/or gross square footage was not available from the County Tax Assessor's Office for all stores in the sample. Instead, cash register total was used as a proxy for store size because it was highly correlated with gross square footage in the stores where this figure was available ($n = 39$, $r = 0.98$, $p < 0.001$).

Only two of the 50 stores (4%) refused a coder's request to spend 20 minutes counting and categorising signs for a study about point-of-purchase advertising. Six randomly selected stores were observed by the two coders independently and intercoder reliability for all measures was excellent. The highest intraclass correlation coefficients (ICCs) were obtained for counting cash registers (1.0) and age-of-sale signs (0.97), and for rating the visual impact of advertising (0.96); lower intercoder reliability was obtained for counting youth brand marketing materials and product facings (ICCs were 0.86 and 0.74, respectively).

To determine which of the 48 stores were popular with teens, focus groups were conducted with one class from each of the three middle schools in Tracy. Students were asked to nominate 12 stores from the list of all retail tobacco outlets in the school catchment area (the area from which each school drew its student population). Some of the same stores were nominated at different schools, resulting in a total of 27 stores. The selections were confirmed by data from the Survey of Teen Opinions about Retail Environments (STORE) study—an in-class survey of 2125 students in grades 6–8 (ages 11–14 years) whose sample and procedures are described elsewhere.[12] Each school's survey depicted photographs and addresses of the 12 nominated stores and measured the frequency with which students visited each store in the past month. More than one third of students (38%) visited at least one of the 12 stores every day, 28% visited at least one of the 12 stores 2–3 times per week, and 14% visited at least one of the 12 stores weekly. Two of the 27 stores that the focus groups identified as popular were reclassified because more than 80% of surveyed students reported never shopping there.

Independent-sample t tests compared the quantity of marketing materials and shelf space for cigarettes and the visual impact of cigarette advertising in stores popular with teens and other stores in the same community. The quantity of marketing materials and shelf space for "youth brands" (Marlboro, Camel, Newport) and other brands were also compared between the two groups of stores. To adjust for varying store size, such counts are typically divided by the number of cash registers.[26] We report unadjusted means because the average size of stores popular among teens and other stores was not significantly different ($p = 0.63$), the unadjusted numbers are easier to interpret, and the conclusions from tests of adjusted and unadjusted means were essentially the same. Given the skewed distribution of some measures, we also conducted Mann-Whitney U tests, but results did not differ from the parametric tests reported.

RESULTS

The 48 stores contained an average (SD) of 22.6 (21.5) branded cigarette marketing materials and 123.8 (98.9) product facings per store. In the stores popular among adolescents, these numbers increased to 31.0 (24.5) and 153.1 (102.3) per store, respectively (table 1). Combining all brand impressions from marketing materials and products, adolescents were exposed to an average of 184.1 (109.2) cigarette brand impressions per store visit.

There were 3.4 times as many ads for cigarettes on windows of stores popular among adolescents than on other stores in the same community (table 1). Coders' impressions of the quantity of cigarette marketing materials confirmed a disparity between the two groups of stores, as well. Cigarette advertising had significantly greater visual impact in the popular than in the other stores (table 1).

The three brands most popular with adolescents (Marlboro, Camel, and Newport) accounted for 45% of all cigarette marketing materials and 45% of all shelf space for cigarettes in the 48 stores. Stores popular among adolescents contained almost three times more marketing materials and twice as much shelf space for Marlboro, Camel, and Newport than other stores in the same community (table 2). One possible explanation for this difference is that stores popular among adolescents were more likely to be the types of stores (convenience, liquor, and small grocery stores) which typically contain the most tobacco marketing.[6 22] However, a χ^2 test yielded no significant difference in the distribution of store types between the popular and other stores.

Another plausible explanation is that stores popular among adolescents were also popular among adults and therefore contain more advertising for the top selling brands (Marlboro, Camel, and Newport) and more advertising overall. However, we found no differences between popular and other stores in the quantity of marketing materials and

Table 1 Mean (SD) number of cigarette marketing materials and their visual impact by store popularity (Tracy, California)

	Stores popular among youth		
	No (n = 24)	Yes (n = 24)	p Value
Marketing materials by location			
Exterior* mean (SD)	1.7 (2.6)	5.8 (6.4)	0.03
Interior*	12.6 (13.5)	25.2 (23.6)	0.12
Shelf space (facings)*	94.4 (87.8)	153.1 (102.3)	0.16
Overall visual impact (0–3)†	0.9 (0.6)	1.4 (0.7)	0.01

*†Tests compared means adjusted for store size; cell means are unadjusted.
†Average rating for interior and exterior.

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Table 2 Mean (SD) quantity of cigarette marketing materials and shelf space by brand and store popularity (Tracy, California)

	Stores popular among youth		
	No (n = 24)	Yes (n = 24)	p Value
Cigarette marketing materials			
Youth brands	5.3 (5.8)	14.8 (11.4)	0.01
Other brands	9.0 (9.5)	16.1 (14.1)	0.15
Cigarette shelf space (facings)			
Youth brands	36.3 (36.7)	75.5 (53.4)	0.02
Other brands	58.1 (55.2)	77.6 (54.5)	0.60

*t Tests compared means adjusted for store size; cell means are unadjusted.

shelf space for cigarette brands other than Marlboro, Camel, and Newport (table 1). Nor did we find a significant difference between the quantity of marketing materials for three top selling beer brands (Budweiser, Miller, and Heineken) in stores popular among adolescents (mean (SD) 25.5 (25.0)) and the other stores (23.5 (24.2)).

Finally, we tested whether the tobacco industry's signs about identification required for tobacco purchase were more numerous in the stores popular among teens than in the other stores. California law requires a sign at every cash register warning against illegal tobacco sales to minors, but no law governs the number or placement of such warnings provided to retailers by the tobacco industry. Ironically, stores popular among teens displayed more of the industry's signs and shelving to promote Marlboro, Camel, and Newport, but did not display more of the industry's signs to discourage minors from purchasing these products illegally (mean (SD) 3.9 (2.4)) than did other stores (3.7 (3.2)).

DISCUSSION

According to this study, cigarettes are marketed more heavily in stores where adolescents shop—particularly the cigarette brands most popular with adolescent smokers. Compared to other stores in the same community, stores popular among adolescents displayed more than three times as many cigarette marketing materials outside, and contained almost three times more marketing materials and twice as much shelf space for Marlboro, Camel, and Newport. These three brands account for more than 80% of the cigarettes bought by US adolescents.[29] The four brands advertised most heavily in US stores (Marlboro, Camel, Winston, and Newport)[30] are three of the four brands with the largest sales revenue (Marlboro, Newport, Doral, Camel).[31] The relation between market share and the prevalence of marketing materials and product facings in stores warrants further research, particularly since advertising is related more strongly to cigarette brand choice among adolescents than adults.[32]

This study is the first we are aware of to measure shelf space for cigarettes as an indicator of retail tobacco marketing. The fact that Marlboro, Camel, and Newport accounted for 45% of all marketing materials and 45% of all shelf space for cigarettes in the 48 stores may be purely coincidental. It may also suggest that tobacco companies consider self space devoted to their brands as important as other forms of in-store marketing.

Study limitations

The school based survey did not assess the frequency with which adolescents visited all retail tobacco outlets in the school catchment area. Thus, we cannot confirm that unpopular stores were visited less frequently than the stores nominated by the focus groups. However, incorrect classification would likely decrease the observed differences between the two groups of stores. Future research should use other means to determine which stores are most popular with adolescents, such as merchant interviews or consumer marketing data.

The current study classified marketing materials and product facings into only four brand categories—Marlboro, Camel, Newport, or other. Although "other brands" is a potentially crude comparison for "youth brands", it is unlikely that one or two brand names accounted for most of the marketing materials recorded in the "other" category. In a survey of 1565 US stores, Marlboro, Camel, and Newport accounted for 46% of all cigarette marketing materials, seven of the remaining top 10 brands accounted for 42%, and innumerable other brands accounted for the remaining 12%.[33] The absence of reliable information about the total number of cigarette brands advertised in stores makes it difficult to appreciate the extent to which brands favoured by teen smokers dominate the retail environment. Indeed, it would be helpful if the Federal Trade Commission or other organisations maintained a list of cigarette brands sold.

Although this study examined a small sample of stores in a single California community, observations about the quantity of cigarette marketing materials are quite similar to those from larger, more representative samples. For example, the average number of cigarette marketing materials was slightly lower than the average for a California sample of 569 stores (22.7 *v* 25, respectively),[7] and the proportion of marketing materials for Marlboro, Camel, and Newport in this sample was comparable to the California sample[7] and to a US sample of 1565 stores (45%, 42%, and 46%, respectively).[30] Using a standardised protocol to quantify marketing materials and shelf space for cigarettes, future research should compare the quantity of marketing materials in countries with varying regulations at the point of sale, and determine whether adolescents are disproportionately exposed to cigarette marketing materials, particularly to brands favoured by young smokers.

Implications for tobacco control

Several examples serve to illustrate how successfully US tobacco companies have avoided restrictions on advertising at the point of sale. The MSA, which bans cigarette ads on billboards and limits such ads in magazines and at sponsored events, contains only two provisions that affect ads in stores.[34] One provision limits the size of exterior ads to 14 square feet and another prohibits using cartoons to advertise cigarettes in stores or elsewhere. More stringent regulations proposed by the US Food and Drug Administration—mandating

What this paper adds

Two previous studies found more cigarette ads on store windows within 300 metres of schools than on stores farther away from school, but lacked information about where adolescents shop. This study combined school based surveys with retail observations to determine whether cigarettes are promoted more heavily in stores where adolescents shop frequently. Such stores contained more marketing materials and shelf space for Marlboro, Camel, and Newport than did other stores in the same community. Simply eliminating ads may be insufficient to substantially reduce adolescents' exposure to cigarette brand impressions in stores because the preponderance of these come from product displays. Future restrictions on retail tobacco marketing should consider the potential impact of cigarette packaging as well as advertising.

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black-and-white, text only advertisements and banning self service displays—did not survive judicial review.[35] The US Supreme Court also struck down a Massachusetts law that prohibited placing cigarette ads within 5 feet of the store floor—at children's eye level.[36]

The Framework Convention on Tobacco Control (FCTC) does not specify point of sale in its recommendation to ban tobacco advertising, promotion, and sponsorship.[37] However, the FCTC endorses larger, more vivid warning labels on cigarette packs, like those in Canada and Brazil, which are clearly visible in stores and may serve as important cues to reduce tobacco use.[38] Countries such as Ireland, New Zealand, and Thailand, and several Canadian provinces and Australian states reduce young people's exposure to tobacco marketing by banning tobacco ads at the point of sale. Requiring merchants to stock cigarette packs out of sight, in overhead bins or beneath the counter, is also recommended to prevent smoking.[39] According to this study, that practice could reduce US adolescents' exposure to cigarette brand impressions in stores by as much as 83%.

This study is unique in pairing adolescent self reports with in-store observations to demonstrate that stores popular among adolescents contain more marketing materials and shelf space for Marlboro, Camel, and Newport than other stores in the same community. A replication with larger samples in other jurisdictions is clearly warranted to determine whether this is a pervasive pattern or isolated incident. Whether tobacco companies intentionally target youth at the point of sale also warrants further investigation. Indeed, the strategic use of this venue to reach youth would not be surprising in environments that increasingly restrict tobacco companies' access to traditional advertising venues, such as billboards, magazines, and other media. At a time when cigarette packaging is an increasingly important component of tobacco marketing,[24 40 41] this study underscores the need for strategies that would reduce the quantity and impact of adolescents' exposure to cigarette brand impressions in stores.

ACKNOWLEDGEMENTS

This study was funded by Public Health Service grant CA67850 from the National Cancer Institute.

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Effects on Youth of Exposure to Retail Tobacco Advertising[1]

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The absence of significant restrictions on tobacco advertising in stores has prompted concern about the proliferation of these messages and their impact on youth. This is among the first studies to investigate the effects of adolescents' exposure to retail tobacco advertising. Under the guise of testing teen-interest news stories, 8th and 9th graders (n = 385) saw photographs of a convenience store that was either dominated by or devoid of tobacco advertising while listening to a story about a proposed tobacco control law or one about teen food purchases. Regardless of the news story they heard, students exposed to the tobacco-saturated store perceived significantly easier access to cigarettes, believed more peers tried and approved of smoking, and expressed weaker support for tobacco-control policies than did the comparison group. The study results suggest that widespread tobacco advertising in stores might distort adolescents' perceptions about the availability, use, and popularity of this product.

Stores saturated with tobacco advertising constitute a significant public health concern, especially for youth. Tobacco ads are more numerous in stores located near schools (Barovich, Sussman, Dent, Burton, & Flay, 1991; Cummings, Sciandra, & Lawrence, 1991; Wildey et al., 1992; Woodruff, Agro, Wildey, & Conway, 1995) and in neighborhoods with a higher proportion of residents under age 18 (Ribisl, Feighery, Lee, Schleicher, & Halvorson, 1999). Indeed, many youth are routinely and unavoidably exposed to retail tobacco advertising. According to recent market research, the nation's 23 million teenagers visit convenience stores nearly 100 million times per month (Channel One Network, 2000).

In our research, 62% of a sample of Bay Area seventh graders (n = 571) shopped in a convenience store or liquor store at least once a week (Schooler, Feighery, & Flora, 1996), and 40% of a sample of eighth and ninth (n = 389)

[1]This research was funded by Public Health Service Grant #CA 67850 from the National Cancer Institute.

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Journal of Applied Social Psychology, 2002, **32**, 9, pp. 1771-1789.
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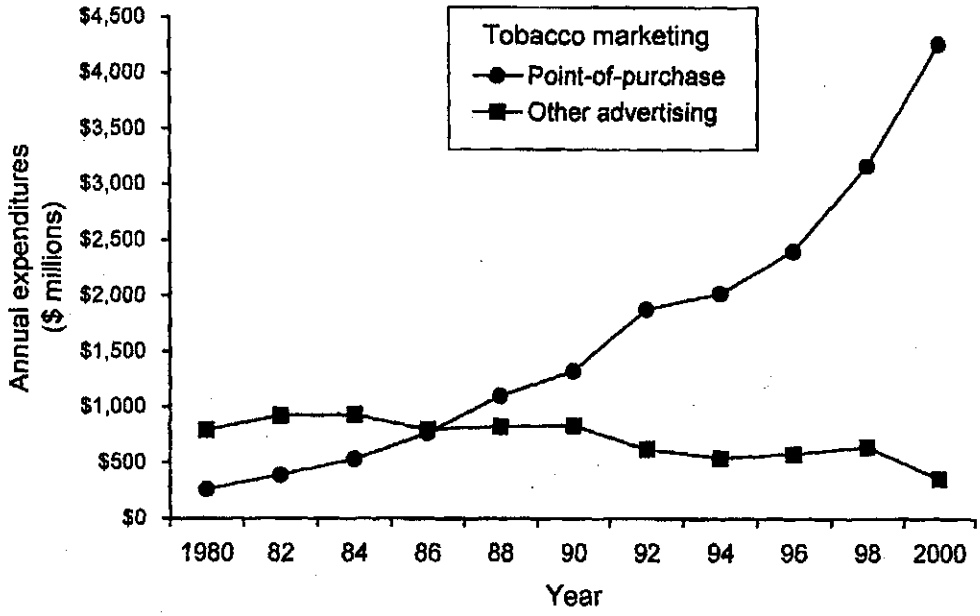

Figure 1. Tobacco industry's expenditures on point-of-purchase versus other advertising, 1980 to 2000.

graders said they visited these types of stores practically every day (Henriksen, Flora, Feighery, & Fortmann, 1999). Surprisingly little is known about whether exposure to widespread tobacco advertising in stores influences youth smoking. To address this gap, the current study examines whether manipulating exposure to retail tobacco advertising affects adolescents' perceptions and attitudes about tobacco use.

Proliferation of Tobacco Advertising in Stores

The tobacco industry spends more on point-of-purchase marketing ($4.3 billion in 2000) than on any other form of cigarette advertising (Federal Trade Commission, 2002). Their retail marketing strategy combines the use of traditional signs and functional items (e.g., clocks, hand baskets, counter mats) with cigarette brand names or logos, and incentives for merchants to display cigarettes in prime locations, especially counter areas (Feighery, Ribisl, Achabal, & Tyebjee, 1999). Over the past 20 years, retail marketing has increased from 21% to 44% of the tobacco industry's total advertising budget (Federal Trade Commission, 2002). Based on data from the Federal Trade Commission (2002), Figure 1 compares spending (millions of dollars) on point-of-purchase ads with spending on newspaper, magazine, billboard, and transit advertising combined.

Pressure to reduce young people's exposure to tobacco marketing has forced the industry to adopt new restrictions on advertising, but few of these affect the

retail environment. The *Master Settlement Agreement* (MSA; National Association of Attorneys General [NAAG], 1998) between the state attorneys general and the tobacco companies contains only two such regulations. One provision limits the size of exterior ads to 14 ft^2 (4.27 m^2), and another prohibits using cartoons in ads (in stores or elsewhere; MSA, Section II-ii; NAAG, 1998). More stringent proposals from the Food and Drug Administration (FDA)—mandating black-and-white, text-only advertisements and banning self-service displays—did not survive judicial review. The Supreme Court ruled by a 5 to 4 margin that the FDA had overstepped Congressional authority in asserting its power to regulate the marketing of cigarettes to young people (*Food and Drug Administration et al. v. Brown & Williamson Tobacco Corp.*, 2000).

Several studies document the preponderance of tobacco ads in stores where youth shop (Cummings et al., 1991; DiFranza, Coleman, & Cyr, 1999; Feighery, Ribisl, Schleicher, Lee, & Halvorson, 2000; Ribisl et al., 1999; Roeseler, Russell, Rogers, Feighery, & Gehrman, 1995; Rogers, Feighery, Tencati, Butler, & Weiner, 1995; Voorhees, Yanek, Stillman, & Becker, 1998; Woodruff et al., 1995). Because procedures for categorizing and counting ads differ from one study to the next, the research yields varied estimates for the amount of tobacco advertising in stores. For example, studies based on random samples of retail tobacco outlets found an average of 14 ads inside and 3.6 ads outside 586 California stores (Feighery et al., 1999) compared to 27 ads inside and 7.5 ads outside 102 Massachusetts stores (DiFranza et al., 1999). In addition, several studies have suggested that retail tobacco ads are positioned where young people are most likely to see them (Pucci, Joseph, & Siegel, 1998; Roeseler et al., 1995; Rogers et al., 1995). For example, more tobacco advertising covered the windows of stores within 1,000 ft (304.8 m) of schools than those farther away from schools (Rogers et al., 1995). One third of outdoor tobacco advertisements within 1,000 ft (304.8 m) of schools were placed at children's eye level, defined as 3.5 ft (1 m) or lower (Pucci et al., 1998). In another study, stores closest to schools were more likely than others to have tobacco ads in children's line of sight: near candy and below 3 ft (0.9 m; Roeseler et al., 1995).

Effects of Tobacco Advertising on Youth

Young people are attracted to tobacco advertising and promotions (Fischer, Schwartz, Richards, Goldstein, & Rojas, 1991; U.S. Department of Health and Human Services [USDHHS], 1994), and the vast majority of adolescent smokers prefer the most heavily advertised brands (Barker, 1994; Pierce et al., 1991; Pierce, Gilpin, & Choi, 1999). Numerous studies reveal that young smokers recognize and know more about cigarette advertisements than do their nonsmoking peers (Aitken & Eadie, 1990; Aitken, Leathar, & O'Hagan, 1985; Aitken, Leathar, O'Hagan, & Squair, 1987; Chapman & Fitzgerald, 1982; Goldstein,

Fischer, Richards, & Creten, 1987; Klitzner, Gruenewald, & Bamberger, 1991). In addition, greater intentions to smoke are associated with exposure to and knowledge of cigarette advertising (Altman, Levine, Coeytaux, Slade, & Jaffe, 1996; Botvin, Botvin, Michela, Baker, & Filazzola, 1991; Gilpin, Pierce, & Rosbrook, 1997; Unger, Johnson, & Rohrbach, 1995). A few prospective studies have suggested that adolescents' approval of advertising predicts increased susceptibility to smoke and later smoking (Aitken, Eadie, Hastings, & Haywood, 1991; Biener & Siegel, 2000; Dobson, Woodward, & Leeder, 1992; Pierce, Choi, Gilpin, Farkas, & Berry, 1998). In fact, recent research has suggested that tobacco advertising might exert a greater influence on adolescent smoking than does smoking by peers or family members (Evans, Farkas, Gilpin, Berry, & Pierce, 1995; Pierce et al., 1998; Sargent et al., 2000).

Research about the effects of tobacco advertising on adolescent smoking is primarily concerned with young people's exposure to magazine ads, billboards, sponsored events, and promotional items for cigarettes. Comparatively little is known about adolescents' exposure to tobacco advertising in stores. We will briefly summarize the few studies to address this topic.

A recent study demonstrated an association between the tobacco industry's promotional expenditures and rates of adolescent smoking (Redmond, 1999). Dollars spent on conventional advertising (print, billboard, public transit) and sales promotion (point-of-purchase advertising, public entertainment, samples, direct mailing, audiovisuals) were correlated with rates of daily smoking among adolescents. During the period in which sales promotion exceeded advertising expenditures (1983-1992), significantly greater numbers of 9th graders initiated daily smoking than would be expected otherwise. Specifically, year-to-year changes in sales promotions accounted for about 54% of the variance in a smoking deviation score (the difference between actual and expected smoking rates). However, many types of promotional activities occur beyond the boundaries of the retail outlet, such as product or coupon distribution through direct mail or community events. Without removing the expenditures for these types of promotions, the unique contribution of retail marketing to youth smoking is unknown.

A survey of 7th graders from lower income neighborhoods in San Jose, California, provides further evidence of a relationship between exposure to retail tobacco advertising and adolescent smoking (Schooler et al., 1996). Advertising exposure was derived from two types of measures. *Exposure opportunity* measured how frequently students visit the types of stores that contain tobacco advertising (e.g., liquor stores, convenience stores, small markets, grocery stores). *Perceived exposure* measured how often students recall seeing tobacco ads in these venues. About two thirds of the students (62%) reported frequent visits to stores and remembered seeing ads or promotional items for cigarettes in stores "a lot." The odds of experimentation were 38% higher for these youth than for other youth, even after controlling for exposure to smoking by family and friends.

One explanation for this relationship is that widespread advertising and promotions for tobacco in stores makes the product more accessible to youth. Such marketing might encourage minors to obtain tobacco from stores by stealing, purchasing, or *tapping* (asking an older customer to purchase tobacco), particularly if adolescents associate pro-tobacco messages with a low risk of failure and few consequences to getting caught (Rimpelä, Aarø, & Rimpelä, 1993). A few studies have addressed youth access by correlating the amount and nature of tobacco advertising in stores with shoplifting (Caldwell, Wysell, & Kawachi, 1996), illegal sales (DiFranza et al., 1999), and purchase requests by minors (Voorhees et al., 1998). For example, a survey of 150 stores in Baltimore, Maryland, examined the correlation between teenagers' requests to purchase cigarettes (reported by merchants) and tobacco advertisements featuring young adult models (who appeared to be in their 20s or younger). More minors tried to buy cigarettes in stores with youth-oriented tobacco advertising than they did in stores without such ads (Voorhees et al., 1998).

Another explanation for the relationship between exposure to retail tobacco advertising and adolescent tobacco use focuses on social norms. The preponderance of tobacco advertising, promotions, and products in stores might encourage adolescents to perceive smoking as more common and more socially acceptable than it really is (Coeytaux, Altman, & Slade, 1995; Gilpin et al., 1997; Lynch & Bonnie, 1994; Warner et al., 1986). In fact, adolescents' exposure to tobacco marketing in other venues has been associated with inflated prevalence estimates; that is, overestimating the percentage of people who smoke (Kessler et al., 1996; USDHHS, 1994). These and other normative beliefs have been shown to be important risk factors for adolescent tobacco use (Aitken et al., 1991; Evans, Dratt, Raines, & Rosenberg, 1988; Flay, Hu, & Richardson, 1998; Graham, Marks, & Hansen, 1991; Grube, Morgan, & McGree, 1986).

The current study extends previous research by testing both of the aforementioned explanations in the context of a controlled experiment. Based on the explanations outlined earlier, we hypothesize that manipulating adolescents' exposure to retail tobacco advertising will alter their perceptions about the availability and use of this product. Specifically, we predict the following:

> *Hypothesis 1.* Adolescents exposed to a store saturated with tobacco ads will perceive easier access to cigarettes than will adolescents exposed to a store without tobacco ads.

> *Hypothesis 2.* Adolescents exposed to a tobacco-saturated store will believe more peers smoke and will approve of smoking than will adolescents exposed to a tobacco-free store.

This study also examines the effect of retail advertising exposure on adolescents' attitudes toward control policies that affect youth. Lower rates of adolescent

smoking are associated with policies that restrict tobacco sales and marketing and restrict smoking in public places (Forster et al., 1998; Pentz et al., 1989; Wolfson et al., 1998). However, widespread tobacco advertising in stores might discourage adolescents from supporting tobacco-control policies by creating a pro-smoking environment in which such policies seem unnecessary or undesirable. Thus, we predict the following:

> *Hypothesis 3.* Adolescents exposed to retail tobacco advertising will express weaker support for tobacco-control policies than will adolescents exposed to a store without such advertising.

Method

Design

Students' exposure to retail tobacco advertising was manipulated under the guise of pretesting a news story written for teens. A 2 × 2 between-subjects design examined the effects of exposure to retail tobacco advertising (pervasive vs. absent) and story context (tobacco related vs. unrelated) on perceived access to cigarettes, normative beliefs about smoking, and support for tobacco-control policies.

Sample

A convenience sample of 18 eighth and ninth grade classes from five schools in northern California participated in this study in Fall 1998. Passive parental consent was obtained for all participants (n = 385), and fewer than 20% of parents refused permission. The sample was 48% (n = 186) female, 52% (n = 199) male, and was ethnically diverse: 25% (n = 98) Hispanic; 24% (n = 92) Asian, Southeast Asian, or Pacific Islander; 18% (n = 69) White; 5% (n = 21) African American; and 27% (n = 104) who specified multiple ethnic origins.

Stimulus Materials

Color photographs of a convenience store were digitally altered to create two versions of the same retail environment: one dominated by tobacco ads and one devoid of tobacco ads. Adobe Photoshop 5.0 (Adobe Systems, 1998) was used to replace and rearrange ads for cigarettes, beer, and snack foods in two pictures—a view of the area around the cash register and one of the storefront widows. These areas were selected because they typically contain the heaviest concentration of tobacco advertising in a store (Feighery et al., 2000). Several different ads for six tobacco brands—Marlboro, Camel, Newport, Kool, Doral, and Special 10s—

appeared in the pictures of the tobacco-saturated store. In the tobacco-free store, cigarette ads were replaced with ads for snack foods, soda pop, and beer. References to store names, such as 7-Eleven, were removed. No clerks or customers were visible in the photographs.

Two fictional news stories were also created for this study. One story, inspired by a news item in a local paper, described a controversy about a proposed law to ticket minors who smoked at a shopping mall near school. Another story described teen food purchases from convenience stores. Stories about these topics were created because they varied the presence or absence of references to smoking, and could be illustrated with both versions of the stimulus photographs. Both stories quoted multiple sources, including a storeowner and customer, and took approximately 90 s to read aloud.

Procedure

Before the experimental manipulation, all students participated in a discussion that was designed to increase the salience of brand advertising. Students were asked to help define the term *brand name*, to correctly distinguish brand names from product types (e.g., Baskin Robbins, Haagen Dazs, Breyer's vs. vanilla, chocolate, rocky road) and to volunteer brand names for several product categories (e.g., cars, clothing, shoes).

Following the discussion of brand advertising, classrooms were randomly assigned to see photographs of the same store either dominated by or devoid of tobacco advertising and to listen to a news story about a tobacco-control law or one about teen food purchases. The instructions invited students to listen to the news story, which was read aloud while they looked at pictures showing where the story took place. Careful attention to advertising was encouraged by telling students that they would be asked about their memory and opinions of the news story and pictures, including questions about brand names. Thus, there were four experimental conditions. Students were exposed to either a tobacco-saturated or a tobacco-free store while listening to a news story that either mentioned or did not mention smoking. Following exposure, students completed a brief paper-and-pencil questionnaire. Not all questions were about tobacco. The questionnaire contained items about students' memory and opinions of the news story and their shopping behavior, in addition to manipulation checks and outcome measures described in the next section.

Manipulation Checks

A convenience store without tobacco advertising is practically inconceivable. Because convenience stores are typically saturated with ads and promotions for cigarettes (Feighery et al., 2000) and because the stimuli were described as

"pictures of a convenience store," we were concerned about students' perceptions of the store portrayed in the control condition. For this reason, several types of measures—unaided recall, cued recall, perceived exposure to retail tobacco advertising—were included as manipulation checks.

Recall was measured after a brief distraction task. When the pictures were removed from view, students were asked to write down any two things they could remember about the news story. Afterward, an open-ended item asked students to list every brand name they remembered seeing in the store (unaided recall). These lists were coded for the number and names of tobacco brands mentioned, and whether a tobacco or non-tobacco item was mentioned first. Perceived exposure to retail tobacco advertising was measured at the conclusion of the survey: Students indicated how often they recalled seeing cigarette ads in stores on a 5-point scale ranging from 1 (*never*) to 5 (*all the time*). This item was used to test for a mean difference between groups exposed to the tobacco-saturated or tobacco-free store. Finally, students were asked to identify the interior and exterior of the pictured store from an array of six photographs (cued recall).

Dependent Variables

Perceived access. The survey measured perceived access to tobacco from the pictured store and from stores near where students live. Using a 6-point scale ranging from 1 (*very easy*) to 6 (*very hard*), students rated how difficult it would be for students their age to buy cigarettes from the pictured store. Two additional items were adapted from a statewide school survey conducted for California's Department of Health Service Tobacco Control Section (Independent Evaluation Consortium, 1998). Students indicated on a 6-point scale ranging from 0 to 5 the number of stores in their neighborhood that would sell cigarettes to them and to other students their age. These two items were summed to create another measure of perceived access.

Normative beliefs about smoking. A measure of perceived prevalence was created by averaging the two items (Flay et al., 1998). Students estimated how many out of 100 classmates in their grade smoke cigarettes at least once a month. This item was repeated for estimates of the percentage of high school students who smoke cigarettes at least once a month. Using a 6-point Likert scale, students indicated how much they agree with the statement, "Most kids my age think it's okay to smoke cigarettes once in a while." This item was repeated for most high school kids, and the two responses were averaged to measure peer approval for smoking (Chassin, Presson, Sherman, Corty, & Olshavsky, 1984; Independent Evaluation Consortium, 1998).

Support for tobacco-control policies. Six items asked students to indicate how much they agreed with policies that would increase cigarette prices, restrict advertising, enforce laws to reduce tobacco sales to minors, forbid youth from

smoking at school, establish fines for youth who try to purchase tobacco, and expel students who smoke on school grounds. These items were adapted from existing measures of support for tobacco-control policies used with adults (Centers for Disease Control and Prevention, 1994; Laforge et al., 1998; Velicer, Laforge, Levesque, & Fava, 1994) and adolescents (Independent Evaluation Consortium, 1998; Unger et al., 1999). Item responses were averaged to create a composite measure of attitudes toward tobacco control, which higher scores indicating greater support for policies that would reduce youth smoking (Cronbach's $\alpha = .81$).

Demographics

The questionnaire also included self-report items about gender, grade level, ethnicity, and smoking susceptibility. A classification scheme developed and validated by Pierce and his colleagues (Choi, Pierce, Gilpin, Farkas, & Berry, 1997; Pierce et al., 1998; Pierce, Choi, Gilpin, Farkas, & Merritt, 1996; Pierce, Farkas, Evans, & Gilpin, 1995; Unger, Johnson, Stoddard, Nezami, & Chou, 1997) was used to categorize students as: (a) nonsusceptible never smokers, (b) susceptible never smokers, or (c) experimenters. Students who reported ever trying smoking (even just a few puffs) were coded as experimenters. Intentions to smoke in the future were used to distinguish susceptibles from nonsusceptibles among the remaining students who had never tried smoking. Using a 4-point scale ranging from 1 (*definitely no*) to 4 (*definitely yes*), students indicated their intention to try smoking cigarettes soon, in the next year, and if a best friend offered them one. Students who failed to answer *definitely no* in each circumstance were coded as susceptible never smokers. Students who never smoked and expressed a firm commitment not to smoke in the future were coded as nonsusceptible never smokers.

Analysis

The chi-square test was used to check that random assignment yielded equivalent groups with respect to tobacco use and other demographics. No association between treatment condition and tobacco use, gender, or grade level was found. To test the hypotheses, a 2×2 ANCOVA determined the effects of exposure to retail tobacco advertising (pervasive vs. absent) and story context (tobacco related vs. unrelated) on perceived access to cigarettes, normative beliefs about smoking, and support for tobacco-control policies, controlling for smoking susceptibility. The primary study hypotheses concern the effect of manipulating adolescents' exposure to tobacco advertising in stores. A factor for story context tested the possibility that explicit references to smoking in the news story might enhance or otherwise alter the impact of the tobacco advertising in the photographs.

Results

Manipulation Checks

Data from both cued and unaided recall measures suggest that students paid careful attention to the in-store advertising. Almost all students (93%) selected the correct photographs of the pictured store from an array of six pictures. All 194 students who saw the tobacco-saturated store recalled seeing at least one of the advertised cigarette brands: 88% remembered Camel, 82% Marlboro, and 71% Newport. Nearly all students (96%) mentioned a tobacco brand first, and the average number of tobacco brands recalled was 3.16 (SD = 1.16). However, 6% of the students who saw the tobacco-free store mistakenly recalled seeing cigarettes advertised. These 12 cases were eliminated from subsequent analyses.

Differences between the groups who saw the tobacco-saturated or tobacco-free store could still be detected 20 min after exposure. At the conclusion of the survey, students reported more frequent exposure to ads for cigarettes in stores in the treatment condition (M = 4.41, SD = 0.84) than in the control condition (M = 4.17, SD = 1.03), $t(351) = 2.41$, $p < .05$. Thus, the effect of manipulating students' exposure to retail tobacco advertising did not dissipate quickly.

Effects of Advertising Exposure on Perceived Access

Table 1 summarizes the mean differences in perceptions about the access, use, and control of tobacco by exposure to retail advertising. The results are collapsed over the news-story version (tobacco related vs. unrelated) because the factor yielded no significant main or interaction effects for most dependent variables. Regardless of the news story they heard, students believed that cigarettes were more easily purchased from the store saturated with tobacco ads (M = 3.94) than from the store without such advertising (M = 3.62), $F(1, 368) = 3.97$, $p < .05$. Similarly, students exposed to retail tobacco advertising perceived significantly easier access to cigarettes from stores in their neighborhood than the comparison group, $F(1, 368) = 8.20$, $p < .05$. Thus, retail-advertising exposure influenced students' perceptions about the ease of obtaining cigarettes from stores.

Effects of Advertising Exposure on Normative Beliefs About Smoking

The main effect of advertising exposure on perceptions about tobacco use was significant, as shown in Table 1. Students who were exposed to a store saturated with tobacco advertising believed that more students smoked (M = 52.80, SD = 22.26) than did those who were exposed to a store devoid of tobacco advertising (M = 49.22, SD = 20.86), $F(1, 368) = 4.05$, $p < .05$. No significant main or interaction effect of the news story on perceived prevalence was observed.

Table 1

Perceptions About Tobacco Access, Use, and Acceptance by Exposure to Retail Advertising

	Retail advertising exposure[a]			
	Tobacco saturated (n = 194)		Tobacco free (n = 179)	
Perceived access	*M*	*SD*	*M*	*SD*
Pictured store	3.94*	1.61	3.62	1.52
Other stores	3.41**	2.55	2.74	2.17
Perceived prevalence	52.80*	22.26	49.22	20.86
Policy support	3.89	1.20	4.08*	1.20

Note. Results are collapsed over news-story version (tobacco related vs. unrelated) because the factor yielded no significant main or interaction effects for these dependent variables.

[a]Tests of significance were obtained from ANCOVA, controlling for smoking susceptibility.

*$p < .05$. **$p < .01$.

The effect of retail advertising exposure on perceived approval for smoking depended on which news story students heard, as indicated by a significant interaction, $F(1, 368) = 8.83$, $p < .01$. As shown in Figure 2, students exposed to the tobacco-saturated store perceived significantly more approval for smoking (M = 4.59, SD = 1.22) than did students exposed to the tobacco-free store (M = 4.05, SD = 1.42), but only if they heard the story about food purchases. The opposite was true for students who heard the story about a proposed tobacco-control law. Students exposed to the tobacco-saturated store perceived less approval for smoking (M = 4.04, SD = 1.57) than did students exposed to the tobacco-free store (M = 4.38, SD = 1.41), but this difference was not significant, $t(175) = 1.50$, *ns*. Thus, the hypothesized effect of retail advertising exposure on perceived approval for smoking was supported only partially.

Effects of Advertising Exposure on Policy Support

As predicted, students exposed to tobacco advertising in stores expressed significantly weaker support for tobacco-control policies (M = 3.89, SD = 1.20) than did the control group (M = 4.08, SD = 1.20), $F(1, 368) = 5.48$, $p < .05$. No significant main or interaction effect of the news story version on policy support was observed.

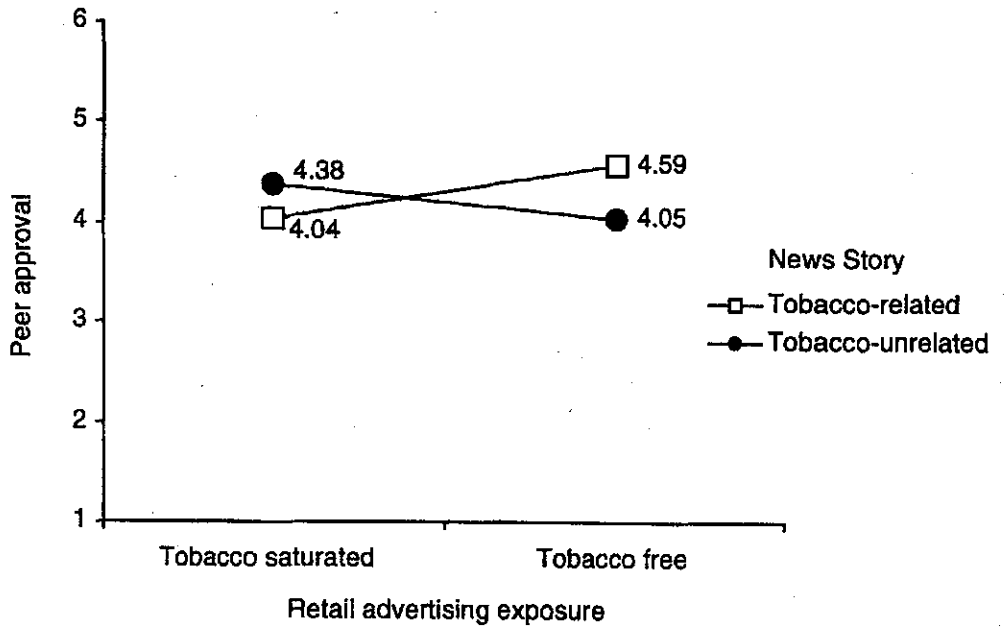

Figure 2. Perceived approval for smoking by retail advertising exposure and story context.

Discussion

Because so few studies of tobacco advertising have addressed the retail environment, the current study sought to fill a gap in the literature by examining the impact of adolescents' exposure to these messages. This research highlights a concern about the ubiquity of tobacco advertising in retail outlets and its impact on youth smoking. Specifically, the study results suggest that widespread promotion of tobacco in stores distorts adolescents' perceptions of the product's availability, use, and acceptance. These outcomes are important because they have been identified as risk factors for adolescent smoking.

Adolescents' exposure to retail tobacco advertising was manipulated under the guise of testing a teen-interest news story. Students in the eighth and ninth grade saw photographs of a convenience store that was either dominated by or devoid of tobacco advertising while they listened to a news story about a proposed tobacco-control law or one about teen food purchases. Whether advertising exposure occurred in a context that mentioned or did not mention smoking had little bearing on the results. Regardless of the news story they heard, students exposed to retail tobacco advertising perceived significantly easier access to cigarettes from the pictured store and other from stores in their neighborhood than did the comparison group. In-store advertising also influenced students' perceptions about tobacco use and approval for smoking among peers. As predicted, perceived prevalence estimates were higher among students who were exposed to

the tobacco-saturated store than to the tobacco-free store. However, the hypothesized effect of advertising exposure on perceived approval for smoking was supported only partially. Perceived approval for smoking was greater among adolescents exposed to retail tobacco advertising than the comparison group, but only among those who listened to the news story that did not mention tobacco.

Retail tobacco advertising influenced adolescents' attitudes toward policies that would reduce youth smoking, such as penalizing minors who try to purchase tobacco, forbidding students from smoking on school grounds, increasing cigarette prices, and restricting marketing. Adolescents exposed to tobacco advertising in stores expressed significantly weaker support for such policies than did the comparison group. In light of increased efforts to pass and enforce tobacco control laws in many states and cities, these findings are noteworthy. The results of this study suggest that retail tobacco marketing contributes to an environment that promotes pro-smoking attitudes among youth and might undermine support for policies designed to restrict youth access and reduce tobacco use.

Study Limitations

Several factors limit the ability to draw conclusions about the impact of routine exposure to retail tobacco advertising in the course of adolescents' daily lives. The artificial nature of the stimulus is one weakness of the current study. This experiment manipulated students' exposure to photographs of stores that were novel (our creation) and unfamiliar. Comments from study participants provided some anecdotal evidence about the quality of the experimental stimuli. Although most students said the stores appeared "real" or "looked like stores in their neighborhood," some mentioned that the photographs appeared to be "doctored" or "phony." To address this problem, a follow-up a study is under way, using a full-motion video to create a more true-to-life simulation of in-store experiences.

The small sample size and random assignment of classrooms to experimental conditions are also weaknesses of the study design. Ideally, students within a class would have been randomly assigned to different experimental conditions running simultaneously in multiple locations—an impossible achievement in overcrowded public schools. Unfortunately, too few classrooms participated in the study to make the classroom rather than the student the appropriate unit for statistical analyses. To address the potential for bias, we computed intraclass correlations and confirmed that these values were not significantly different from 0.

Finally, a controlled experiment is not well suited to test the effects of long-term, cumulative exposure to retail tobacco advertising that plagues our youth. However, the fact that such a brief exposure produced differences, if confirmed, emphasizes the potentially large impact of cumulative exposure to tobacco ads in stores. Future studies should move from a cross-sectional, experimental method

to a longitudinal, observational method to measure the impact of these messages. Indeed, few longitudinal studies have examined the effects of tobacco advertising on youth, and none have addressed in-store advertising. Such longitudinal data would permit stronger causal inferences about the effects of these messages on adolescents' perceptions, attitudes, and behaviors.

Implications for Tobacco-Control Policy

The tobacco industry's retail marketing strategy is designed, in part, to offset the impact of tax increases and tobacco-control efforts imposed by several states (Chaloupka, Slater, & Wakefield, 1999). Given increased restrictions on other forms of cigarette advertising, it is likely that tobacco companies will intensify their advertising and promotions in stores. One tobacco-industry marketing executive predicts, "Increasingly, the store will be treated not just as an outlet for volume, but as a targeted communication channel" (Pollack, 1999).

Several government- and state-funded health initiatives have specified strategic goals to reduce young people's exposure to tobacco advertising and promotions (e.g., California Department of Health Services, 1998). A more detailed understanding of retail tobacco advertising and its impact on youth smoking would benefit such policy efforts. This study is the first to demonstrate how retail tobacco advertising can contribute to an environment that encourages pro-smoking attitudes among youth. Future research should investigate how to effectively counter the pervasive, pro-tobacco messages in adolescents' consumer environment.

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A Longitudinal Study of Exposure to Retail Cigarette Advertising and Smoking Initiation

WHAT'S KNOWN ON THIS SUBJECT: Point of sale is the dominant channel for advertising cigarettes, and adolescents are routinely exposed to these messages.

WHAT THIS STUDY ADDS: This is the first longitudinal study to provide evidence that adolescents' exposure to widespread cigarette advertising at the point of sale is a risk factor for smoking initiation.

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KEY WORDS
adolescence, advertising, cohort studies, smoking

ABBREVIATION
FDA—Food and Drug Administration

www.pediatrics.org/cgi/doi/10.1542/peds.2009-3021

doi:10.1542/peds.2009-3021

Accepted for publication Apr 29, 2010

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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FINANCIAL DISCLOSURE: *The authors have indicated they have no financial relationships relevant to this article to disclose.*

abstract

FREE

OBJECTIVES: Accumulating evidence suggests that widespread advertising for cigarettes at the point of sale encourages adolescents to smoke; however, no longitudinal study of exposure to retail tobacco advertising and smoking behavior has been reported.

METHODS: A school-based survey included 1681 adolescents (aged 11–14 years) who had never smoked. One measure of exposure assessed the frequency of visiting types of stores that contain the most cigarette advertising. A more detailed measure combined data about visiting stores near school with observations of cigarette advertisements and pack displays in those stores. Follow-up surveys 12 and 30 months after baseline (retention rate: 81%) documented the transition from never to ever smoking, even just a puff.

RESULTS: After 12 months, 18% of adolescents initiated smoking, but the incidence was 29% among students who visited convenience, liquor, or small grocery stores at least twice per week and 9% among those who reported the lowest visit frequency (less than twice per month). Adjusting for multiple risk factors, the odds of initiation remained significantly higher (odds ratio: 1.64 [95% confidence interval: 1.06–2.55]) for adolescents who reported moderate visit frequency (0.5–1.9 visits per week), and the odds of initiation more than doubled for those who visited ≥2 times per week (odds ratio: 2.58 [95% confidence interval: 1.68–3.97]). Similar associations were observed for the more detailed exposure measure and persisted at 30 months.

CONCLUSIONS: Exposure to retail cigarette advertising is a risk factor for smoking initiation. Policies and parenting practices that limit adolescents' exposure to retail cigarette advertising could improve smoking prevention efforts. *Pediatrics* 2010;126:232–238

Tobacco use among adolescents has declined since 2000, but 21% of eighth-graders and 45% of high school seniors still report experimenting with smoking.[1] Because this behavior increases the risk for adult smoking,[2,3] it is important for pediatricians to be aware of environmental factors that promote smoking experimentation and initiation in childhood and adolescence.

Point of sale has become the dominant channel for tobacco advertising in the United States, representing 90% of the tobacco industry's $12.5 billion marketing budget in 2006.[4] The quantity of cigarette ads in stores has increased over time,[5,6] and tobacco companies provide more ads and shelf space for cigarettes in stores where adolescents shop frequently.[7] Not surprising, 63.7% of US adolescents reported seeing ads for cigarettes all or most of the time when they visit convenience stores, supermarkets, and gas stations.[8]

Two population-based surveys of adolescents examined the impact of retail tobacco marketing on smoking initiation. A US study correlated data from the Monitoring the Future school surveys with the prevalence of tobacco advertising in convenience stores near the surveyed schools.[9] Higher scores on a measure of retail tobacco advertising were correlated with higher odds of "puffing" (only), but the study could not determine whether surveyed adolescents visited any of those stores. A national survey of students (aged 14–15) in New Zealand observed a graded, cross-sectional relationship between the frequency of visiting stores that sell cigarettes and the odds of experimenting with smoking[10]; however, in New Zealand, tobacco advertising is banned at the point of sale and pack displays are the only form of retail promotion. Thus, previous studies were cross-sectional, and neither measured exposure to retail tobacco advertising per se. A longitudinal survey of California adolescents revealed that perceived exposure to cigarette advertising in stores and to actors who smoke on television were associated with greater susceptibility to smoking at follow-up,[11] but the study did not examine the unique influence of retail cigarette advertising on smoking behavior. To address these important gaps in the literature, this study examined whether exposure to retail cigarette advertising is a risk factor for smoking initiation, by using longitudinal data from a sample of adolescents for whom cross-sectional findings have been reported.[12,13] A secondary objective was to examine which of 3 exposure measures that were correlated with trying smoking at baseline predict initiation at follow-up.

METHODS

The Survey of Teen Opinions about Retail Environments (STORE) combined data from a longitudinal, school-based survey with observations of retail tobacco marketing in Tracy, California (population 56 929), a Central Valley city with a similar ethnic/racial composition to the state of California and a higher median household income. Active parental consent and student assent were obtained by using a protocol that was approved by Stanford University's Administrative Panel on Human Subjects. The baseline survey was administered at all 3 middle schools in grades 6 to 8 (February through April 2003) by using a procedure described elsewhere (78% participation rate).[12] Follow-up surveys were administered ~12 months after baseline, when students were in grades 7 to 9, and ~30 months after baseline, when students were in grades 9 to 11.

Measures

Two items assessed adolescents' smoking status at baseline and follow-ups: ever smoking, even just a puff, and number of days smoked in the past month. The primary outcome was smoking initiation, defined as the transition from never smoking to ever smoking at either follow-up. This study did not examine current smoking as a separate outcome because the incidence of smoking in the previous 30 days was quite low: 4.1% at 12 months and 7.9% at 30 months.

We compared 3 measures of exposure to retail cigarette advertising reported in a previous cross-sectional study.[13] A 3-item measure of shopping frequency asked students to report how often they visited any convenience stores, small markets, and liquor stores, 3 types of stores that typically contain the most cigarette advertising.[14–16] A more detailed measure combined information about where and how often students shopped in stores near school and assessed the quantity of advertising and shelf space (product facings) for cigarettes in those stores. Specifically, we multiplied the frequency of visits to each store near school by the number of cigarette-branded ads, functional items (eg, ash cans, clocks, counter mats) , and product facings in each store and then summed scores for each student to compute cigarette brand impressions per week. A measure of perceived exposure, adapted from the National Youth Tobacco Survey, was a single item that asked students to estimate how often they see cigarette ads when they visit stores.[8]

Measurements of other baseline characteristics that could confound associations between exposure to retail cigarette advertising and smoking initiation are described in more detail elsewhere.[12] Briefly, exposure to social influences to smoke was measured by asking about current smoking by a parent or other household member, the number of 4 best friends who smoke, and perceived ex-

posure to people who smoke in movies or on television. Other covariates were risk-taking propensity,[17] unsupervised time after school (days per week), self-reported grades in school, and demographics (gender, grade level, race, and ethnicity).

Analyses

Of the 2110 students who completed a baseline survey, 1681 reported never having tried smoking, and 1356 of these provided data about smoking behavior at either or both follow-ups (retention rate: 81%). Attrition analyses compared all covariates for this analysis sample with the 325 who were lost to follow-up, by using χ^2 and t tests.

Tests of the primary hypothesis about exposure to retail cigarette advertising and smoking initiation used multilevel modeling to account for clustering of students within schools. Although exposure to retail cigarette advertising varied significantly among schools, the relationships between exposure and smoking initiation did not vary. In the final models, all covariates were also treated as fixed effects, and the intercept randomly varied across schools. Separate multilevel models examined smoking shopping frequency and cigarette brand impressions per week with smoking initiation at 12-month and 30-month follow-ups. Because these 2 exposure variables were quite skewed, we compared groups according to tertiles. All models included perceived exposure as a covariate because it was not highly correlated with other exposure measures at baseline,[13] and a previous study observed independent associations of perceived exposure and shopping frequency with adolescent smoking.[10] All models also adjusted for demographics, exposure to smoking by parents and peers, risk-taking behavior, exposure to smoking on television or in movies, self-reported grades in school, and unsupervised time after school. The last 2 variables were dichotomized at the median value because the distributions were quite skewed. Race and ethnicity were treated as separate variables. Race was coded to compare any minority with Hispanic and non-Hispanic white students because the last 2 groups have the highest smoking rates among California adolescents. Ethnicity was coded to compare any Hispanic with non-Hispanic students regardless of race.

RESULTS

Attrition was ~30% between each assessment and was consistent across grades. No greater attrition occurred during the transition to high school. The baseline never smokers who were lost to follow-up were more likely than the analysis sample to be boys (56.0% vs 44.2%; $P < .001$), to live with a smoker (47.2% vs 38.0%; $P < .01$), to earn mostly Bs or lower (58.3% vs 38.8%; $P < .001$), and to score higher on risk-taking behavior (2.6 vs 2.4; $P < .001$). Students who were lost to follow-up did not differ from the analysis sample on shopping frequency ($P = .27$); however, students who were lost to follow-up were more likely than the analysis sample to rank in the highest tertile of cigarette brand impressions per week (42.8% vs 31.1%; $P < .001$). No differences between the 2 groups were observed for other covariates, including exposure to peer smoking and unsupervised time after school.

The analysis sample (aged 11–14 at baseline) included slightly more girls than boys (Table 1). The sample was both racially and ethnically diverse: 5.3% black, 14.9% Asian/Pacific Islander, 23.0% multiracial, 53.4% white,

TABLE 1 Characteristics of Never Smokers at Baseline and Association With Exposure to Retail Tobacco Marketing

Characteristics at Baseline	*n*	Value	Shopping Frequency, visits/wk			*P*
			Low	Moderate	High	
Grade level, %	1356					.120
6	504	37.2	33.0	38.5	40.2	
7	410	30.2	32.5	27.7	30.5	
8	442	32.6	34.5	33.8	29.4	
Male gender, %	1354	44.2	42.2	43.4	46.8	.355
Hispanic ethnicity, %	1342	40.2	30.6	38.5	51.1	<.001
Racial minority	1351	46.0	46.4	48.2	43.2	.317
Self-reported grades (mostly Bs or below), %	1351	38.8	31.3	37.9	46.9	<.001
Unsupervised after school (>2 d/wk), %	1342	50.2	42.3	55.0	53.8	<.001
Risk-taking propensity (4 = max), mean ± SD	1355	2.4 ± 0.9	2.3 ± 0.9	2.5 ± 0.8	2.6 ± 1.0	<.001
At least 1 parent/household smoker, %	1353	38.0	27.3	39.7	47.1	<.001
At least 1 friend smokes, %	1354	9.7	8.2	9.2	11.7	.180
Perceived exposure, mean ± SD						
See smoking in movies/television (4 = often)	1352	2.8 ± 0.9	2.6 ± 0.9	2.9 ± 0.9	2.3 ± 1.0	<.001
See cigarette ads in stores (4 = often)	1354	3.2 ± 0.8	3.1 ± 0.8	3.3 ± 0.8	3.4 ± 0.8	<.001
Cigarette brand impressions/wk, mean ± SD	1354	324.7 ± 501.2	113.9 ± 266.8	226.9 ± 304.9	633.4 ± 663.6	<.001

P values derived from χ^2 or analysis of variance. All proportions are column percentages unless otherwise noted. For example, 33% of students who reported low shopping frequency were sixth-graders.

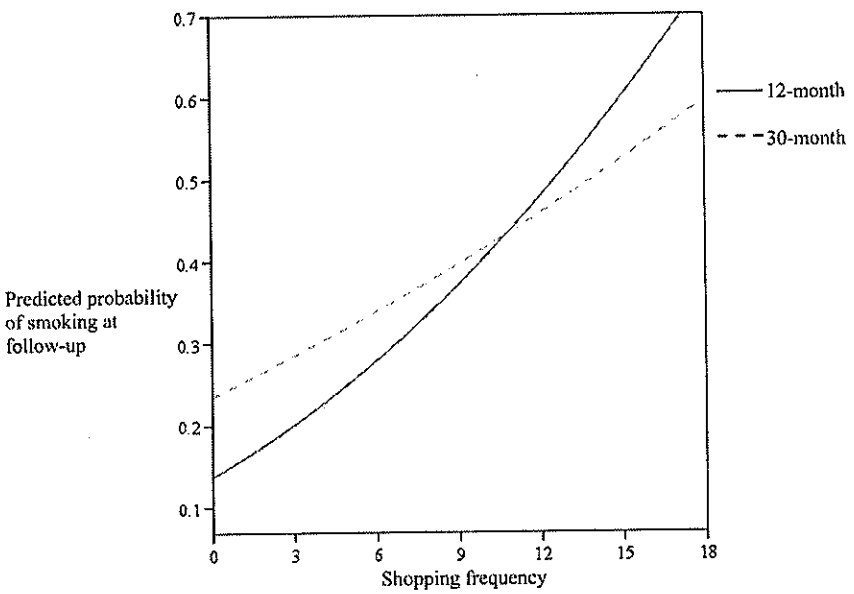

FIGURE 1
Predicted probability of smoking initiation at follow-up on the basis of shopping frequency (visits per week) measured at baseline.

and 3.5% other or unknown; 40.2% were Hispanic.

At baseline, adolescents who had never smoked reported visiting convenience stores, liquor stores, or small markets an average of 2.1 times per week (SD: 2.8; maximum: 18.0). Visits to stores near school yielded an average of 325 cigarette brand impressions per week (SD: 501; maximum: 5987). These cues were noticeable to never smokers: 82.1% of the sample reported seeing cigarette ads in stores sometimes or often. As shown in Table 1, shopping frequency was positively correlated with other measures of exposure to retail cigarette advertising and with several risk factors for smoking initiation. Shopping frequency was unrelated to gender, age (grade level), being a racial minority, and having at least 1 friend who smokes.

The incidence of smoking initiation was 18% after 12 months and 27% after 30 months. The unadjusted associations between store visits at baseline and the probability of smoking at 12- and 30-month follow-ups illustrate a graded relationship (Fig 1). A significant quadratic term indicates an accelerated probability of smoking with more frequent store visits. Table 2 summarizes the odds ratios and confidence intervals from the multilevel model, adjusted for all covariates in the table. Compared with students who reported the lowest shopping frequency (fewer than 0.5 visits per week), the odds of initiation after 12 months increased 64% for students who reported moderate visits (0.6–1.9 visits per week) and more than doubled for those who reported ≥2 visits per week (see Table 2). This association persisted at the 30-month follow-up: the odds of smoking increased 19% for moderate visits and 42% for the most frequent visits. Although Hispanic adolescents were more likely than others to report trying smoking at the 12-month follow-up, there was no significant interaction of ethnicity with shopping frequency on smoking initiation (data not shown).

Perceived exposure predicted a small but significant increase in the odds of initiating, but only at the 30-month follow-up (see Table 2). Tests of an interaction examined whether the impact of shopping frequency on smoking initiation was greater for students who perceived more exposure to cigarette ads in stores, but it was not significant (data not shown).

The most detailed measure of exposure, cigarette brand impressions per

TABLE 2 Predictors of Smoking Initiation After 12 and 30 Months

Baseline Characteristics	Smoking at 12 mo (n = 1182), OR (95% CI)	Smoking at 30 mo (n = 895), OR (95% CI)
Constant	0.02 (0.01–0.06)	0.03 (0.02–0.04)
Grade level		
6	1.00	1.00
7	0.88 (0.58–1.32)	1.41 (1.19–1.67)
8	1.44 (0.99–2.10)	1.26 (1.07–1.49)
Male gender	0.94 (0.68–1.30)	0.86 (0.75–0.99)
Ethnicity (Hispanic vs all others)	1.59 (1.15–2.22)	1.43 (1.25–1.65)
Racial minority (any vs all others)	1.01 (0.73–1.40)	0.88 (0.77–1.01)
Self-reported grades (mostly Bs or below)	1.51 (1.10–2.09)	1.61 (1.40–1.86)
Unsupervised after school (>2 d/wk)	1.36 (0.98–1.88)	0.83 (0.73–0.96)
Risk-taking propensity (1–4)	1.51 (1.25–1.81)	1.41 (1.30–1.53)
At least 1 parent/household smoker	1.54 (1.12–2.12)	1.25 (1.09–1.44)
At least 1 friend smokes	1.67 (1.06–2.64)	1.91 (1.56–2.36)
Perceived exposure		
See smoking in movies/television (4 = often)	1.10 (0.91–1.31)	1.26 (1.17–1.36)
See cigarette ads in stores (4 = often)	0.90 (0.74–1.10)	1.11 (1.02–1.22)
Shopping frequency (visits/wk)		
Low (<0.5)	1.00	1.00
Moderate (0.5–1.9)	1.64 (1.06–2.55)	1.19 (1.00–1.41)
High (2.0–18.0)	2.58 (1.68–3.97)	1.42 (1.19–1.69)

Odds ratios (ORs) are adjusted for all other variables in the table. CI indicates confidence interval.

TABLE 3 Cigarette Brand Impressions as Predictor of Smoking Initiation After 12 and 30 Months

Baseline Characteristics	Smoking at 12 mo (n = 1182), OR (95% CI)	Smoking at 30 mo (n = 895), OR (95% CI)
Constant	0.03 (0.01–0.07)	0.03 (0.01–0.09)
Grade level		
6	1.00	1.00
7	0.88 (0.58–1.32)	1.39 (0.94–2.07)
8	1.52 (1.04–2.22)	1.26 (0.85–1.86)
Male gender	0.94 (0.68–1.30)	0.87 (0.62–1.20)
Ethnicity (Hispanic vs all others)	1.56 (1.12–2.17)	1.38 (0.99–1.93)
Racial minority (any vs all others)	1.01 (0.73–1.39)	0.88 (0.63–1.22)
Self-reported grades (mostly Bs or below)	1.55 (1.13–2.14)	1.61 (1.15–2.25)
Unsupervised after school (>2 d/wk)	1.31 (0.95–1.82)	0.82 (0.59–1.13)
Risk-taking propensity (1–4)	1.50 (1.25–1.80)	1.40 (1.16–1.70)
At least 1 parent/household smoker	1.61 (1.17–2.21)	1.27 (0.91–1.76)
At least 1 friend smokes	1.61 (1.02–2.54)	1.88 (1.15–3.06)
Perceived exposure		
See smoking in movies/television (4 = often)	1.08 (0.90–1.30)	1.26 (1.05–1.51)
See cigarette ads in stores (4 = often)	0.90 (0.73–1.10)	1.10 (0.89–1.36)
Cigarette brand impressions per week		
Low (<60)	1.00	1.00
Moderate (60–259)	1.22 (0.79–1.89)	1.20 (0.81–1.79)
High (≥260)	2.36 (1.55–3.61)	1.58 (1.05–2.37)

Odds ratios (ORs) are adjusted for all other variables in the table. CI indicates confidence interval.

week, predicted similar increases in the odds of smoking initiation at both follow-ups. After 12 months, the odds of smoking were 2.36 times greater for students who ranked in the highest category of exposure (≥260 brand impressions per week) than for students who ranked in the lowest category of exposure (<60 brand impressions per week); after 30 months, the odds of smoking were 58% greater (Table 3). The difference between moderate and low tertiles of cigarette brand impressions was not significant at either time point.

DISCUSSION

This is the first longitudinal study to provide evidence that adolescents' exposure to widespread cigarette advertising at the point of sale is a risk factor for smoking initiation. Two measures of exposure were developed by (1) assessing self-reported frequency of visits to the types of stores that contain the most cigarette advertising and (2) eliciting information about where and how often adolescents shopped near school and observing the quantity of ads and pack facings in those stores. Adjusting for multiple other risk factors, both measures predicted significant increases in the odds of initiating smoking among adolescents who had never smoked at baseline. A graded relationship was also observed: the more store visits adolescents reported at baseline, the greater their chances of initiating smoking at follow-up.

Contrary to expectation, the most detailed exposure measure, cigarette brand impressions per week, was not a substantially better predictor of smoking initiation than the 3-item measure of shopping frequency. Because the combination of in-store observations with student survey data are costly and impractical for population-based surveys, we recommend shopping frequency as an appropriate and useful indicator of exposure to retail tobacco advertising.[13] An alternative is to infer exposure from geographic area measures, such as the density of stores that sell cigarettes in specified neighborhoods or the quantity of cigarette ads that those stores contain. Imputing environmental data to individuals assumes that exposure is constant for individuals in the same area, but this study observed substantial individual differences in adolescents' exposure to retail cigarette advertising within school neighborhoods. This does not invalidate area measures of exposure but indicates that such predictors will have limited power.

Perceived exposure (noticing cigarette ads) was not as strong a predictor of smoking initiation as the other measures of exposure. This result is consistent with our cross-sectional report and our conclusion that perceived exposure measures a different underlying construct.[13] Additional research is needed to examine whether perceived exposure measures a cognitive bias for cigarette advertising and whether it predicts other aspects of adolescent smoking. Such inquiry is important because perceived exposure is typically the only item about the retail environment that appears on state and national surveys about adolescent smoking.

Strengths of this study are its longitudinal design, the inclusion of multiple measures of exposure to retail cigarette advertising, and the assessment of behavioral outcomes at 2 follow-ups. Surveying students in a single California community is the primary weakness of this study and limits the ability to generalize findings to other adolescents and stores; however, it seems unlikely that adolescents' exposure to retail tobacco advertising and its relationship with smoking behavior would be different for adolescents who live in other areas where cigarette packs and advertising are displayed prominently at the point of sale. California has the longest running anti-tobacco media campaign in the United States but does not advertise anti-tobacco messages at the point of sale. Exposure to anti-tobacco ed-

ucation in the media and in school might make California adolescents more resistant than others to retail cigarette advertising, but that would make it more difficult to detect its effect on smoking behavior in this sample.

The response and retention rates in this study are comparable to other school-based surveys that use active parental consent[18,19]; however, students who were lost to follow-up reported more frequent exposure to retail cigarette advertising at baseline. Consequently, this study may underestimate its impact on smoking behavior at follow-up. By focusing exclusively on exposure measured at baseline, this study cannot assess the impact of cumulative exposure to retail cigarette advertising on smoking.

Previous research has shown that adolescents' exposure to pack displays alone, in the absence of cigarette advertising at the point of sale, is associated with increased intentions to smoke.[10,20] This study cannot disentangle the relative importance of advertising and pack displays in encouraging youth smoking.

Shopping frequency may be a proxy for access to cigarettes or for other unmeasured confounders; however, this study controlled for a large number of potential confounders, including unsupervised time and risk-taking propensity. It is highly plausible that retail cigarette advertising would influence smoking initiation because it is ubiquitous at the point of sale and salient to adolescents. Thus, it seems unlikely that an unmeasured risk factor confounded our results. Moreover, because randomized trials of the influence of retail cigarette advertising are not possible, longitudinal studies such as this one provide the strongest guidance available to establish relevant policies.

In 2009, the Family Smoking Prevention and Tobacco Control Act granted the Food and Drug Administration (FDA) authority to regulate the manufacturing, marketing, and sale of tobacco products.[21] Three provisions that could reduce the impact of pro-smoking cues at the point of sale are restricting tobacco advertising to black-and-white, text-only ("tombstone") format, eliminating misleading terms such as "light" and "mild," and mandating stronger warning labels on advertising and packaging. Even with expanded authority, the FDA's restrictions must be consistent with the first amendment, a requirement that tobacco companies are contesting in court.[22] Indeed, a previous FDA ruling mandating tombstone advertisements did not survive judicial review.[23] Results of this study provide empirical evidence for the argument that restricting advertising at the point of sale could reduce adolescent smoking.

CONCLUSIONS

A growing body of evidence suggests that stores that are saturated with cigarette advertising and product displays constitute a significant public health concern, particularly for youth.[24] Results from this longitudinal study complement and extend previous findings from cross-sectional surveys[9,10] and experiments.[20,25] Additional longitudinal studies are needed to assess the impact of retail cigarette advertising on other behavioral outcomes, such as established smoking and brand choice.[26]

The steady decline in smoking rates among US adolescents that has been observed since 2000 is unlikely to continue without addressing the proliferation of cigarette advertising at the point of sale. Both US and international agencies identify regulations of retail advertising and promotions as a priority for tobacco control.[27,28] Smoking initiation by children and adolescents remains significant, and health professionals need to maintain their vigilance. Until and unless public health efforts to curtail tobacco advertising and promotion further in retail settings succeed, those who care for adolescent patients should warn them and their parents about the potential effects of exposure to such advertising. Widespread adoption is needed for current clinical guidelines that call for medical care providers to assess smoking status and provide support for cessation. Pediatricians and other health care practitioners could also advocate for anti-tobacco education that addresses retail promotion.

ACKNOWLEDGMENTS

This research was funded by the National Cancer Institute grant R01-CA67850.

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Helmets Are Not Just for Children: *A recent article in* The New York Times *(Alderman L, May 22, 2010) noted that 90 percent of the 714 bicyclists killed in 2008 were not wearing helmets. This data compiled by the Insurance Institute for Highway Safety called for adults over 30 being strongly encouraged to wear helmets because their gray matter is not packed as tightly as it used to be. According to Dr Angela F. Gardner, president of the American College of Emergency Physicians, "As you age, your brain shrinks, but your skull does not. That extra space means that the brain can bounce around inside the skull and may be more easily damaged from a blow." Despite this, while half of our states have laws requiring children and teens to wear helmets, no state requires people of all ages to do so. Perhaps we can encourage our parents to do what our kids do when they ride their bikes—wear a helmet!*

Noted by JFL, MD

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How do tobacco retail displays affect cessation attempts? Findings from a qualitative study

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Received 27 April 2009
Accepted 29 January 2010

ABSTRACT

Background Tobacco retail displays promote smoking experimentation among youth; however, little is known about their effect on smokers making a quit attempt. Calls to ban tobacco retail displays would be strengthened if this measure would deter initiation and support cessation.

Methods Semistructured in-depth interviews were conducted with 20 individuals, from two New Zealand provincial cities, who had attempted to quit smoking in the last 6 months.

Results Tobacco products had high visibility, and elicited emotional and physical reactions that created on-going temptation, complicated cessation attempts and stimulated impulse purchases. Participants strongly supported banning tobacco retail displays primarily because they thought this would reduce youth initiation, promote greater consistency with smoke-free promotions and assist those attempting to quit.

Conclusions The effects of tobacco retail displays on smokers making a cessation attempt are explored. The findings are consistent with experimental and survey research, and expand a growing evidence base that supports government-mandated bans on tobacco retail displays.

The New Zealand Smoke-free Environments Act 1990 banned tobacco advertising and sponsorship, leading tobacco companies to rely more heavily on media that have fewer restrictions, such as retail store displays and product branding.[1–4] Point-of-sale (POS) marketing maintains brand visibility and promotes sales, and provides tobacco companies with undiscriminating reach and potentially high exposure to children.[5–9] Analyses of industry documents suggest that retail marketing is a pivotal medium in "dark markets", where mainstream mass media are restricted.[2 4 10–13] Displays position tobacco products as "a benign cultural commonplace ... on a par with milk and bread",[14] and their ubiquity facilitates initiation by suggesting that smoking is more prevalent than is actually the case, enhances perceptions of smoking and weakens non-smoking intentions.[15] Accumulating research findings suggest that tobacco retail displays may attract new users, particularly children, and have prompted calls to ban in-store tobacco marketing.[16–22]

Evidence that tobacco displays promote smoking initiation raises the question of whether they may also maintain the salience of smoking and induce nicotine craving, thus impeding cessation and promoting relapse among recent quitters.[23] Given the tobacco industry's interest in retaining concerned smokers, uneven compliance with existing regulations, and the difficulty of quitting,[14 24] identifying environmental factors that inhibit cessation could inform more effective policy development.

To date, few studies have explored whether or how retail displays affect smokers, particularly those making a quit attempt or who have recently become smoke-free. Carter *et al*'s (2006) experimental study concluded that tobacco imagery affected adult smokers' cravings for cigarettes.[25] Given that their test stimuli comprised only eight cigarette packets arranged as an isolated group, full POS displays may have even stronger effects, a suggestion supported by a survey of Australian smokers, which concluded that tobacco retail displays stimulate impulse purchases and tempt those trying to quit.[26]

Behaviour modification theory recognises that environmental variables, such as POS stimuli, cue and maintain behaviour; logically, this theory suggests that exposure to retail displays impedes smoking cessation.[27–29] Yet, despite theoretical and empirical evidence that POS displays could maintain smoking among smokers, few studies have explored how former smokers and lapsed quitters understand, and are affected by, tobacco retail displays. As this knowledge would inform policy development and add a new dimension to existing findings, we investigated how lapsed quitters and former smokers perceived retail displays and regulatory proposals that would limit these.

METHODS

Twenty in-depth interviews were undertaken with 11 Māori and 9 non-Māori participants. All had made a quit attempt in the last 6 months; 12 were still smoke-free while 8 had lapsed. The sample included a high proportion of Māori as smoking prevalence is disproportionately high among these people (45.7% cf 20.6% among non-Māori) and results in serious health inequalities.[30] Participants were purposively recruited to promote diversity and were drawn from cessation providers, including the NZ Quitline (8) and an iwi (indigenous Māori) health provider (10) and personal networks (2). Participants were aged between 23 and 59 years, came from varied socioeconomic backgrounds, had differing smoking histories and included both genders. Interviewing continued until saturation of themes became apparent. Table 1 contains details of participants' demographics and smoking history.

Three interviewers (two Māori and one non-Māori) made telephone contact (including up to 10 callbacks) with potential participants. In total, 61 people were contacted; 4 refused to participate, 9 had an inactive number, 23 had moved, 3 resided with other participants, 2 were unavailable during

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Table 1 Participants' quitting history

Participant code	Gender	Ethnicity	Age	Years smoking	No of quit attempts last 12 months*	Longest period S/F (ever)
1	F	NZE	49	35	1	12 months
2	F	NZE	58	40	0	2 years
3	F	NZE	44	23	2	3 months
4	M	NZE	47	24	0	4 years
5	F	NZE	59	43	0	2 years
6	F	NZE	49	34	2	3 days
7	F	NZE	54	40	0	1 day
8	F	Māori	43	27	0	9 months
9	M	NZE	45	35	0	3 weeks
10	M	NZE	59	40	2	0 days
11	F	Māori	37	17	3	1 week
12	M	Māori	45	31	1	1 year
13	F	Māori	28	12	2	4 months
14	F	Māori	35	16	0	6 months
15	M	Māori	23	12	2	3 weeks
16	M	Māori	57	42	0	4 weeks
17	F	Māori	51	34	0	
18	F	Māori	33	12	2	7 days
19	M	Māori	43	27	0	
20	F	Māori	32	21	3	4 months
Mean			45	28		

*Excludes their most recent quit attempt.
NZE, New Zealand European; S/F, smokefree.

the fieldwork period and 20 were successfully interviewed. After deducting ineligible participants, the response rate was 83%.[1]

McCracken's "long interview" approach provided an overall protocol for the research, which began with a detailed literature review and considerable reflection by research team members.[31] As recommended, the semistructured interviews opened with biographical and behavioural questions, questioning then encouraging participants to review their quit experiences, the factors influencing these attempts, and the outcome. Participants also commented on how they perceived retail environments and explained whether they would support a ban on point of sale tobacco displays.

Interviews took place in participants' homes or workplaces and lasted between 20 and 40 min. Each interview was recorded and transcribed verbatim, and two interviewers (one Māori and one non-Māori) used Braun and Clarke's (2006) approach to review transcripts and recordings, and identify themes.[32]

Quotations illustrate emergent themes and note whether participants were Māori (M) or non-Māori (NM), female (F) or male (M), their smoking status quit (Q) or lapsed (L), and their age. Ethical issues in the research protocol were reviewed and approved by the Department of Public Health, University of Otago.

RESULTS

Factors motivating quit attempts

The interviews created a discussion context by exploring participants' smoking history. On average, participants had smoked for 28 years (range 12–40 years), made multiple quit attempts, and, at different stages in their lives, been smoke-free for periods ranging from 1 day to 4 years. Participants' desire to re-assert control over their lives provided the strongest motivation to quit. Many also wanted to avoid smoking-related harm, particularly when they had first-hand experience of illnesses attributable to smoking. Becoming smoke-free was also strongly linked to financial liberation, as it would release participants from choice dilemmas, such as their need for tobacco versus their responsibility to provide for their families.

Influences on quit attempts

Participants' environments and circumstances often complicated their quit attempts; stressful situations, lack of preparation, ongoing access and exposure to tobacco imagery had affected their ability to become (or remain) smoke-free. The high salience of tobacco products was a recurring theme, particularly the size and position of tobacco displays: "Oh yeah, they are right smack bang in front of you, so you can't miss them" [MML,28]. The prominence and position of tobacco displays ensured high visual salience: "When I go up to the counter, the first thing that catches your eyes, at the back of them [staff] is the cigarette counter... [they] are in your face... they are right there in front of you ... in full view... in a big huge cabinet." [MFQ,43] as did the location of these: "It's staring straight at you when you walk up to the counter." [MMQ,43].

While a small group felt unaffected by displays, others felt tempted. Awareness of the display, the difficulty of avoiding seeing tobacco brands and the ease with which they could access these brands stimulated desire: "...there was a temptation there... I knew what I was buying and my eyes would flash across to the display where the cigarettes were." [MFQ,37] and "You are just thinking, "hmmm, I wish I could have some of those", cause they are right there." [MML,23].

Temptation created physical and emotional cravings: "Right behind the flaming counter, because when I gave up, that's all I'd look at when I'd go to a dairy or petrol station for smokes ... Yeah, it did make me long for a smoke when I saw them... It made me think, gosh, look what I'm missing out on." [NMFL,44]. Cravings prompted purchase: "Yeah, normally I see the smokes and then that'll trigger me to buy a packet." [MFL,32].

Participants' cravings went beyond physiological responses and were anchored by deep affective feelings: "It was in your face... it

[1] RR=(20/61−(9+23+3+2))100=83%.

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would be like I could see a smoker and I would be... kind of drawn to it in a sense." [NMMQ,45]. Tobacco brand imagery exerted a mesmerising influence as smokers accessed the persona they created via the brand: "There's a connection made, you know, between observing, seeing the packet, and then knowing what the packet feels like, and then you can start by getting warmed up about opening the packet and smelling the cigarettes and lighting one up and what that means for you and you know there's whole number of connections that are made... it's advertising." [NMMQ,45]. Exposure to tobacco imagery reminded quitters of familiar behaviours and the benefits they derived, and created a powerful challenge to their cessation attempts.

Responses to policy proposals

Most participants supported proposals to ban tobacco retail displays because these increased the difficulty of quitting: "I would agree...that having them in your face, for those who are trying to give up, [that] ... it is harder for them." [MFQ,43]. Removing displays would thus remove a barrier quitters must overcome in their cessation journey: "I think it would be a hell of a lot easier if it wasn't there... because you know, the temptation's not there." [NMML,59]. Exposure to brand imagery challenged their quest to become (and remain) smoke-free: "I'd be quite happy if they were all to go, under the counter, or in a back room, or something like that... I felt very tempted. And it brought back to me what I was missing out on again, just that emptiness." [NMFL,44].

Participants also felt strongly that a ban on tobacco displays would protect children. Some thought it morally wrong to expose children to toxic products: "I don't think it's right that those cigarettes are where they are... I don't think... that children should be exposed to cigarettes." [NMMQ,45]. Others believed removing displays would increase the chances that young people would not smoke: "I reckon it might be a good chance of them not smoking, 'cause it's not there when they walk into a shop." [MFQ,28]. Some projected their own feelings of temptation and thought removing displays would reduce the risk that young people might smoke: "It's possibly encouraging for younger people who are more easily tempted." [NMMQ,47].

In addition, several thought removing tobacco displays would help promote consistent smoke-free messages: "The message is conflicting in the sense that we've stopped smoking in a pub, we've stopped smoking on a bus, but we still let cigarettes be retailed in just about every shop in New Zealand. That... seems a paradox." [NMMQ,45].

Banning tobacco displays would challenge the view of smoking as "normal": "It's [allowing displays] doing, letting, telling them it's okay to smoke" [MFQ,43]. Participants thought making tobacco less visible would reduce perceived social approval of smoking, which would decrease the number who began smoking: "Maybe then [once retail displays were banned]... less people would take it up and it would be a thing that eventually... you don't see that many people doing anymore." [NMMQ,45].

DISCUSSION AND CONCLUSIONS

This study probed how lapsed quitters and former smokers view tobacco POS displays and feel affected by them, and explored their reaction to a proposed ban on tobacco retail displays. The findings explain how these displays function and confirm effects reported earlier.[15 25 26]

Participants explained how tobacco displays reminded them of the addiction they are relinquishing, and the ease with which they could resume it. Exposure to tobacco brand imagery also stimulated physical cravings and resurrected the emotional ties they had with "their" brand. The key themes are logically aligned with behaviour modification theory, and its recognition of the role brand imagery and learned associations play in fostering purchase.

On one level, participants' support for a government ban on tobacco retail displays, and the benefits they thought this would bring, reflects the difficulty of becoming and staying smoke-free. However, it also recognises the influence tobacco imagery exerts and their desire to protect future generations.

Our findings suggest that tobacco retail displays promote smoking and undermine cessation attempts. Given the difficulty of quitting and the multiple attempts often required, policy makers need to create supportive quitting environments by eliminating stimuli that promote lapsing. Article 13 of the Framework Convention on Tobacco Control calls for a "comprehensive ban of all tobacco advertising, promotion and sponsorship" and requests signatories to go beyond the provisions specified.[33] Given that participants viewed POS displays as advertising, our findings imply that bans on these displays would be consistent with existing legalisation and Framework Convention on Tobacco Control obligations. More generally, the findings align with results from experimental studies and surveys and suggest that eliminating tobacco retail displays would deter initiation and support addicted smokers seeking to become smoke-free.

What this paper adds

- Calls for tobacco display bans are supported by experimental and survey evidence, but little is known about how displays affect quitters or why many support bans on these.
- This qualitative study found that tobacco retail displays elicited emotional and physical responses, and undermined quit attempts. Current and former smokers strongly supported banning tobacco displays, which they thought would assist smokers attempting to quit and remove an on-going invitation that encourages young people to experiment with tobacco.

Acknowledgements We are grateful to the individuals who agreed to participate in this research and whose detailed responses provided the basis of this article.

Funding New Zealand Cancer Society (PO Box 12700, Wellington 6144, New Zealand) and Action on Smoking and Health (PO Box 99 126, Newmarket, New Zealand).

Competing interests All authors have undertaken work for the Cancer Society of New Zealand and Action on Smoking and Health New Zealand. Although we do not consider it a competing interest, for the sake of full disclosure we note that all authors have undertaken tobacco-related research for the New Zealand Ministry of Health. All authors have received funding for tobacco-related research from the Health Research Council of New Zealand.

Patient consent Obtained.

Ethics approval This study was conducted with the approval of the Department of Public Health, University of Otago.

Provenance and peer review Not commissioned; externally peer reviewed.

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Title: Exposure to Tobacco Retail Outlets and Smoking Initiation among Public High School Students in New York City

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Background: Accumulating research suggests that exposure to tobacco products and marketing in retail settings is associated with increased odds of smoking experimentation among adolescents. Few studies have examined the exposure-initiation relationship using large samples from urban areas that are racially diverse. This study was designed to estimate the relationship between exposure to tobacco retail outlets and smoking initiation in a diverse urban setting.

Methods: Data came from the 2011 NYC Youth Risk Behavior Survey (YRBS), a population-based, self-administered survey of over 10,000 public high school students in New York City. Respondents indicated how many days a week they visit store types that sell tobacco and whether they had tried smoking for the first time in the previous 12 months. Measures of social norms, living with a smoker, risk-taking behavior and socio-demographic characteristics were also collected. Logistic regression analyses were conducted to estimate the exposure-initiation relationship and test for effect modification while controlling for covariates.

Results: The predicted probability of smoking initiation increased from 7.7% for 0 days a week exposed to tobacco retailers to 16.0% for exposure 7 days a week. The odds of initiation were significantly higher among adolescents exposed to tobacco retail outlets 2 days or more a week compared with those exposed less often (AOR = 1.41, $p<.01$). The results did not vary by race. There was a significant interaction between retail exposure and risk taking indicating that the relationship between exposure and initiation attenuated as risk taking increased (AOR = .90, $p<.01$). Among students with no history of risky behaviors, frequent retail exposure predicted 33% higher odds of initiation; at high levels of risk taking, frequent retail exposure was not associated with initiation.

Conclusions: These results are consistent with past research showing that frequent exposure to tobacco marketing in retail settings is associated with increased odds of initiation. Reducing exposure to tobacco retail marketing could play an important role in curtailing smoking among adolescents.

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Exposure to Tobacco Retail Outlets and Smoking Initiation among New York City Adolescents

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Society for Research on Nicotine & Tobacco
2013 Annual Meeting
Boston, MA

BACKGROUND

- Past research has found that frequent exposure to tobacco marketing at the point of sale (PoS) is associated with increased likelihood of smoking initiation (e.g., Henricksen et al., 2010; Paynter & Edwards, 2009).
- Most previous studies have focused on pre- and young teens (11-14 years old) in the same small, semi-rural community comprised primarily of whites and Hispanics (e.g., Feighery et al., 2006).
- Smoking initiation among adolescents varies by age, race/ethnicity, and urbanicity.
- We assessed the relationship between exposure to retail tobacco marketing and smoking initiation among a racially diverse sample of high school students in New York City.

METHODS

NYC Youth Risk Behavior Survey (YRBS)

- The YRBS is a cross-sectional, self-administered survey conducted in odds years. It uses a stratified, two-stage cluster sample to produce a representative sample of public high school students, grades 9 through 12. Post-stratification weights adjust for nonresponse and the gender, race/ethnicity and grade distributions of the NYC public high school population. A total of 11,570 surveys were completed in 2011.

Measures

- *Smoking Initiation:* defined as having tried cigarette smoking for the first time in the previous 12 months.
- *Tobacco Retailer Exposure:* defined as how many times per week students shopped at pharmacies, delis, or bodegas. Responses ranged from 0 to 7 or more times per week. These outlets represented 75% of licensed tobacco retailers in 2011.
- *Covariates:* age, sex, race/ethnicity, borough of residence, perceived subjective and descriptive social norms, living with a smoker, risk-taking behaviors, household poverty

ANALYSES

Bivariate

- Bivariate analyses were conducted to identify variables associated with the frequency of exposure to tobacco retailers and smoking initiation.
- Wald χ^2 tests were used to identify significant associations (α = .05).

Multivariable

- We conducted a series of logistic regression analyses to estimate the relationship between exposure to tobacco retailers and smoking initiation while controlling for covariates.
- Variables were included in the models if they were associated with either retail exposure or smoking initiation.
- A model including linear and quadratic terms for retail exposure was estimated to test for dose-response and curvilinear effects. Interaction tests were also conducted to assess if race or any other covariates modified the exposure-initiation relationship.
- All analyses were limited to underage students (17 years or younger) who provided a response to the retail exposure item (N = 8633).

Table 1. **Respondent Characteristics Associated with Exposure to Tobacco Retailers**

	Frequent Exposure			Infrequent Exposure			
	N	%	95% CI	*N*	%	95% CI	p-value
Sample distribution (row %)	4798	51.9	(50.1, 53.7)	3835	48.1	(46.3, 49.9)	–
Age							0.27
<= 14 years old	1137	25.3	(21.6, 28.9)	1006	27.7	(22.6, 32.7)	
15 years old	1213	26.0	(20.4, 31.7)	1027	28.0	(22.6, 33.4)	
16 years old	1322	26.2	(22.7, 29.7)	974	23.8	(21.3, 26.3)	
17 years old	1125	22.6	(17.9, 27.2)	828	20.6	(17.5, 23.7)	
Sex							0.87
Female	2690	52.8	(48.9, 56.7)	2148	53.1	(48.3, 57.9)	
Male	2095	47.2	(43.3, 51.1)	1673	46.9	(42.1, 51.7)	
Race/Ethnicity							<.0001
White	570	18.7	(12.1, 21.3)	585	16.6	(13.5, 20.0)	
African American	1109	29.3	(23.5, 35.2)	929	31.1	(23.3, 38.9)	
Hispanic	2428	42.1	(37.7, 46.3)	1310	26.3	(22.4, 30.2)	
Asians	278	10.9	(8.0, 13.9)	609	24.9	(19.7, 30.2)	
Others	247	0.9	(0.7, 1.1)	228	0.9	(0.8, 1.1)	
Borough							<.0001
Bronx	1232	20.4	(17.0, 23.7)	713	14.6	(11.7, 17.4)	
Brooklyn	997	28.9	(21.1, 32.8)	950	31.9	(26.6, 37.1)	
Manhattan	1318	24.6	(19.0, 30.3)	626	15.4	(12.3, 18.5)	
Queens	630	21.5	(17.6, 25.5)	766	29.7	(24.7, 34.8)	
Staten Island	621	6.6	(5.5, 7.6)	780	8.4	(7.2, 9.6)	
Friends approve of smoking (subjective norm)	739	15.3	(13.2, 17.4)	589	15.0	(12.7, 17.4)	0.83
Overestimate smoking among peers (descriptive norm)	3331	73.0	(70.0, 76.0)	2444	64.6	(60.4, 68.8)	<.0001
Lives with a smoker	1598	34.8	(32.0, 37.2)	1161	30.9	(28.7, 33.1)	0.031
Risk-taking (1+ behaviors)	2591	54.5	(51.7, 57.3)	1434	36.4	(32.8, 40.0)	<.0001
Household poverty level (high)	227	5.0	(3.8, 6.1)	151	3.9	(3.2, 4.7)	0.004

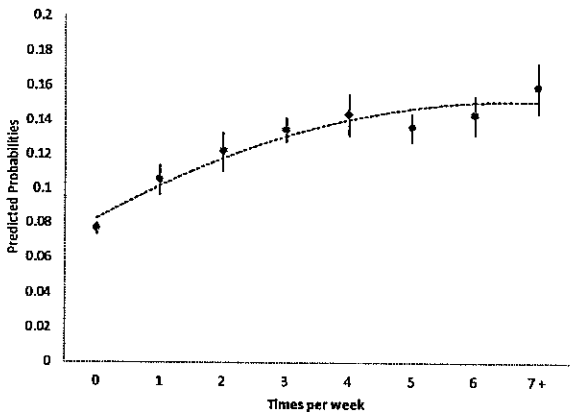
Notes: Data come from the New York City 2011 Youth Risk Behavior Survey (YRBS). Analyses limited to respondents 17 years old and younger. Frequent exposure = visiting retailers 2 times or more times a week; infrequent exposures = visiting retailers 1 or 0 times per week.

Table 2. **Logistic Regression Analysis of Tobacco Retailer Exposure and Smoking Initiation**

	Model 1			Model 2			Model 3		
	AOR	95% CI		AOR	95% CI		AOR	95% CI	
Exposure to tobacco retail outlets									
Linear trend	1.25**	(1.06, 1.43)		–	–	–	–	–	–
Quadratic trend	0.97*	(0.95, .99)		–	–	–	–	–	–
Dichotomous (2+ days vs. 1 or less)	–	–	–	1.41**	(1.08, 1.84)		1.33***	(1.14, 1.56)	
Race									
White	ref.			ref.			ref.		
Black	0.6**	(0.42, .87)		0.6***	(0.42, .86)		0.6***	(0.41, .86)	
Hispanic	0.85	(0.58, 1.27)		0.85	(0.57, 1.26)		0.85	(0.58, 1.25)	
Asian	0.63†	(0.4, .98)		0.63†	(0.41, .98)		0.65†	(0.42, .99)	
Other	1.09†	(0.7, 1.67)		1.08†	(0.7, 1.66)		1.07†	(0.7, 1.65)	
Borough									
Bronx	0.96	(0.69, 1.34)		0.96	(0.69, 1.33)		0.96	(0.69, 1.34)	
Brooklyn	1.2	(0.85, 1.71)		1.2	(0.85, 1.71)		1.2	(0.85, 1.69)	
Manhattan	1.09	(0.77, 1.52)		1.09	(0.78, 1.52)		1.09	(0.78, 1.52)	
Queens	1.25	(.94, 1.65)		1.25†	(.95, 1.64)		1.25*	(0.95, 1.65)	
Staten Island	ref.			ref.			ref.		
Friends approve of smoking	1.48**	(1.09, 2.02)		1.47*	(1.08, 2.01)		1.44*	(1.06, 1.95)	
Overestimate smoking among peers	1.72***	(1.3, 2.26)		1.72***	(1.3, 2.27)		1.73***	(1.31, 2.27)	
Living with a smoker	1.39**	(1.1, 1.75)		1.37**	(1.09, 1.73)		1.37**	(1.08, 1.73)	
Risk taking	1.34***	(1.26, 1.42)		1.33***	(1.25, 1.42)		1.33***	(1.25, 1.42)	
Household poverty	1.12†	(1.0, 1.26)		1.12†	(1.0, 1.26)		1.11†	(0.98, 1.26)	
Exposure (dichotomous)*Risk taking	–	–	–	–	–	–	0.90**	(0.83, .98)	

Notes: AOR = adjusted odds ratio. †p< .10, *p=< .05, **p=< .01, ***p=< .001

Figure1. **Predicted Probability of Smoking Initiation as a Function of Times per Week Exposed to Tobacco Retailers, Adjusted for Covariates**



RESULTS

Bivariate

- Race/ethnicity, borough of residence, overestimating smoking among peers, living with a smoker, risk taking and household poverty were all associated with more frequent exposure to tobacco retail outlets (**Table 1**).
- The overall prevalence of smoking initiation among students was 11.9%. The prevalence of initiation was associated with the number of times visiting retailers per week, race/ethnicity, perceived pro-smoking norms, living with a smoker, risk taking, and high household poverty (data not shown).

Multivariable

- Model 1 revealed significant linear and quadratic trends in the smoking initiation-retail exposure relationship (**Table 2**). The predicted probabilities of initiation from this model are shown in **Figure 1.**
- Model 2 uses a dichotomous exposure variable. Tests for effect modification found a significant negative interaction between retail exposure and risk-taking, indicating the relationship between exposure and initiation attenuated as risk-taking increased (Model 3).

DISCUSSION

- Visiting tobacco retailers 2 or more times per week was associated with significantly higher odds of smoking initiation.
- The predicted probability of initiating among students visiting retailers 7 times or more a week (16%) was double that of students who never visit retailers (8%) in a typical week. This relationship was strongest among students who had low risk-taking tendencies.
- This is one of the few studies to examine exposure to tobacco retailers among a racially-balanced sample of older teens in an urban setting. It is also one of the only to test for moderating variables.
- Reducing the impact of tobacco retail marketing could play an important role in future efforts to curtail smoking among adolescents.

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
VOLUME 5: NO. 3 JULY 2008

ORIGINAL RESEARCH

Exploring the Use of Little Cigars by Students at a Historically Black University

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Suggested citation for this article: Jolly DH. Exploring the use of little cigars by students at a historically black university. Prev Chronic Dis 2008;5(3). http://www.cdc.gov/pcd/issues/2008/jul/07_0157.htm. Accessed [*date*].

PEER REVIEWED

Abstract

Introduction

Considerable evidence exists that little cigars are popular among African American adolescents and young adults who smoke. However, few studies have been published on the use of this tobacco product by young blacks in the United States. This research investigated little-cigar use among students at a historically black university in the southeastern United States.

Methods

As a follow-up to a survey on tobacco use among freshmen that revealed unexpectedly high rates of little-cigar use, 3 focus groups were conducted with current or former smokers of little cigars. Topics included preferred brands of little cigars, preference for little cigars over cigarettes, social contexts for smoking little cigars, perceived health risks of smoking little cigars relative to smoking cigarettes, and thoughts about quitting.

Results

Focus group participants preferred little cigars to cigarettes for various reasons, among them taste, smell, a better "buzz," social purposes, status, and perceptions that smoking little cigars is less addictive and less harmful than smoking cigarettes. Opinions on health risks varied; some participants believed that health risks can be reduced by removing the inner liner of little cigars.

Conclusion

Use of little cigars should be addressed in tobacco research, use prevention, and use cessation efforts, targeting students at historically black colleges and perhaps other young African Americans. Results also suggest that clear distinctions should be made among cigarettes, little cigars, and cigars, and that tobacco use prevention and cessation programs should debunk myths that little cigars are a safe alternative to cigarettes. Study findings should be confirmed and elucidated through additional research.

Introduction

Evidence exists in both scientific literature (1-3) and the media (4) that little cigars are popular among African American adolescents and young adults who smoke. However, few studies have been published in tobacco research literature on this form of tobacco or its use by young blacks in the United States (1,2,5).

African Americans aged 18 to 24 years are less likely to smoke tobacco than their white contemporaries (6,7). Nevertheless, college-aged African Americans should be considered a priority population in tobacco control efforts for several reasons. First, African American smokers start using tobacco later than white smokers, often after high school (8,9), and, as adults, smoke cigarettes at about the same rate (10). Second, blacks are disproportionately affected by smoking-related diseases (11). Third, young blacks are targeted heavily by the tobacco industry. Tobacco companies have long marketed their products to young African Americans (12-14); recent promotions such as Brown & Williamson's Kool Mixx campaign suggest no inclination to cease these efforts (15,16).

Smoking behaviors include choosing tobacco products.

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This paper focuses on the use of little cigars (e.g., Black & Milds, Swisher Sweets). Also known as *cigarillos*, little cigars are slightly larger than cigarettes but much smaller than traditional full-sized cigars. Some (e.g., Black & Milds) are filled with pipe tobacco. In recent years, manufacturers have introduced flavored little cigars, marketing them heavily to young adults. Little cigars are generally sold in packages of 5. In North Carolina in 2007, a pack cost approximately $2.50, and singles were sold for $0.75. Between 1990 and 2005, annual taxable sales of cigarettes in the United States declined 31%, but during the same period sales of little cigars doubled (17).

The health risks associated with smoking cigars are well documented (18-22) and include coronary heart disease, chronic obstructive pulmonary disease, and cancers of the oral cavity, larynx, esophagus, and lung. In addition to health concerns, cigars pose the risk of addiction to nicotine. Both full-sized cigars and little cigars contain considerable amounts of nicotine. Although total nicotine content of little cigars differs from product to product (23), one report suggests that, compared with cigarettes, little cigars can deliver between 2 and 5 times the nicotine per gram of tobacco (24).

A literature review revealed only a few published studies that specifically address the use of little cigars. Malone et al (1) conducted focus groups with African American adolescents aged 14 to 18 years about little-cigar use. They found that many youths were smoking little cigars without identifying the product as either cigar or cigarette, and the youths often viewed little cigars as being safer than both. Page and Evans (2) revealed a similar phenomenon in their ethnographic observations and interviews with black adolescents aged 11 to 15 years.

Richter et al (5) used focus groups to explore young adult smokers' perceptions of the health risks of cigarettes and nontraditional tobacco products, including little cigars. Compared with black participants, Hispanic and non-Hispanic white participants were more likely to rate little cigars as more harmful than their preferred cigarette. Black participants were more likely than other participants to view all tobacco products as equally risky or to rate little cigars as safer than their preferred cigarette.

In one of the few studies to explore why youth use cigars, Soldz and Dorsey (25) conducted a survey of middle and high school students and found that current cigar users were much more likely than nonusers to agree with the statements that cigars "taste good," "smell good," and are "something different to try" than the statements that cigars "are not as bad for you as cigarettes" or "give you a good buzz." Unfortunately, this study did not differentiate between full-sized cigars and little cigars, and whether these findings pertain to African Americans is unclear, as data were not analyzed by race and only 2.1% of respondents were black.

The largest exploration of young people's patterns of cigar use and their perceptions of cigar health risk was conducted by the Office of the Inspector General (26). The study involved a survey and focus groups with 230 urban (i.e., predominantly black) and suburban (i.e., predominantly white) teenagers. Most teenagers were in high school or middle school, and one third were current smokers of cigars. Cigar use in general and little-cigar use in particular were higher among the urban students than among the suburban students. Cigar smokers noted that they typically smoked at parties, often when they were drinking alcohol, and although they knew the general risks of tobacco use, they were much less aware of the specific risks of smoking cigars. Most cigar smokers agreed that regular cigar smoking was addictive, but many were uncertain. Unfortunately, findings from the focus groups did not distinguish between urban and suburban youth, black and white youth, or full-sized and little cigars.

The research described here was conducted among students at a historically black university in the southeastern United States. Focus groups of current or former smokers of little cigars were used to explore reasons for using this product, the contexts of that use, and perceived health risks of smoking little cigars.

Methods

In fall 2003, a brief paper-and-pencil, self-administered survey on tobacco use was conducted in sections of a required freshman course at a historically black university. The survey revealed unexpectedly high rates of little-cigar use. Of the 684 students (219 male and 465 female) who completed the survey, 25% (63 male students and 107 female students) reported smoking tobacco in the past 30 days. Asked what products they had smoked in the past month, students reported little cigars much more often than cigarettes (74% vs 44%). The preference for little

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cigars over cigarettes was stronger among male students than among female students but held for both groups. Of male smokers, 84% reported smoking little cigars (either exclusively or in combination with cigarettes), and only 33% smoked cigarettes (either exclusively or in combination with little cigars). The comparable figures among female smokers were 69% for little cigars and 50% for cigarettes.

To explore these findings further, 3 focus groups were conducted in July 2005. Using handbills that briefly described the focus groups, 2 student interns directly recruited participants by approaching students at gathering places on campus and asking them if they currently smoke or formerly smoked little cigars. Those students who answered affirmatively were invited to participate in the focus groups. The only other eligibility criteria were being African American and being enrolled at the university.

The author conducted 2 focus groups and was present for the third, which was facilitated by an intern. The groups lasted 60 to 90 minutes, and participants received a $30 gift certificate for their time. The groups were not segmented in any way; students simply chose the group that was most convenient for them. The author developed a set of focus group questions in consultation with health education students at the university, some of whom had themselves smoked little cigars. Topics included participants' current smoking status, brands of little cigars smoked, frequency of smoking and amount smoked, reasons for smoking little cigars instead of cigarettes, perceived risks relative to cigarettes (in terms of both addiction and disease), intentions to quit, and the social context for smoking little cigars. (Responses to questions about quitting are not reported in this paper.)

Written notes were taken during each group. With participants' permission, the discussions were also tape-recorded, and the recordings were transcribed verbatim. The author reviewed the tapes and analyzed original notes and transcriptions to identify important issues and recurring themes. Given the small number of focus groups conducted, the author coded text of the original notes and transcriptions by hand, highlighting segments of text reflecting identified issues and themes.

The focus group protocol (as well as the earlier survey) was approved by the institutional review board of the university where the research was conducted.

Results

Three focus groups were held, and 21 African American students, 17 male and 4 female, participated. Ages ranged from 19 to 25 years. Of participants, 20 were current smokers of little cigars; one was a former user. Only 6 of the 21 also smoked cigarettes; one other was a former cigarette smoker. Black & Milds (often referred to simply as Blacks) were overwhelmingly the brand of choice for little cigars. In fact, for these students the name *Blacks* was synonymous with little cigars.

Why little cigars are preferred to cigarettes

When asked why they preferred little cigars, participants provided various responses.

Taste and smell. A common response was that little cigars taste better than cigarettes. Several students noted that little cigars have a "smoother" taste, and one student said, "A cigarette tastes like chemicals." Black & Milds are filled with pipe tobacco, and generally participants found the odor pleasing, especially compared with that of cigarettes. As one student put it, "Cigarettes stink . . . [but] a Black smells so good." Some participants were concerned about others' reactions to the smell of cigarettes, especially members of the opposite sex.

"Buzz." Many students reported that they smoked tobacco for the feeling it gave them and that the feeling from little cigars was better or more intense compared with the feeling from cigarettes. One student remarked, ". . . the first cigarette you also get a buzz, but after that there is nothing but cigarette. But with Black & Milds, like you get one every time."

Social purposes. According to many participants, smoking little cigars was an integral part of their social life, especially on occasions involving alcohol (e.g., at parties, at clubs). Typical comments included, "I think drinking and smoking Blacks goes together" and "What would happen is you were drinking and smoking, and it just went pretty well hand in hand." Many students noted that in a social setting a little cigar is often passed among friends, much like a marijuana joint. "Normally people smoke and pass," said one participant. "We might share while in the line at the club," added another.

Status. Several participants expressed the opinion

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that many young people had taken up smoking little cigars because it is in vogue. One participant observed, "Some . . . just want to look cool in the club." During one focus group a student intern in this project noted that many popular hip-hop and rap artists smoke little cigars in music videos. He and several participants expressed opinions that these celebrities may create or reinforce the "cool" image of little cigars.

Beliefs related to addiction and harm. Many participants viewed little cigars as being less addictive and less harmful to their health compared with cigarettes. These reasons are explored in detail later.

Two reasons unrelated to cigarettes were also offered for smoking little cigars:

Stress. Many participants mentioned using little cigars to cope with stress. One participant said, "After class, after work, after an argument . . . I will smoke a Black to calm down." Reported another, "I work in customer service. . . . When I go home . . . I just sit back and smoke a Black and reflect on my day, look at who I was about to cuss out."

Marijuana use. A few students said they smoked little cigars in conjunction with marijuana to heighten the effects of the marijuana. One participant remarked, "Now I smoke after weed to get an extra boost."

How and how much little cigars are smoked

Participants indicated that inhaling was necessary to get a buzz from little cigars, and almost all participants reported doing so. One participant said not inhaling "is a waste of money."

When participants were asked how many little cigars they smoked, their responses ranged from 1 pack (i.e., 5 cigars) per day to 1 pack every 2 weeks. Those participants who also smoked cigarettes indicated that they smoked more cigarettes than little cigars. One student noted that he smoked 3 packs of cigarettes per week but only 1 pack of Blacks per week.

Many participants indicated that they did not smoke an entire little cigar in a single session. Said one, "I will hype me a Black in the morning, smoke a little before I go to class, then go to class and come back out, and I smoke a little bit more. And then I might go home . . . and smoke the rest of the Black."

Other students stressed that they do not smoke a whole little cigar by themselves, referring to the practice of passing a little cigar among friends. A participant stated, "I can't smoke a whole one by myself. . . . Like I said, I got to smoke with one of my boys." Another participant commented, "Collectively we might smoke five to six Blacks in a day." Summing up this discussion, a student commented, "You got to share the Black."

Beliefs about addiction

The belief that little cigars are not as addictive as cigarettes was widespread. A participant remarked, "In cigarettes there are more things to get addicted to." Another participant observed, "You see people smoking cigarettes; they be outside in like 10-degree weather, because they need a cigarette. . . . If I want a Black and even if I want it . . . bad, I still won't do anything like [that]." A third participant simply stated, "I could shake a Black, but I couldn't shake cigarettes."

A minority of students disagreed. One declared, "Black & Milds in some cases [are] just as addictive — different gun, same bullet." Another student noted that he had started smoking little cigars to stop smoking cigarettes. He said it worked, but now he felt addicted to little cigars. Even so, he was confident he could stop but said he had not tried: "I don't feel that I smoke enough Blacks in a day for it to be a serious health risk to me."

Beliefs about health risks

Participants' opinions were divided regarding the health risks of smoking little cigars compared with the risks of smoking cigarettes; some participants believed little cigars were less harmful than cigarettes. Several students noted that little cigars are not addressed in antismoking messages. One student remarked, "I ain't never heard anything about Black & Milds being bad . . . but you hear everything about cigarettes and how they give you cancer and all." Other students claimed a difference in ingredients: "[There are] more harmful things in cigarettes that are not in Blacks, like more gas, toxic gases, and stuff like that." Still other participants cited a difference in the quantity consumed. One student stated, "I think that it is not as bad, because you don't smoke Black & Milds as much, at least I don't."

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Other students expressed the opinion that the risks of cigarettes and little cigars are equivalent. "It's the same thing; tobacco is tobacco," said one student. In a more nuanced observation, another student commented, "Smoking a Black you might get the same disease as that cigarette smoker is going to get later on, but you are going to get it years after them."

Still other participants thought little cigars are more harmful than cigarettes and offered different explanations. Some students suggested that little cigars are a stronger tobacco product. For example, one student remarked, "One Black & Mild is just like smoking 10 cigarettes or something like that."

Several students expressed the opinion that toxic chemicals are concentrated in a paper liner in Black & Milds and that this paper makes little cigars more harmful than cigarettes. They referred to this liner as the "cancer stick." These students believed that the risk of smoking little cigars can be reduced by removing the liner through a process called *hyping*, also known as *freaking* (2). As they described it, hyping involves taking the plastic tip off the cigar, completely emptying the tobacco from the wrapper, removing the paper lining inside the wrapper, and returning the tobacco to the wrapper. The primary purpose of hyping is to improve the smoking experience (i.e., making it easier to inhale deeply and "get a good buzz"), but because of students' beliefs that the liner contains high levels of harmful chemicals, some students thought removing it also made little cigars safer.

Confusion about the purpose of the paper liner was considerable. One participant remarked, "My brother [says the] cancer stick is like the filter. I said, nah, the cancer stick can't be no filter, but I felt like that little stick was putting more harm in my body than good and if I take it out, at least I will be winning a little bit."

Several students expressed interest in learning more about little cigars and their risks. One stated, "I want to find out what is in a Black. I have been smoking this for years, and I am going to find out what is really in it." In one focus group, the facilitator asked if participants would want to read factual information about little cigars. All members of the group agreed they would.

Discussion

Published research on the use of little cigars by young African Americans is scant. A literature review identified 3 studies (1,2,5), 2 of which (1,2) focused on minority adolescents younger than the target population in this study. Other studies (3,25,26) looked at cigar use by young people but did not consistently distinguish between black and white youth or between full-sized and little cigars. Nevertheless, some themes that emerged in this study were similar to those documented earlier. These themes include the widespread popularity of Black & Milds (1-3,5,26), the practices of sharing, hyping, and using little cigars to boost the effects of marijuana (1,2), taste and smell as primary reasons for smoking cigars (5,25,26), and confusion about the risks of smoking cigars compared with cigarettes (1,2,5,26).

Among the most disturbing findings in this study are those regarding perceived health risks of little cigars. As in previous studies (1,2,5,26), this study identified beliefs among some participants that little cigars are less addictive and pose fewer health risks than cigarettes. Some students cited these beliefs as the reason they preferred little cigars to cigarettes. However, these beliefs were far from universal; many participants expressed the opinion that smoking little cigars was as dangerous as smoking cigarettes, if not more dangerous.

One factor contributing to the potential harm from little cigars is the way they are smoked. In general, smoke from neither cigars nor pipes is directly inhaled. This presumably explains why rates of respiratory diseases are significantly lower among cigar and pipe smokers than among cigarette smokers, although rates are still substantially higher among cigar and pipe smokers than among nonsmokers (18,19). However, almost all members of the focus groups reported inhaling little cigars, primarily to get the "buzz" that many said made smoking little cigars pleasurable. These students may think little cigars are safer because they are not cigarettes, but they are inhaling them as if they were cigarettes.

Richter et al (5) have asked whether young adult users of nontraditional tobacco products like little cigars believe the health risks of these products are the same as with cigarettes and simply choose to ignore those risks, or whether they are truly unaware of the risks because they view nontraditional products as being very different

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products from cigarettes. Their own findings suggest that the former may be the case for African American young adults, but Page and Evans' study (2) indicates that the latter may be true for young African American youth. They interviewed adolescents aged 11 to 15 years who did not identify little cigars as being either cigarettes or cigars and some adolescents who did not even associate little cigars with tobacco. The study reported here included many participants who seemed to be ignoring perceived health risks, some participants who were unaware of the health risks, and other participants who expressed confusion about the health risks.

Some college students in the current study offered logical, if incorrect, explanations for why they believe that little cigars pose fewer health risks than cigarettes (e.g., little cigars are not mentioned in public health antismoking messages, little cigars have fewer chemicals and contain less nicotine than cigarettes). Some students played down the health risks by noting that they smoke fewer little cigars than cigarette smokers smoke cigarettes. Other students seemed to engage in "magical thinking" to justify their use of little cigars. One student reasoned that smoking little cigars must be less harmful than smoking cigarettes, because when he smoked a little cigar, the plastic tip did not turn brown like the filter of a cigarette does. Another student rationalized her use of little cigars by saying her grandmother smoked cigarettes and died of a smoking-related disease.

Devising such creative rationales is easy when there is genuine confusion about risk and when hard facts are unavailable to clear up the confusion. Many participants expressed such uncertainty as well as an interest in learning more about little cigars. However, few antitobacco materials specifically address little cigars. The findings here suggest that African American college students might be more attentive to factual information about little cigars than they are to comparable information about cigarettes, which they are likely to have encountered before and which they may see as irrelevant to their smoking behaviors. The probability that students would pay attention to such information might increase if the information reflected the cultural context in which students consume little cigars. Brown & Williamson has exploited hip-hop culture to market Kool cigarettes to young African Americans (15,16). Advocates of tobacco use prevention and cessation could employ similar strategies in the social marketing of messages about little cigars.

The focus groups confirmed the finding from earlier studies (2,26,27) that language is critical when addressing tobacco issues with young African Americans — both adolescents and young adults. First, it cannot be assumed that smoking implies the use of tobacco, because many participants in this and other studies (1,2,26) also reported smoking marijuana. Second, clarifying what is meant by little cigars is important. Some participants were unclear that Black & Milds were little cigars. Distinguishing between little cigars and traditional full-sized cigars, which are sometimes smoked as is and are sometimes emptied of tobacco and filled with marijuana (i.e., blunts), is also important. Some earlier studies differentiated cigars from blunts (1,2,26), but often the distinction between full-sized and little cigars is not made. If youth smokers consider little cigars to be neither cigarettes nor cigars (2,27) and a survey only asks about those 2 products, the survey may underestimate tobacco use.

Large recurring studies such as the National Youth Tobacco Survey (28) and the Youth Risk Behavior Survey (29) ask about cigars, cigarillos, and little cigars but not separately. Questions that lump these products together provide little information about the significance of little-cigar use among young African Americans (27). Furthermore, in neither survey do questions include examples of little-cigar brands. If some youth smokers are unaware that Black & Milds are little cigars, then the failure to provide brand examples may also lead to an underestimation of little-cigar use.

Limitations

This study was limited to 3 focus groups of 21 college students at one historically black university, and the results may lack external validity. To what extent the focus groups shed light on the use of little cigars by African American young adults who are not in college, by black students at predominantly white colleges, or by college students who are not African American is not clear.

The focus group data were coded without qualitative data analysis software and therefore without the assistance such software provides in categorizing and reviewing qualitative data. However, the small number of participants made it easy to code, organize, and examine data by hand. Only the author analyzed the focus group data, so there was no check on the reliability of interpreting and categorizing text segments. This shortcoming is mitigated

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by 3 factors. First, the author was very familiar with the data, having been present during all focus groups. Second, the categories of interest were clearly but broadly defined, and the themes that emerged were not difficult to identify. Third, the author made no effort to quantify responses to particular questions beyond general groupings (e.g., a few, many, most). Misinterpretation or misclassification of a few statements should not alter basic conclusions of the analysis.

Conclusions

Focus groups do not comprehensively define or describe an issue, but they provide information in participants' own words that deepen our understanding of the issue. In this study, focus groups were used to identify common habits and beliefs about little cigars that warrant further investigation and attention in the design of programs and materials to encourage tobacco prevention and cessation among African American college students. The results build on the findings of other research on cigar use by adolescents and young adults and extend our understanding of this smoking behavior.

However, given the preliminary nature of this study and its small number of participants, additional research on the use of little cigars by African American college students is needed to confirm and elucidate its findings. If verified, these results have several implications for tobacco control advocates at historically black colleges and universities and possibly at other campuses and other venues where African American young adults can be reached:

- Tobacco research targeting this audience should address the use of little cigars. Research on smoking is often limited to cigarettes, and when it does relate to cigars, it rarely considers them separate from full-sized cigars.
- Research on tobacco use should make clear distinctions among the various substances and products that can be smoked. If research does not differentiate between marijuana-filled "blunts" and cigars and if it does not specifically ask about little cigars and provide examples of little cigar brands, then tobacco use in this population may be miscalculated (1,2,27).
- Tobacco use prevention and cessation programs should address little cigars in materials, curricula, counter-advertising, and services. If tobacco use prevention programs do not plainly distinguish the substances and products that the target audience might use, these programs may confuse rather than enlighten.
- Tobacco programs should provide clear information about little cigars. Some little-cigar smokers are honestly confused about the health risks of using little cigars (1,2,5,26) and want the truth about using this product.
- Tobacco programs should debunk myths found in this and other (1,2,5,26) studies that:
  - Little cigars are not addictive.
  - Little cigars are a safe alternative to cigarettes.
  - Hyping reduces the health risk of little cigars.

This study hopefully will help define and promote additional research into the use of little cigars by African American college students and other college-aged African Americans. Research that targets this population and that addresses the use of little cigars in tobacco use prevention and cessation efforts needs to be addressed by the public health community. If it is not, then smoking behaviors that pose significant risks to African American young adults may be overlooked.

Acknowledgments

This research was supported by grants from the Faculty Senate at North Carolina Central University and the North Carolina Health and Wellness Trust Fund. Many individuals contributed their time, effort, and expertise to this research. Laura Fish assisted in the conception and design of the focus groups. Rosalind Richardson, Audrey Foster, and Anthony Brow helped arrange and conduct the focus groups. Steven Stewart, Robin Swift, and Jean Sam reviewed drafts of the manuscript.

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The Effects of Tobacco Control Policies on Smoking Rates: A Tobacco Control Scorecard

David T. Levy, Frank Chaloupka, and Joseph Gitchell

This article reviews studies of the effect of tobacco control policies on smoking rates with the aim of providing guidance on the importance of different policies. Based on past studies, we estimate the magnitude of effects of major tobacco control policies, how their effects depend on the manner in which the policies are implemented, the relationship between the different policies, and the barriers to implementation. The most successful campaigns have implemented a combination of tobacco control policies. Of those policies, substantial evidence indicates that higher taxes and clean air laws can have a large impact on smoking rates. Evidence also indicates that media campaigns when implemented with other policies are important. Research on greater access to treatment and telephone support hotlines indicates a strong potential to increase quit rates and may be important in affecting heavier smokers. Direct evidence on the effects of advertising bans and health warnings is mixed, but these policies appear to be important in some of the countries that have had success in reducing smoking rates. School education programs and limits on retail sales are not likely to have much impact if implemented alone, but may be more important when combined with other policies.

KEY WORDS: smoking, tobacco control policy

Smoking is the single most preventable cause of premature mortality. Approximately 440,000 deaths are attributable to smoking each year in the United States alone, and considerable medical costs are associated with morbidity.[1] Globally, it is estimated that there are currently 4 million tobacco attributable deaths each year, with current trends driving a rise to 10 million deaths per year by the 2030s.[2]

Substantial evidence indicates that tobacco control policies, especially when combined in a comprehensive program, can substantially reduce smoking rates.[3–6] A number of papers and government reports suggest concurrently adopting a group of policies.[3–7] Although these reports review and document the evidence, they do not attempt to prioritize different policies or discuss how the various policies interrelate.

This article provides an evidence-based review of the various tobacco control policies that contribute to reduced smoking initiation and increased quitting behavior and success. The goal is to provide guidance on the importance and limitations of different policies in order to help government planners and advocates focus their efforts and best utilize their scarce resources. Based on past studies, we provide estimates of the magnitude of effects of major tobacco control policies on smoking rates, how the effects depend on the manner in which the policies are implemented, and the barriers to implementation. We also consider the relationship between the different policies, including the different populations that they affect, with a view toward developing an effective overall tobacco control strategy.

The first two authors' work on this article was partially supported by GlaxoSmithKline Consumer Healthcare, a marketer of tobacco dependence pharmacotherapy. The third author works for a consulting firm that provides consulting services to GlaxoSmithKline Consumer Healthcare in the area of tobacco dependence treatment. The first author's work has also been supported by a grant from the Substance Abuse Policy Research Program of the Robert Wood Johnson Foundation, and the second author's work has also been supported by a grant from the Robert Wood Johnson Foundation for the ImpacTeen project. The authors thank Raluca Popovici for her help with the references.

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J Public Health Management Practice, 2004, 10(4), 338–353
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Methods

We consider nine types of tobacco control policies that have been examined empirically and can be directly implemented by national or subnational government agencies: (1) taxation, (2) clean air laws, (3) restrictions on advertising, (4) anti-smoking media campaigns, (5) health warning labels, (6) the enforcement of youth access laws, (7) school education programs, and (8, 9) policies to increase the utilization of cessation treatments and services.

The ultimate goal of tobacco control policies is to improve health by reducing tobacco use. One commonly used measure is the number of cigarettes smoked per capita. It is useful to decompose this measure into the number of individual smokers and the quantity smoked per smoker. The adult prevalence rate is usually measured in terms of those who have smoked at least 100 cigarettes in their lifetime and are currently smoking. Changes in prevalence rates over time occur through smoking initiation and cessation, and we will highlight when studies use these specific measures. Also considered are how policies affect the quantity smoked per smoker, because quantity smoked is correlated with health outcomes and may also affect the progression to more established smoking and the likelihood of cessation activity and success.[8]

Unless otherwise indicated, the results are presented in terms of the relative reduction in smoking rates (eg, the change [in percentage points] in the smoking rate divided by the prepolicy or comparison group smoking rate). Standardizing to prepolicy levels is useful in translating results to populations with different smoking rates.

In the review of the studies, we attempted to provide an overview of the studies of policy effectiveness. Rather than provide an exhaustive listing or evaluation of all studies, we rely mostly on past reviews that have systematically and critically examined the research and consider more recent studies not included in these reviews. The largest number of studies of tobacco control policies has been conducted for the United States. We examine studies of other countries, but unless otherwise indicated, the reader should presume that the study is for the United States.

Much of the review is drawn from analyses used to develop the computer simulation model *SimSmoke* (Pacific Institute for Research and Evaluation, Calverton, MD). This model predicts US smoking rates and smoking-attributable deaths and considers the effect of tobacco control policies on those outcomes. It also considers differential effects on age, gender, and racial/ethnic group, and how the effect of policies depends on the manner in which they are implemented and the length of time period considered. The predicted effects are based on reviews of the literature and the advice of an expert panel.[9–14]

Much of the review is drawn from analyses used to develop the computer simulation model *SimSmoke*.

Taxes

Tax increases generally yield at least commensurate increases in cigarette price,[15,16] which, in turn, reduces cigarette consumption.

Evidence

Estimates of price elasticity of demand for US cigarettes typically range between −0.3 and −0.5, meaning that a 10% increase in cigarette prices would produce a decrease in demand for cigarettes per adult of 3–5%.[6,17–20] The addictive aspects of smoking imply that long-term responses to permanent price increases will be about twice as large as short-run effects.[21]

Studies of price elasticity have been conducted for other high-income countries and a growing number of low- and middle-income countries.[22] The results for higher income countries, including Canada, the United Kingdom, Austria, Finland, Switzerland, and New Zealand,[3] consistently find that price affects cigarette consumption with price elasticities comparable to those in the United States.[23] Estimates from low- and middle-income countries indicate greater responses to price with elasticity estimates about double those from high-income countries.[22]

Recent studies have decomposed the effects of price on consumption into the effects on prevalence rates and the effects on the quantity of cigarettes consumed by those who continue to smoke.[24–26] They have generally found that at least half of the decrease results from reduced prevalence, which may reflect higher rates of cessation or lower rates of initiation. Several studies directly examined the relationship of price to cessation rates, generally concluding that higher prices raise the likelihood of cessation.[23,27–29] Tauras,[28] for example, estimated that a price elasticity of smoking cessation is in the range from 0.3 to 0.5, whereas Douglas[29] estimated that a 10% increase in the price of cigarettes reduces the duration of smoking by about 10%.

Although estimates vary, many studies indicate that youth and young adults are more sensitive to price than adults.[3,5,6,30] Chaloupka and Grossman[24] concluded that a 10% increase in cigarette prices would reduce the number of young smokers by nearly 7% and their

Although estimates vary, many studies indicate that youth and young adults are more sensitive to price than adults.

average quantity smoked by more than 6%. Emery et al,[31] Ross et al,[32] Tauras et al,[33] and Liang and Chaloupka[34] have found that higher prices mostly affect the progression to established smoking. Prices also have strong effects on 18–24 year olds,[25,35] the age group when smoking habits often become firmly established. In considering other sociodemographic factors, there is no clear pattern of gender differences.[36–38] Townsend[39] and the Centers for Disease Control and Prevention (CDC)[26] found that price elasticity is greatest in low-income populations.

Implementation issues

The impact of a tax change will depend on the initial price of cigarettes relative to the price of other goods, the size of the tax relative to the initial price, and the average income of the smoking population. The effect of a tax will erode over time unless it is indexed to inflation or is levied as a percent of the wholesale cost, especially in economies with high inflation rates.

The effects of a cigarette tax might also be reduced through the purchase or sale of untaxed (smuggled) cigarettes as smokers substitute lower price cigarettes. However, the scale of any problem is often overstated. Countries have significantly increased taxes without experiencing dramatic increases in smuggling.[19,40] Stricter penalties and stronger enforcement efforts, including improved tracking of cigarette consignments, may reduce the smuggling problem.

Because higher taxes are such an effective policy for reducing smoking, they have been strongly opposed by tobacco manufacturers and growers.[41–43] Smokers may also oppose the higher costs, although some actually support tax increases when tied to funding comprehensive programs.[19] Because of its impact on smoking rates, a tax increase may be politically acceptable as a means to reduce health costs or a relatively painless way to raise government revenues.[19]

Besides reducing smoking rates, tax increases may also be used to finance broader tobacco control campaigns. Earmarking taxes has been an important part of tobacco control policy in the states of California and Massachusetts and the countries of Canada, Poland, and Finland.[19,44]

Bottom line

Cigarette excise taxes are widely considered one of the most important tobacco control policy tools, based on the many studies using a variety of statistical techniques.[3,6,19] For the United States, *SimSmoke* assigns a larger prevalence elasticity for those below age 20 (−0.6) than for those age 36 and above (−0.2).[20] *Simsmoke* predicts that a tax increase of $1.00 (indexed to inflation) with prices initially $4.00 (a 25% price increase) would reduce smoking prevalence by 7% within three years, increasing to 14% over time as the younger smokers who are most affected by price grow older and more smokers quit due to the reduced quantity smoked.

● Clean Indoor Air Laws

Clean indoor air laws may prohibit smoking in a range of public places. The more comprehensive laws also include restaurants, bars, and private workplaces. Clean indoor air laws may make smoking less attractive by reducing opportunities to smoke and by supporting social norms against smoking. The implementation of clean indoor air laws has been motivated by substantial evidence of the harms of environmental tobacco smoke (ETS) to nonsmokers.[45,46]

Evidence

Extensive clear air laws have been generally found to be associated with lower smoking rates for the United States.[9] Studies have found between 5% to 20% lower per capita cigarette consumption in states with comprehensive clean air laws. Fewer studies have examined prevalence and cessation rates. Emont et al[47] and Ohsfeldt et al[48] found that states with extensive clean air laws had at least 10% lower prevalence rates than other states. Emont et al[47] found 12% higher rates of former to current smokers and Moskowitz[49] found 38% higher 6-month cessation rates in areas with strong worksite laws.

The importance of clean air laws is also indicated by studies that examine the effect of private work-site policies on the smoking rates of their workers.[3,9,45,50–54] Studies of bans by firms within a particular industry sector, as well as studies over a broader population of firms, have generally reported reductions in quantity smoked in the range of 5% to 25% and reductions in prevalence rates of 0% to 20%, with less consistent effects for quit rates.[55] Longo et al[56] found that quit rates over the 6 years following a ban more than doubled compared to those in firms without bans. Population-based studies have reported about 10% to 15% higher quit rates in firms with bans. Levy and Friend[55] observed that studies indicate more pronounced effects on the quantity smoked in the year after smoking restrictions are implemented and increased cessation in later years.

Studies of work-site restrictions have been conducted for other countries, including Australia,[57,58] Canada,[59] Germany,[60] and Switzerland.[61] Even though effect sizes have varied, they generally obtain significant effects that are roughly similar results to those for the United States. In a study of clean air laws, Stephens et al[62] found that stricter laws in Canada were associated with nearly the same reduction in prevalence rates as large price increases. Following the implementation of a national smoke-free law in Finland, Heloma et al[32] found 16% to 17% declines in smoking prevalence and the number of cigarettes smoked per smoker in firms previously without bans.

Several studies have found that clean air laws reduce youth smoking,[55] but effects may only apply to males. Wakefield et al[130] found that bans on smoking in schools and other public places primarily affected the transition to more established smoking. Ohsfeldt et al[48] found more prominent effects of smoking bans on males and on those aged 25–44, and Farrelly et al[64] observed smaller reductions in smoking rates among low income compared to high income and among those aged 18–24 compared to those aged 40–65.

Implementation issues

The effectiveness of clean air restrictions will depend on how easily they may be circumvented by the smoker.[65] Glasgow et al[66] and Farrelly et al[64] have found that companies allowing smoking only in designated areas had substantially smaller effects on smoking behaviors than firms with a total ban, and Brauer and Mannetje[67] obtain consistent results for clean air laws.

Greater government enforcement and media publicity may also increase compliance with the law.[9] Whereas voluntary compliance appears high in the United States,[68] compliance problems may arise in countries without a firm base of public support for the law.[45] Nations with high smoking rates and a lack of anti-smoking norms (especially regarding the effects of ETS) may find that compliance with strict bans is low.

Store, bar, hotel and restaurant owners, as well as tobacco manufacturers and growers, may challenge clean air laws due to a perceived negative economic impact on trade, although studies indicate minimal to nonexistent impact.[9] State laws may be used to preempt communities from implementing strict policies. There are some costs associated with enforcement, but smoking bans may reduce the number of fires, cleaning costs, and lower absenteeism and health-related costs.[9]

Clean air laws may provide a rallying point for organizing nonsmokers to lobby for policies that reduce ETS exposure. Community mobilization may increase firm compliance with strict smoking bans and provide impetus for broader tobacco control programs. Grass roots support for the Massachusetts and California campaigns focused on clean air issues.[69,70]

A multitude of studies, using a variety of different methodologies, have found that strong smoking restrictions, whether imposed by public laws or private firms, reduced smoking behaviors.

Bottom line

A multitude of studies, using a variety of different methodologies, have found that strong smoking restrictions, whether imposed by public laws or private firms, reduced smoking behaviors. The clean air module in *SimSmoke* predicts an 11% reduction in smoking prevalence from comprehensive bans implemented with strong enforcement and media publicity.[10] Work-site laws have the biggest effect, comprising 7% to 8%, with restaurant laws comprising 2% to 3%, and the school and other public places laws each comprising about 1%. A partial ban is predicted to have less than 50% the effect of a strict ban. A 60% smaller effect is predicted for smokers less than 24 years of age and older than 65 years of age than for those aged 24–65. The effects of clean air laws will also depend on how many firms already have smoking restrictions and the percent of the adult population that does not work indoors or does not work at all.

● Advertising Restrictions

Advertising and promotions can increase the attractiveness of smoking by creating an image favorable to those considering or already engaged in smoking. In the United States, policies to control the advertising and promotion of tobacco products include a federal ban on radio and television advertising, attempts to limit promotions aimed at youth, state and local bans on advertising in particular locations (eg, billboards), and on particular promotion practices (eg, distributing free samples). Other countries have had policies ranging from bans on electronic/print media to bans on outdoor and point-of-purchase advertising, as well as bans on sponsorship and other activities and strong limits on how tobacco products can be displayed.[71]

Evidence

Most US studies examine the impact of overall cigarette advertising expenditures on total cigarette sales, and obtain mixed results. The effects are generally not statistically significant or indicate a small effect on

smoking.[27,71] These conclusions also apply to studies from other countries (eg, Australia, Spain, New Zealand, and the United Kingdom). Data problems and the inability to examine large changes in advertising may preclude studies from distinguishing the effects.

A separate group of studies of the US television and radio bans have again obtained mixed results,[71,72] as have studies of other countries, most notably Organization for Economic Cooperation and Development (OECD) countries.[73–75] However, a recent study of OECD nations by Saffer and Chaloupka[76] found that partial bans were not associated with reductions in tobacco use, but comprehensive bans on advertising and promotions were associated with a significant (6.3%) reduction in tobacco consumption.

A number of studies have found that cigarette advertising is effective in getting children's attention and in youth recall of ads.[5,6] However, these studies may not adequately distinguish prior susceptibility to smoking as a cause of interest in ads.

Implementation issues

For advertising bans to be effective, they must be comprehensive. If applied to a small number of media, tobacco manufacturers will use a variety of other communication channels. The range of media is broad (television, radio, print, billboard, in-store displays), and may include other marketing strategies such as sponsoring sports events.

Bans on advertising have been opposed by some tobacco manufacturers,[6] and may be opposed by organizations concerned about government restrictions on advertising. However, debates surrounding their implementation may educate the public and gain political support for other tobacco control policies.

Bottom line

Studies of the effect of advertising bans yield mixed results. *SimSmoke* predicts that a comprehensive ban will reduce smoking prevalence by 4% and reduce initiation by 6%, whereas a partial ban reduces prevalence and initiation by 2%. The larger effects on initiation reflect evidence that youth are particularly amenable to advertising.

● Product Labeling

Governments may require that manufacturers supply information about their product. A primary example is tobacco health warnings labels on the package of cigarettes. The labels may extend beyond product packaging to print, billboard, or point-of-purchase advertising.

Evidence and implementation issues

Studies of health warnings (of the type used in the United States) indicate limited (short term) or no effects on cigarette use.[4,77] Adults and youth were often not able to recall or ignored the messages, perhaps distracted by other imagery on the package. However, a study[78] found that tobacco sales decreased in South Africa after warning labels were required.

Canada, Australia, New Zealand, and Poland have recently required large, graphic warnings displayed on cigarette packages. Evidence from Australia[79] and Canada[80] indicates that the more prominent warnings effectively attract attention. Borland[81] found a doubling of quit attempts. Less research has been conducted for low-income countries, where populations may be less informed of the health risks. Based on the effectiveness of health information policies where smoking rates are growing, Kenkel and Chen[82] suggest coupling health warnings with other information policies (eg, government sanctioned health reports or media campaigns) in low-income countries.

Bottom line

Weak warnings appear to have little or no effect, but *SimSmoke* predicts that large, graphic warnings may reduce smoking prevalence and increase promote cessation rates by 2%. Studies have been conducted mostly for high-income countries, and effects may differ in lower income countries and for different demographic groups.

● Mass Media Policies

Anti-tobacco media campaigns were originally focused on educating consumers on the health risks of smoking. More recent campaigns have attempted to target cessation or to change social norms through generating public support for tobacco control policies. They have made use of television, radio, billboards, and print.

Evidence

Studies found that adult and youth tobacco use declined following initiation of national media campaigns launched under the Fairness Doctrine in 1966,[6,71,83] with reductions in per capita consumption as high as 4% per year. More recent studies have examined statewide media campaigns funded by tobacco tax revenues, such as those in Arizona, California, and Massachusetts.

They have generally found declines in smoking rates and increased health-enhancing attitudes and quit attempts following implementation of anti-smoking media campaigns,[71,83–86] although the effect sizes vary. Hopkins et al,[3] in a systematic review for the US Task Force on Community Preventive Services, found that per capita consumption reductions ranged from 9.8% to 17.5%, with a median of 13%. Studies of media campaigns indicate similar success for countries other than the United States, notably Greece, Finland, Turkey, the United Kingdom, and Australia,[71] but some earlier studies indicate less promising results.[83] Based on 7 studies of media campaigns (including from Australia and one from Finland), Hopkins et al[3] reported substantial variation in the change in prevalence rates.

Some studies have examined the effect of media-based campaigns on quit rates. Burns et al[87] found higher rates of quit attempts and quit success for California and Massachusetts in the years after their tobacco campaigns began, but trends over time yielded inconclusive results. The recent cessation-oriented Arizona campaign was associated with a 20% drop in adult prevalence, some of which could be attributed to a tax hike.[86] Hopkins et al[3] reported on 5 studies (including for Scotland and the Netherlands) of mass media campaigns with additional interventions for increasing cessation among recruited tobacco users. The effects varied considerably, but the median absolute change in cessation was +2.2 percentage points, which translates to a relative increase of 40% when quit rates are 5%. Hopkins et al[3] found insufficient evidence of effectiveness for mass media education programs that use recurring instructional segments and (short-lived) mass media campaigns coupled with cessation contests.

Some studies have explored media campaigns directed at youth. National and state-level mass media and educational campaigns were often related to decreased smoking and/or increased health-enhancing attitudes among minors.[3,63,66,83] Bauer et al[88] found use among Florida middle-schoolers declined by 40% and among high-schoolers by 16% over two years. Some studies of state and community level youth campaigns, however, have shown less promising results.[83,89]

Implementation issues

The more effective campaigns appear to be those conducted in conjunction with other tobacco control policies.[3] Policies such as tax increases and clean air initiatives may have a synergistic effect with mass media policies because of the media publicity (eg, in the newspaper or television) that they generate.[36]

Farrelly et al[90] found that the amount of program expenditures reduced smoking rates above and beyond the effect of taxes, but they did not distinguish the role of media campaigns from other expenditures. The effectiveness of a mass media campaign depends on its scale and duration.[3,91,92] Advertising must reach smokers a sufficient number of times. Reduced effectiveness after some level of expenditures may be lessened by targeting different audiences and changing ad content. CDC[7] recommends that states spend between $1 and $3 per capita per year over a sufficient period of time (eg, 3 years). Effectiveness will depend on the cost and reach of media channels.

Ad content may also affect campaign success.[7] Studies of the Massachusetts and California media campaigns indicate that different contents have proven successful.[83] The more successful interventions employ a "social marketing approach" in which multiple themes are directed at specific demographic groups, followed by consumer testing and feedback, and responsiveness to that feedback.[93,94]

Bottom line

Many studies have been conducted on media campaigns, but estimated effects vary and may depend on content, scale, and other policies in effect. *SimSmoke* predicts that well-financed, long-term media programs reduce smoking prevalence by 7% when combined with other policies,[11] but the effects vary with the scale and duration of the campaign. Youth-oriented campaigns may reduce youth prevalence by as much as 6.5%, but the effects are small for the overall population. Media campaigns linked to other policies, such as clean air laws or telephone hotlines, may act synergistically to help increase support for those policies and enhance their effects.

● School Education Programs

Like early mass media campaigns, early school education programs were often geared toward educating students about the harms of smoking. More recent programs have focused on teaching life skills and about the sociopolitical climate surrounding tobacco use.

Evidence

Studies of school education policies at a program level yield mixed results.[5–7,30,95,96] Some studies find reductions in prevalence rates as high as a 50% and effects sustained as long as 5 years, but many of the better studies fail to find any long-term beneficial effect.[97] Those that indicate success generally find that they affect attitudes and lead to some short-term change in use. Most of the studies that found success examined younger students (ages 12–15) and did not examine later smoking

behaviors, including those after graduating from high school.

Implementation issues

The effects of school education programs appear to vary with the format, scope, and delivery methods. CDC[7] and USDHHS[6] recommend programs that focus on the social influences on tobacco use and that teach the skills to resist those influences. They also recommend that students have booster programs to maintain the effects over time. Those programs in states with active tobacco control policies or in communities with other activities or mass media campaigns appear to be more successful.[6,7,98]

CDC[7] estimates that the cost per student of school education programs is $4 to $6. School programs are not likely to face strong political opposition, except possibly with regard to content, and have sometimes been endorsed by tobacco manufacturers (www.pmusa.com).

Bottom line

Although educational programs have been strongly recommended,[6,7] the evidence on their effectiveness is mixed and it is difficult to estimate their effect on smoking rates from current studies. *SimSmoke* does not indicate that education programs are effective except insofar as they are a part of a broader campaign (eg, with media). School educational programs may help to reinforce norms in those communities with more extensive tobacco control policies.

● Youth Access Enforcement

Youth access policies aim to reduce the sales of cigarettes to minors. They require the passage and enforcement of laws that prohibit the cigarettes sales by retailers to minors (usually individuals under age 18). Enforcement may involve compliance checks, penalties, publicity, and bans on self-service displays or vending machines.

Evidence

Reviews by Levy and Friend[11,12] and Forster and Wolfson[99] report consistent evidence from a large number of studies that youth access policies reduced the percentage of stores selling to youth, but a smaller number of studies indicate that the effect of youth access policies on prevalence rates has been mixed. Overall, the studies provide little evidence that youth access policies are effective in terms of reducing smoking prevalence.[100,101] However, some studies find limited success among smokers below age 16 when retail compliance is high (ie, above 90%).

Implementation issues

Studies indicate greater retail compliance rates when there are self-service and vending machine bans, sufficient compliance checks, strict penalties, merchant awareness programs, and community mobilization. Two of the studies reporting reductions in smoking rates involved programs with heavy community participation.[102,103] Youth get much of their cigarettes from nonretail sources, such as theft, older peers, and parents.[83,104] As retail sales to youth are reduced, youth further switch to nonretail sources,[83,101] suggesting the need for other policies to also target these sources.

Whereas cost may provide a barrier to implementation, the money collected through fines may help offset such concerns. Youth access policies are likely to receive little political opposition, except possibly from retail merchants. The tobacco companies have generally supported youth access policies (www.pmusa.com), but state laws may be used to preempt communities from implementing strict policies.

Studies of youth access policies provide, at best, limited support for their effectiveness. Since youth substitute nonretail sources (older peers, parents, theft) when retail access is made more difficult, *SimSmoke* predicts a maximum 25% reduction in youth prevalence with strong enforcement, stiff penalties, and heavy community participation.[105] However, it still takes 15 years before there are large reductions in adult prevalence.[12,13]

● Access to Cessation Treatments

Behavioral therapies and pharmacotherapies alone have been found to roughly double, and together roughly quadruple, the likelihood of successful quitting.[106] Government may subsidize (eg, federal-level Medicare or state-level Medicaid in the United States or through nationalized insurance in the United Kingdom) or mandate that private insurers financially cover cessation pharmacotherapy and/or behavior treatments to increase access to these treatments.

Evidence

Based on four studies, Hopkins et al[3] and Friend and Levy[107] found that insurance coverage of cessation treatments increased their use. Hopkins et al[3] reported absolute differences in treatment use varying from 6 to 28 percentage points (with a median of 7), and that absolute differences in cessation rates ranged from 2 to 11

percentage points, with a median of 8. These studies examined varying rates of coverage, which often included restrictions on use. Schauffler et al[108] found that comprehensive coverage of behavioral, over-the counter, and Rx pharmacotherapies yielded 60% higher likelihood of cessation.

Jaen et al[109] and Cummings et al[110] found high rates of nicotine-patch use for low-income users in an area with community programs. Reductions in cessation treatment costs may also increase use among younger smokers who are more price sensitive.[83,111]

The United Kingdom and New Zealand have begun to provide financial coverage of pharmacotherapies through the national health care systems. Recent evidence indicates that coverage in the United Kingdom has increased quit attempts, the use of pharmacotherapies, and successful (based on a 4-week follow-up) quits[61] (www.doh.gov.uk/public/sb0132.htm). Stringent regulations of product availability (eg, limits on products, prescription requirements, etc.) may also inhibit access.[112] In low-income countries, higher treatment costs and a lack of information about products may inhibit the adoption of policies.[112]

Implementation issues

The effects of access policies may depend on the type of treatments covered and restrictions on use. Programs requiring counseling with pharmacotherapy usage may provide more information, guidance, and support to the smoker, but reduce the convenience. An approach that gives the patient treatment options (eg, over-the-counter therapies alone) increases use,[113] but may lack the support and guidance that could be ideally provided by a health care worker.[114]

Public policies may be implemented as mandates or through government subsidized coverage. Research on their effects is limited.[107] Those health care providers who begin counseling their patients under mandate may be less inclined or able to faithfully follow recommended procedures. Similarly, treatment may be less effective if less committed smokers are induced to try treatments.

Cessation policies may also be more effective when combined with other policies. Tauras and Chaloupka[11] have found that lower prices for cessation treatments and higher cigarette prices encourage cessation treatment use. Media campaigns that encourage treatment, use of quit lines or encourage health care providers to screen patients and channel patients to use effective treatments may also encourage cessation. Hopkins et al[3] reviewed two studies that found that provider education programs alone led to 5.5 and 1.7 absolute percentage increases in the quit rate. When combined with provider reminder systems, six studies of education programs yielded absolute percentage increases in quit rates ranging from −6 to 39 percentage points, with a median of 4.5. However, the Community Intervention Trial for Smoking Cessation, a series of community programs that encouraged interventions by health professionals, work-site activities, and community programs, yielded no effect on heavy smokers and only a 3% increase in quitting among light smokers.[115] Studies of a cardiovascular disease prevention program in Finland and a rural program in India found more dramatic effects.[112]

Studies indicate that cessation treatments are cost-effective relative to other preventive treatments, yet health care payers and providers are often skeptical.[51] Treatment may also be particularly important in helping low income and heavier smokers to successfully quit.

Bottom line

Although there is considerable evidence on the effectiveness of tobacco cessation treatments, direct evidence on the population effect of government policies to encourage quitting and treatment use remains at its early stages. Under current levels of US coverage, *SimSmoke* predicts a 25% increase in the quit rate with broad treatment coverage and requirements of physician involvement.[14] This leads to a 2% relative reduction in the prevalence rate after 5 years and 3.5% reduction after 10 years. Policies that only mandate physician brief intervention further reduce prevalence rates by 1.5% after 10 years.

● Telephone Quit Lines

Telephone quit lines conveniently provide smokers advice and support through the quitting process. Mass media publicity may encourage participation and target specific smokers. Quit lines may be integrated into a health care system or operated as a separate program by government.

Evidence

Telephone counseling has been studied in a variety of settings with diverse populations.[116] Hopkins et al[3] identified 32 studies of quit lines, most of which had other components such as education materials or pharmacotherapy. These studies reported absolute percentage differences in cessation rates from quit line participation ranging from −3.4 to 23 percentage points, with a median of 2.6 percentage points (which imply about a 50% relative increase in quit rates if quit rates were 5% in the absence of quit lines). Six studies that compared

telephone support and patient education to patient education alone provided similar results (absolute percentage differences varying from 0.9 to 6.3 percentage points with a median of 2.4 percentage points). Five of the six studies evaluated proactive telephone support systems and obtained relative percentage differences in cessation of 41%. Fiore et al[106] and Lichtenstein et al[117] found a 20% higher likelihood of successful quitting based on their meta-analyses. The studies include programs in Australia, Canada, England, and Scotland.[116,118]

Studies also indicate quit lines are effective with smokers of all ages and most racial/ethnic groups.[3] However, some groups (eg, men)[119,120] appear to make less use of these services, and some low-income smokers may not have ready access to phones.

Implementation issues

Quit lines are convenient for the smoker because they require no travel and expense and may also be less intrusive to some than face-to-face counseling.[116] They may be combined with programs that provide pharmacotherapy and an option of face-to-face counseling.[116]

Quit lines are a relatively inexpensive way to provide advice.[3,7,118] They may be centralized to reduce costs, but use may be low in the absence of publicity[3] or in populations with limited telephone access. Quit lines advertised as part of a mass media campaign appear to be most successful[118] in reducing population quit rates.

Bottom line

Many studies have found that quit lines are effective, especially when publicized through a media campaign, but estimates of their effectiveness vary. *SimSmoke* predicts substantially increased quit rates of those who call, but relatively small effects on overall smoking prevalence due to their generally low participation rates (less than 5% of smokers). However, evidence indicates that quit lines are a cost-effective way to increase cessation.[3]

● Summary and Conclusions

Summary

Table 1 provides a summary of the effects of different policies, the strength of evidence, the sociodemographic groups most affected, and issues that arise in the implementation of policies. The policies are ordered in terms of their likely importance.

A large increase in cigarette taxes and the passage of comprehensive clean air laws are the cornerstone of strategies that have been successful in reducing smoking rates. Each has the potential to reduce smoking prevalence by 10% or more. A substantial tax is likely to have a larger and relatively immediate effect on the young and on lower income smokers. Work-site restrictions have a more pronounced effect on male, middle age, and higher income workers, unless those workers are already working in firms covered by voluntarily imposed smoking restrictions. Concerns about ETS have been important in mobilizing nonsmokers to advocate further tobacco control policies. Tax revenues may be earmarked for other tobacco control policies.

A mass media campaign provides the third prong in successful tobacco control strategies. A campaign of large enough scale and duration has the potential to further reduce smoking prevalence by 5% to 10%. Media campaigns may also publicize other programs, such as cessation or youth policies, or target to those groups which have the highest smoking rates.

Government cessation policies, such as financial coverage of treatment or quit lines, may also play an integral role in an effective strategy. These policies, initially, may have relatively small effects on smoking prevalence, but the effects grow over time and may help heavier smokers who have the most difficulty in quitting smoking.

Evidence on the effects of advertising bans and warning labels is mixed, but a recent study indicates that comprehensive advertising bans may reduce smoking rates by 6% and that bold, large, and graphic labels may increase cessation. In addition, strict advertising bans and warning labels have been adopted in nations that have been successful in their tobacco control efforts and may be important in low- and middle-income nations with growing smoking rates.

Evidence on youth access enforcement and school education programs is mixed, but they may be easiest to get implemented. Their effect on overall smoking rates, however, is likely to be small if implemented without other tobacco control policies that affect nonretail sources of tobacco to youth.

The interrelationship of tobacco control policies

While we have focused on individual policies, the most successful tobacco control strategies appear to involve multiple policies implemented as part of a comprehensive strategy.[6,121,122] Multiple policies may act

While we have focused on individual policies, the most successful tobacco control strategies appear to involve multiple policies implemented as part of a comprehensive strategy.

TABLE 1 ● Summary of policy effects and issues in implementation

Policy	Effect on quit rates*	Strength of evidence*	Effect on prevalence rates	Strength of evidence	Subgroups affected	Implementation issues
Taxes/price	10% increase in price yields a 3–5% increase in quit rates	Few studies	25% price increase yields a 7% decrease in the initial years increasing over time to 14%†	Strong, many studies, many different nations, relatively consistent evidence	Larger effects on youth and low-income smokers	Effects depend on the size of the tax hike and initial price. Generates funds that may be earmarked for other tobacco programs. Likely to be strongly opposed by tobacco industry, may be some increased smuggling for large tax increases.
Clean Air Laws	Unclear from studies but many find significant effects	Studies obtain a wide range of results, effect appears to increase with time	7–8% decrease for work site ban, 3–4% for restaurant and other public place bans, 11% for comprehensive bans†	Moderate-strong, many studies for high income nations, studies generally find effects, but effect sizes vary	Larger effects on high income, male and ages 24–54, but depends on private restrictions in place	Strict bans may require publicity and enforcement in areas without strong anti-smoking norms. Second-hand smoke issues may mobilize political support for other programs. Likely opposition from the tobacco and some other businesses.
Media campaigns	40% increase for cessation oriented media campaigns	Moderate, most studies obtain significant results but effect sizes vary	7% decrease when sufficiently funded and combined with other policies†	Moderate, most studies obtain significant results but effect sizes vary, and may depend on other policies in effect	Unclear, may have smaller effects on youth	Should be of sufficient scale and duration, and content should be tested. Most effective when combined with other policies. Inexpensive way to reach many people. May be challenged by tobacco interests.
Expanding access to cessation treatment	5–25% increase depending on the breadth of coverage†	Low, especially regarding the long-term effects	1–2% reduction after 2 years depending on coverage breadth†	Low, especially regarding the long-term effects	Low income and heavy smokers	Effects may depend on the restrictions placed on users, and support to health care providers. Depends on health care payers and providers support.

(*continues*)

TABLE 1 © Continued

Policy	Effect on quit rates*	Strength of evidence*	Effect on prevalence rates	Strength of evidence	Subgroups affected	Implementation issues
Telephone hotlines	20–40% increase by users	Moderate, effect sizes vary and long-term effects not well known	<1% reduction in the first year, but more in future years†	Unknown, depends on extent of reach	Affects most smokers, but may be tailored to specific groups	Most effects when well publicized. May be coordinated with more extensive cessation programs. Found to be cost effective.
Advertising restrictions	Not studied	—	4% reduction but increasing to 6% over time†	Moderate-low. Studies obtain mixed results	Youth are found to recall ads, which are associated with more prosmoking attitudes	Low cost, but requires comprehensive ban. Political concerns may help mobilize support for other programs. Likely opposition from the tobacco interests.
Warning labels	One study found that quit attempts doubled	No studies examine successful cessation	May be 2% effect for large graphic warnings†	Low, mixed results, and few studies in recent years	May be most effective in low-income countries	Requires large graphic warnings. May be supplemented with information campaigns. Likely opposition from tobacco interests.
Youth access policies	Not studied		A maximum 25% reduction in youth smoking rates, but small immediate reductions in overall smoking rates†	Low/moderate, but stronger support for policies involving heavier community participation	Youth, especially those below age 16	Requires strong enforcement. Appears most effective when conducted with more extensive community campaigns. Costs may be impediment, likely to face little political opposition.
School education programs	Not studied		Indeterminate	Low-moderate. Many studies, but results are mixed, and do not examine long-term effects	Below age 16	Content may be important, programs may be more effective in communities with other tobacco policies. Likely to face little political opposition.

NR = not relevant.
*Effects are measured in percentage terms relative to the initial rates: (post-intervention rate − pre-intervention rate)/pre-intervention rate.
†Indicates based on *SimSmoke* computer simulation model (see references in text).

synergistically to shape individual attitudes and societal norms toward smoking. Tobacco control policies may also need to be of sufficient number and importance for smokers to overcome the addiction to smoking, so that they are able to quit. Evidence indicates that "hard-core" smokers are being affected in states with potent strategies.[123] One reason for implementing different policies is that they affect different demographic or smoking groups. For example, clean air laws may primarily affect adult smokers who smoke heavily, while youth access policies affect younger smokers. To the extent that there are fewer older smokers, youth may have one less sources for getting cigarettes when retail sources become less accessible. By targeting different groups, they have complementary effects and reduce disparities in smoking behaviors. Although evidence indicates that there are synergies in combining policies, the number of additional smokers that are induced to quit might at some point be reduced, as new policies are implemented or existing policies are made more stringent. Some smokers may be less susceptible to quitting, because they are more addicted.

Other policies and factors

We have not considered several policies within the confines of government. For example, federal agencies in the United States currently regulate the content and marketing of pharmacotherapies. Evidence on the effects of making products more readily available (eg, as over-the-counter rather than prescription) suggests a benefit, though these benefits have not yet been observed in state-level population effects studies.[113,124] In various countries, federal agencies have attempted to regulate the size and number of cigarettes sold in a pack, where cigarettes can be sold, and limits on tar, nicotine, and other harmful substances in the cigarettes. The desirability of allowing "safer cigarettes" has been questioned, since these products may keep smokers addicted to the products[125] and evidence to date has shed little light on the strength and character of these effects.

Certain policies often occur outside of government. For example, the effect of litigation directed against tobacco manufacturers has not been studied, but may affect smoking rates.[6] Recent United States experience suggests that large settlements against tobacco manufacturers led to higher cigarette prices[38,126,127] and may generate publicity that affects attitudes towards smoking.

Government may encourage private firms, households, or nongovernment community groups to voluntarily implement smoking bans. Farkas et al[128] found that home bans were associated with increased cessation and reduced quantity smoked. Pierce et al[129] and Wakefield et al[130] found that youths in homes with smoking bans were less likely to be smokers. The effect of community education programs in encouraging these voluntary bans has received little attention.[3]

Tobacco control policies may generally be made more effective if they are supported by government agencies and advocacy groups. Active support by these groups may increase public support and compliance with the laws. Evaluations of existing programs may be needed to justify their continued existence or growth.[131] While there is strong evidence that certain policies are generally effective, it may be necessary to show their effect on smoking rates and health outcomes in the nation, state, or community in which they are implemented. Evaluation may also help to determine which groups are being affected and how existing policies may be better implemented.

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Nicotine & Tobacco Research Advance Access published September 8, 2011

Brief Report

The Association Between Point-of-Sale Displays and Youth Smoking Susceptibility

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Received January 18, 2011; accepted July 19, 2011

Abstract

Introduction: According to tobacco industry documents, tobacco displays within the retail environment assume a much greater importance with the loss of other marketing channels. The impact of these displays upon young people and their future intentions to smoke (susceptibility) is, therefore, of significant interest to public health.

Methods: A cross-sectional in-home survey was conducted in 2008 with young people ($N = 1,401$) aged 11–16 years, recruited from across the United Kingdom. We examine the salience of and attraction to cigarette displays at point-of-sale (POS), among youth, and whether this is associated with susceptibility. We concentrate exclusively on the 956 never-smokers.

Results: Logistic regression, controlling for known risk factors of youth smoking, found that noticing cigarette displays was associated with higher levels of susceptibility (odds ratio [*OR*] = 1.77, $p < .05$) and greater attraction to displays was associated with higher susceptibility ($OR = 1.07$, $p < .001$).

Conclusions: It is difficult, if not impossible, to safeguard young people from exposure to displays of tobacco at POS. That these displays were associated with increased susceptibility suggests that moves to place tobacco out of sight in the United Kingdom, and elsewhere, are justified.

Introduction

As traditional forms of marketing are closed off to tobacco companies, they typically reallocate marketing resource to partially regulated or unregulated channels. For instance, in the United Kingdom, following the Tobacco Advertising and Promotion Act (TAPA; H.M. Government, 2002), which effectively bans all traditional forms of advertising, sponsorship, and promotion, marketing expenditure appears to have been reapportioned to the display of tobacco products at point-of-sale (POS). Although the TAPA limits tobacco advertising at POS to a single A5 advertisement, it does not place any restrictions on displays. As displays are one of the last forms of marketing to be regulated in the United Kingdom, they are, therefore, one of the few viable means for tobacco companies to promote their wares.

The business and management literature suggests that displays at POS are a potent form of advertising (Hastings et al., 2008). This helps explain why the tobacco industry spends such large sums of money on displays every year (J. Gottheil Marketing Communications, 2005), are so particular about how gantries are stocked (Rooke, Cheeseman, Dockrell, Millward, & Sandford, 2010), and indeed the marketing value they attribute to such displays: "The store environment, especially displays inside stores, is the biggest source of advertising awareness for all cigarette trademarks" (Adekunle, 1999).

Tobacco industry documents from the United Kingdom during the 1990s further help to underscore the importance attached to POS displays. Referring to the impact of the upcoming advertising ban in the United Kingdom, the common theme that emerged from these documents was that with the regulation of other marketing channels "Sampling and point-of-sale are probably going to be the major promotional platforms in just over six months time . . . Point-of-Sale will be crucial" (CDP, 1999a, p. 1/2). For this reason, there was a "Massive movement of advertising funds to other areas pre-ban: sponsorship, gift schemes, point of sale" (CDP, 1999b, p. 40), with a strong emphasis on "Dominating the gantry" (CDP, 1995, p. 16). This follows trends in other countries that have imposed advertising bans (Lavack & Toth, 2006).

Another reason that tobacco displays are so valuable to the industry is that they increase exposure to tobacco products, promote particular brands and stimulate unplanned purchases among adult smokers and recent quitters (Carter, Mills, & Donovan, 2009; Dubray, Schwartz, & O'Connor, 2010; Germain, McCarthy, & Wakefield, 2009). They also appear to prompt youth toward smoking; providing powerful cues to begin and to continue smoking (Henriksen, Schleicher, Feighery, & Fortmann, 2010; McNeill et al., 2011; Paynter & Edwards, 2009; Paynter, Edwards, Schlutter, & McDuff, 2009). For instance, a number of studies have found a

doi: 10.1093/ntr/ntr185

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positive association between exposure to POS tobacco marketing and susceptibility among youth (e.g., Feighery, Henriksen, Wang, Schleicher, & Fortmann, 2006; Weiss et al., 2006), and recent research in Scotland with young people, who were asked to discuss their views on tobacco displays, commented that displays were "cool" and that "things like this attracts people to smoke" (Brown & Moodie, 2010).

In this study, we explore young never-smoker's awareness of tobacco displays at POS, the attention they pay to displays and perceptions of them (which we term *attraction*), and support for moving cigarettes out of sight.

Methods

Design

Data come from Wave 5 of the Youth Tobacco Policy Survey, a long-term study examining the impact of tobacco policies on young people. The fieldwork, conducted in Summer 2008, comprised face-to-face interviews conducted in-home, by professional interviewers, accompanied by a self-completion questionnaire. Parental permission and participant consent were secured prior to each interview.

Sample

The sample comprised 11- to 16-year-olds ($N = 1,401$) drawn from households across the United Kingdom, using random location quota sampling. Sampling involved random selection of 92 electoral wards, stratified by Government Office Region and A Classification Of Residential Neighbourhoods (ACORN) classification (a geodemographic classification system that describes demographic and lifestyle profiles of small geographic areas) to ensure coverage of a range of geographic areas and socio-demographic backgrounds. The study was approved by the Ethics Committee at the University of Stirling. For more information on the sampling and methodology, see elsewhere (e.g., Brown & Moodie, 2009; Moodie, MacKintosh, Brown, & Hastings, 2008). This paper focuses only on the 956 never-smokers.

Measures

General Information

Age, gender, social grade (occupation of head of household), and smoking by mother, father, siblings (if any), and close friends were obtained.

Smoking Susceptibility

Never-smokers were those who indicated that they had never tried or experimented with smoking, not even a few puffs. Susceptibility, defined as the absence of a firm decision not to smoke (Pierce, Choi, Gilpin, Farkas, & Merritt, 1996), was measured across three items addressing the likelihood (definitely not, probably not, probably yes, definitely yes) that they would: (a) be smoking when they are 18, (b) smoke a cigarette any time during the next year, and (c) smoke if one of their friends offered them a cigarette. Never-smokers were classed as nonsusceptible if they responded "definitely not" across all three items and classed as "susceptible" if their response was anything other than "definitely not" to any of the three items.

Noticing Displays

This was measured via a single item: "In the last month, have you seen cigarette packets being displayed, including on shelves or on the counter?" (Yes/No).

Attraction to Displays

Five items were combined to form a composite measure of attraction to display of tobacco products at POS (Cronbach's $\alpha = 0.72$). One item on attention asked: "How often, if at all, do you pay close attention to packets of cigarettes displayed inside shops or stores?" with response options "*Never* (1), *rarely* (2), *sometimes* (3), *often* (4), and *very often* (5)". A further four items on perceptions of displays asked: "Can you tell me what you think about the way cigarettes are displayed in shops?" and were assessed via semantic scales: (a) Attractive–Unattractive, (b) Eye-catching–Not eye-catching, (c) Colorful–Not colorful, (d) Tidy–Untidy. All four items were coded on a 5-point scale and reverse coded so that a low score (1) reflected more negative perceptions and a high score (5) reflected more positive perceptions. Each recoded item was also converted to a binary variable to describe the percentages who rated displays positively on each measure (codes 4–5) and those who did not rate them positively (codes 1–3).

A composite score of attraction was derived by combining each of the scores on the four semantic scale items and the 5-point scale frequency of attention score. This provided a composite score, where a low score reflects low attraction and a high score reflects high attraction.

Support for Cigarettes Being Out of Sight

This was measured via a single item: "Shops are currently allowed to display the cigarettes they sell but some people think that they should be out of sight. How much do you agree or disagree that cigarettes should be put out of sight?" This was measured on a 5-point scale ranging from *agree a lot* to *disagree a lot*.

Statistical Analysis

Data were analyzed using SPSS Version 17. Descriptive data are weighted for age, gender, and social grade. Associations between susceptibility and (a) noticing POS and (b) attraction to POS displays were examined using logistic regression to enable these associations to be tested, after accounting for the potential influence of demographic and smoking-related variables. Variables were entered in blocks, with Block 1 controlling for sibling, close friend, and parental smoking, and Block 2 controlling for age, gender, and social grade. Block 3 tested for association with noticing POS, and Block 4 tested for any additional association with attraction to POS displays. The variables were entered in these blocks to enable the additional influence of each set of variables to be assessed. Logistic regression was conducted on unweighted data as age, gender, and social grade were control variables.

Results

Smoking Susceptibility

After excluding cases that had missing information for smoking status ($n = 3$), 68% ($n = 946$) of the weighted sample were never-smokers. The mean age of the never-smokers was 13 years, with 51% ($n = 480$) males and 49% ($n = 466$) females, 38% ($n = 363$) were from social grade ABC1 and 62% ($n = 584$) from

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C2DE. Among the never-smokers, 27% ($n = 259$) were categorized as susceptible and 73% ($n = 687$) nonsusceptible.

Noticing Displays

There was a high level of noticing cigarette displays in shops (81%, $n = 761$). Logistic regression, after controlling for smoking-related and demographic variables, found that noticing cigarettes was positively associated with susceptibility (odds ratio [*OR*] =1.77, $p < .05$; see Table 1).

Attraction to Displays

Almost one in five never-smokers (17%, $n = 161$) sometimes, often, or very often paid close attention to packets of cigarettes displayed in shops. Approximately a third (31%, $n = 287$) rarely paid close attention to packets of cigarettes displayed in shops, while just over half (52%, $n = 491$) never paid close attention. Approximately a half considered cigarette displays to be tidy (52%, $n = 476$), more than a quarter considered displays colorful (28%, $n = 261$) and eye-catching (27%, $n = 248$), and 13% ($n = 121$) considered them attractive. The overall attraction score ranged from 5 (*low attraction*) to 25 (*high attraction*), with a mean of 12.05 ($SD = 4.43$). Logistic regression, after controlling for smoking-related variables, demographic variables, and noticing of cigarette displays, found that being more attracted to displays was positively associated with susceptibility ($OR = 1.07$, $p < .001$; see Table 1).

Table 1. Logistic Regression of Association Between Susceptibility to Smoke and Noticing of and Attraction to Displays

Dependent variable: susceptibility, 1 = Susceptible, 0 = Nonsusceptible	$n = 905$	*AOR*	(95% *CI*) Lower	(95% *CI*) Upper	*p*
Block 1					
Sibling smoking					
No siblings who smoke	735	1.00			.64
Any siblings smoke	127	1.18	0.76	1.81	.46
Do not know/not stated	43	1.26	0.64	2.51	.50
Close friends smoking					
Most do not smoke	771	1.00			.33
Majority smoke	41	1.00	0.49	2.07	0.99
Do not know/not stated	93	1.43	0.89	2.30	.14
Parental smoking					
Neither parent smokes	498	1.00			<.01
Either	313	1.89	1.35	2.64	<.001
Not sure/not stated/no mum/dad	94	1.67	1.01	2.76	<.05
Block 2					
Gender					
Male	457	1.00			.06
Female	448	1.33	0.98	1.81	.06
Social grade					
ABC1	411	1.00			.19
C2DE	494	0.81	0.60	1.11	.19
Age	905	1.03	0.94	1.13	.56
Block 3					
Noticing displays					
No or do not know	166	1.00			<.05
Yes	739	1.77	1.15	2.73	<.05
Block 4					
Attraction to displays	905	1.07	1.03	1.11	<.001

Model Summary at Each Block

	Test of model coefficients			Nagelkerke R^2
	χ^2	*df*	*p*	
Block 1	21.061	6	<.01	0.033
Block 2	6.245	3	.100	0.043
Block 3	9.513	1	<.01	0.058
Block 4	15.251	1	<.001	0.081
Final model	52.069	11	<.001	0.081

Note. AOR = Adjusted odds ratio. Nine hundred and five cases analyzed, 51 cases with missing values. Cases correctly classified = 72.4%. 97.4% of nonsusceptible never-smokers and 7.2% of susceptible smokers were correctly classified.

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Support for Cigarettes Being Out of Sight

There was a high level of support for cigarettes being put out of sight, with 72% ($n = 655$) agreeing "a lot" or "a little" that they should. Approximately 1 in 10 (11%, $n = 99$) disagreed "a lot" or "a little", and the remaining 17% ($n = 155$) neither agreed nor disagreed.

Discussion

This study examines the extent and nature of young never-smoker's engagement with the display of tobacco products at POS, and the relationship, if any, between this and their susceptibility to taking up smoking. The findings demonstrate that the vast majority (81%) of young people who have never smoked do notice tobacco displays at POS, nearly one in five pay close attention to them, one in four perceive them to be eye-catching, and one in eight considers them attractive. Importantly, both noticing and attraction to displays are associated with susceptibility, independent of many other risk factors known to cause smoking. This finding suggests that noticing of, and attraction to, displays may either influence susceptibility or be influenced by an already present susceptibility. The former would suggest that such displays influence future smoking, while the latter suggests that young susceptible never-smokers are seeking out or using POS tobacco displays to shape or reinforce their decisions about smoking. Regardless of the direction of the association, this finding gives cause for concern as it demonstrates that young never-smokers, despite having no existing involvement with the product, and therefore no reason to engage with the display, are vulnerable to POS displays.

These findings are important for two reasons. First, the study goes beyond mere attention toward tobacco displays at POS and instead provides a coherent measure of attraction to displays, which is independently associated with susceptibility. Although not all susceptible never-smokers will go on to take up the habit, importantly, some will, and this research suggests that these displays play an active role in this transition process.

Second, that there is a very high level of exposure to displays, deemed a powerful form of advertising by the business and management literature (Hastings et al., 2008), means that this generation of children, like previous generations, continue to be subjected to marketing by tobacco companies. That almost three-quarters of young nonsmokers agree that tobacco products should be placed out of sight indicates that this exposure is not one that they actually want. Moreover, the very presence of tobacco displays in shops goes directly against Article 13 of the Framework Convention on Tobacco Control (World Health Organisation, 2005), which recommends that member Parties prohibit all forms of tobacco marketing, including displays.

The study has some potential limitations, such as the cross-sectional nature of the study, which prevents us from drawing causal relationships about youth noticing of, and attraction to, tobacco displays, and future smoking behavior. It is also possible that social desirability influenced responses to certain questions, such as agreeing that tobacco should be placed out of sight, and the attraction construct is not a validated measure, although the internal reliability was found to be acceptable. Finally, while the model does not explain much variance in susceptibility to smoke, it does show a small, but significant, association between susceptibility and awareness of and attraction to displays, even after accounting for potential confounders.

Despite the study limitations, the findings are consistent with the growing body of international evidence, which suggests that tobacco marketing at POS, including displays, increase exposure to tobacco products and normalize smoking among young people, a particularly vulnerable population group (e.g., Feighery et al., 2006; McNeill et al., 2011; Paynter et al., 2009; Weiss et al., 2006). We add to the literature by showing that attraction to these displays is positively associated with susceptibility to smoke in the future among young people. Given the findings of this study, and the international evidence more generally, in order to safeguard children from exposure to tobacco displays, and thus tobacco marketing, those countries which have not yet placed tobacco products out of sight in the retail environment should be urged to do so.

Funding

This work was supported by a grant from Cancer Research UK (C312/A8721).

Declaration of Interests

None declared.

Acknowledgments

We thank our late colleague Dr Lynn MacFadyen for her contribution to the development and design of this study.

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Journal of Substance Abuse 13 (2001) 549–561

Journal of Substance Abuse

Cigar risk perceptions in focus groups of urban African American youth

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Abstract

Purpose: To explore cigar use perceptions among urban African American youth. **Methods:** A convenience sample ($n=50$) of African American volunteer participants, ages 14–18, participated in six audiotaped focus groups conducted in two California cities. Transcriptions were analyzed using iterative strategies. **Results:** Most youth believed cigars were harmful to health, yet a disjuncture existed between this abstract belief and the socially embedded understandings revealed in discussions. Some youth felt that cigars were more "natural" and therefore less harmful than cigarettes. For some, that understanding rested on a mistaken assumption that nicotine was an artificial additive not present in cigars. Youth had received little cigar-specific health education. They reported that cigars were easily obtained, noted cigars' social cachet, and drew attention to new brands targeting youth. **Implications:** Perceptions of risk are not merely interesting "subjective" findings but are important determinants of actual use patterns and may not correlate with abstract beliefs. Recent cigarette brand repositionings, such as Winston's "no additives" campaign, have widely publicized the many substances added to cigarettes. Some youth may take lack of cigar-specific preventive education as an indication that cigars do not contain such substances, including nicotine. Misperceptions about risks of cigar and cigar/marijuana smoking must be addressed through consistent, coordinated, and comprehensive tobacco control efforts for all tobacco products. © 2001 Elsevier Science Inc. All rights reserved.

Keywords: Tobacco; Adolescent; Substance use; African American; Risk perception; Focus group

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0899-3289/01/$ – see front matter © 2001 Elsevier Science Inc. All rights reserved.
PII: S0899-3289(01)00092-X

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1. Introduction

Risk perception has been shown to be an important factor in determining youth patterns of substance use (Bachman, Johnston, & O'Malley, 1998). Perception of risk is shaped by numerous factors, including personal experience, peer attitudes, education, media coverage, social factors, and communication and marketing (Douglas & Wildavsky, 1982). Changes in tobacco use practices may be related to risk perceptions or misperceptions.

Cigar smoking has recently increased among United States adults and youth (Baker et al., 2000; MMWR, 1997). Over 20% of male high school students were current users of cigars (used on more than one of the past 30 days) when surveyed in 1999 (MMWR, 2000). This is troubling, because cigar smoking is known to increase risks for several cancers, including lung cancer (Baker et al., 2000; Shanks & Burns, 1998). In addition, cigars may contribute to significant health problems in nonsmokers due to secondhand smoke (Repace, Ott, & Klepeis, 1998). There is also potential for development of nicotine addiction (Baker et al., 2000).

Tobacco use among African American youth has in the past been lower than among White youth (Centers for Disease Control, 1996). However, the percentage of African American male youth who report being frequent cigar users (≥ 50 cigars per year) is higher than that of White or Hispanic males or that of females (MMWR, 1997). In the 1999 National Youth Tobacco Survey, there was little difference in rates of current cigar use among all African American (14.8%) and White (16%) high school students, but among middle school youth, African Americans were almost twice as likely (8.8%) as White middle schoolers (4.9%) to be current cigar users (MMWR, 2000). Overall, 7.8% of middle school males and 20.3% of high school males reported current cigar use in 1999 (MMWR, 2000).

Among racial/ethnic groups, African Americans have the worst mortality from major tobacco-related diseases. For example, 81% of African American smokers who develop lung cancers die from the disease, compared to 54% of White smokers with lung cancer (U.S. Department of Health and Human Services, 1998). The leading cause of cancer deaths among African Americans in 1993 was lung cancer (U.S. Department of Health and Human Services, 1998). These worrisome findings may be related to differences in nicotine metabolism and/or differences in smoking patterns. Although African Americans are less likely to be heavy smokers than Whites, they are also less likely to quit once they begin (Novotny, Warner, Kendrick, & Remington, 1988). Recent research showed that African Americans who smoked 12 to 15 cigarettes daily had nicotine indicator levels as high as White smokers of 20 cigarettes daily (Perez-Stable, Herrera, Jacob, & Benowitz, 1998), suggesting both slower clearance and higher intake of nicotine and smoke per cigarette. African Americans are also more likely to smoke menthol and high-tar brands (Perez-Stable et al., 1998), but the exact mechanisms by which the higher nicotine levels occur remain unknown.

Given the worse health outcomes from tobacco use and differential nicotine uptake of African Americans as compared with other groups, it is particularly urgent that clinical practitioners and public health advocates understand more about the evolution of tobacco use

patterns among African Americans, particularly among youth (Chassin, Presson, Rose, & Sherman, 1996; U.S. Department of Health and Human Services, 1994).

Previous research (Adams et al., 1999a, 1999b; Shopland, 1998) has established that cigar use is unhealthful, that youth are using cigars both as primary tobacco products and as vehicles for marijuana use, and that significant gaps exist in federal and state tobacco control policies related to cigars. Some of these gaps have been addressed since the study reported here was conducted. For example, the U.S. Federal Trade Commission now requires warning labels for cigars. However, there are still significant gaps in our understanding of youth cigar use, including how elements of risk are perceived and considered by youth. Developmental substance use researchers have explicitly called for multimethod approaches to learn more about how adolescents regard various substances (Johnson, Boles, Kleber, Vaughan, & McVeigh, 2000).

Youth trends change rapidly, occur in some areas before appearing in others, and may not be captured by large quantitative studies early enough to alert public health advocates to impending problems (Agar & Reisinger, 1999). Qualitative studies reveal aspects of adolescent health-risk behaviors and understandings that cannot be captured through more experience-distant methods (Rich & Ginsburg, 1999). Everyday sidewalk observations by this paper's authors revealed emerging patterns of African American youth cigar use in San Francisco and Oakland, CA during 1999. These observations, while not systematic, led to a focus group study conducted to learn more about perceptions and practices related to cigar use among these urban African American youth.

2. Methods

Six focus groups were conducted with 50 consenting urban African American participants aged 14–18 residing in San Francisco or Oakland, CA. Focus groups are moderated group interviews that generate rich descriptive data about a phenomenon (Morgan, 1997, 1998). Like other qualitative methods, they can be helpful in understanding behaviors and perceptions within social contexts or in identifying and exploring new trends (Agar & Reisinger, 1999; Rich & Ginsburg, 1999).

Typically, the group is the unit of analysis rather than individuals within the group. Focus group research does not provide the kind of statistical generalizability that various quantitative methods offer, but it can be highly effective in gaining a grasp of various social, linguistic, and cultural parameters of the phenomenon of interest. In addition, data generated in focus groups may aid in identifying salient issues for future research and planning survey questions and interventions.

Youth were recruited through schools or community centers using flyers and direct recruitment efforts. We recruited by asking for youth aged 14–18 willing to participate in a tape-recorded group discussion about tobacco. In order to capture contrasts and interactions between them, and because we sought to learn in general how cigars were viewed rather than to ascertain personal behavioral characteristics, we did not separate groups by tobacco use status. Almost half the participants had personally used cigars. See Table 1 for details about

Table 1
Focus group participant characteristics

	Group 1 ($n=5$)	Group 2 ($n=7$)	Group 3 ($n=7$)	Group 4 ($n=12$)	Group 5 ($n=7$)	Group 6 ($n=12$)	Total all groups ($N=50$)
Age[a]							
14–16	4	1	6	12	7	12	42
17–18	1	5	1				7
Gender							
Female	1	7	1		5	7	21
Male	4		6	12	2	5	29
Grade level							
9	1		1	2		1	5
10	2	1	4	10	3	6	26
11	1	1	1		4	5	12
12	1	5	1				7
Ever tried any tobacco product							
Yes	4	2	4	4	7	6	27
No	1	5	3	8		6	23

[a] One participant in Group 2 did not report age.

participants. The study protocol was approved by the Committee on Human Research at University of California-San Francisco. Parental (or guardian) consent was required for participation of youth under 18 years. Participants were paid US$20 for their time. Brief written pre- and post-discussion questionnaires were completed, including demographic information and assessment for factors that might have influenced responses, such as discomfort with moderator, with other group members, or with the site.

Groups were conducted by two co-moderators, one African American and one White non-Hispanic. Moderators, who had previous experience in conducting interviews and focus groups, were instructed to encourage expression of a wide variety of views, control their responses, allow the group to take the lead in discussion (within the topic parameters), listen rather than push the discussion, and probe for varying viewpoints. Moderators followed a uniform protocol for all groups. Participants were briefed on group process and asked to respond to a set of open-ended questions, which were asked of all groups. In order to encourage a natural flow of conversation, group responses guided the order of questions. Questions focused on eliciting accounts of experiences with cigars, opinions and beliefs about cigars, and discussion of factors influencing youth cigar use and practices. Additional questions were added to the last three groups to serve as a check on emerging interpretations. All groups were audiotaped and transcribed. Verbatim transcripts were reviewed against tapes for accuracy.

Data were analyzed throughout the study using an iterative process. First, all transcripts were reviewed by members of the research team to identify recurrent issues or categories across groups, which were refined into codes. Next, two coders, working independently, used the NUD*IST software program for qualitative analysis to code segments of interview text into the identified categories. Discrepancies were identified and discussed until consensus emerged or were adjudicated by the Principal Investigator. Preliminary analyses were

developed from reviewing coded text to identify recurrent themes and patterns and used to guide questions for remaining groups, which served as a check on the validity of interpretations. The full transcripts were then re-reviewed by all team members to search for corroborating or contrasting instances and to verify that analytic observations appeared consistent across groups.

3. Results

Youth positioned cigars along a continuum of risk, informed by media, school, parental, and other influences. Although 94% (44/47) of the youth responded affirmatively when asked "do you believe smoking cigars is bad for health?" on the written prediscussion questionnaire, the group dialogue revealed considerable confusion about actual risks and a "naturalness" criterion used by youth in weighing the relative risks of tobacco and other products.

3.1. Semantics and patterns of use

In findings published elsewhere (Yerger, Pearson, & Malone, 2001), we noted that there were at least three ways in which participants talked about tobacco products normally subsumed under the name "cigars": premium-type, expensive cigars, which they rarely used; brand-name little cigars, such as Black and Mild, which were popular among African American youth and smoked like cigarettes; and "blunts," cigars used for smoking marijuana. Cigar use, among these youth, was seen as part of a pattern of interrelated drug use practices in which cigars were commonly used to facilitate or enhance marijuana use (Adams et al., 1999b).

3.2. Comparison with cigarettes

A discourse of "naturalness" recurred in discussions of this cigar–marijuana interrelationship and cigarettes. Groups were in agreement that cigarette smoking was addictive and dangerous to health. However, although many youth also identified cigar use as being a health risk, we identified in interviews a recurrent notion that both cigars and marijuana were somehow more "natural" or "fresh" than cigarettes and less likely to cause addiction or other negative effects.

For example, one participant, asked to define a cigar, said,

> It's a natural kind of cigarette; it doesn't have, like all that. . .like the stuff that's in cigarettes, I don't think are in cigars; it's more natural. (Female, FG 6)

Another argued that marijuana was better than tobacco

> 'cause God grew it, it's herbal, and you can't get addicted to weed as much as to tobacco. (Female, FG 2)

One youth participant asserted that

> If you just picked a [tobacco] leaf, and you smoke it like that, I don't think you would get addicted to it, 'cause there's no nicotine in it, it's just fresh. (Male, FG 4)

These comments suggest that "naturalness" is equated with harmlessness, absence of unhealthful additives, or, for some, perhaps even healthfulness, a misperception that contrasts with participants' near-universal acknowledgment that cigarettes are harmful to health and that appears at odds with their response to the question about the health risks of cigars. Youth were widely aware of the addictive nature of nicotine, but as the last comment and others like it revealed, nicotine was often regarded as something "added" in the process of manufacturing cigarettes and/or not found in other tobacco products such as cigars.

When cigars were used for blunts (in a process in which the loose filler tobacco in blunt-type cigars is removed, discarded, and replaced with marijuana), there seemed to be some confusion among group participants as to whether the cigar residual should be regarded as tobacco, and if so, how harmful it might be. Some believed that the removal of the filler tobacco removed all the tobacco, leaving only "paper." Others acknowledged that the outer wrapper of a cigar was tobacco leaf but were unsure as to whether this type of tobacco had the negative effects of the tobacco in cigarettes. Cigarettes were identified as having additional negative substances that were generally not thought to be part of cigars, as the following quotes from youth participants from different groups reveal:

> Cigarettes have nicotine and tar and stuff in it. (Female, FG 2)
> I think that one cigar has about as much tobacco as a whole pack of cigarettes, but now it doesn't have everything else that a cigarette has. (Male, FG 1)
> The tip of the cigarette is the worst part. That's why I spit it back out. . .Like when you first light it, the first hit is the worst one. That's where all the chemicals be. (Female, FG 5)

> *Interviewer:* What do you guys think is more dangerous to your health, cigarettes or cigars?
> *Everyone:* Cigarettes!
> *Interviewer:* Really? Why?
> *Youth (speaking at once):* Cause they got nicotine, and the cancer risks/It's an addictive drug and it make you want to keep having more of it
> *Interviewer:* You don't think a Black and Mild is nicotine?
> No/Yeah/Black and Mild is straight tobacco with a paper.
> (Males, FG 1)

Participants in all groups agreed that cigarettes were dangerous and most could readily name specific negative health consequences of cigarette use, including cancer. However, most participants were less sure about the risks of cigar use and about the number of cigars it would take to equal the effects of a cigarette or pack of cigarettes. Counter-marketing commercials produced by the California Department of Health Services and the San Francisco Tobacco Free Project, televised in the San Francisco area where the

groups were conducted, had shown a man with numerous cigarettes in his mouth to illustrate the amount of nicotine in a single large cigar. This numeric visual comparison had apparently made an impression, as participants spontaneously volunteered their notions about the relative equivalencies of cigars and cigarettes. However, their understanding of the facts varied.

> I heard that cigars is like smoking a whole pack of cigarettes. (Male, FG 1)
> I heard a guy say a Black and Milds was equal to, like, forty cigarettes. (Female, FG 6)
> I think [cigars] are bad for you, too, but not as bad as cigarettes. (Male, FG 1)
> Cigars are more [likely] to cause cancer, because they're bigger than cigarettes, and they got more tobacco. (Male, FG 4)
> I think cigars is more hazardous in some cases than cigarettes, 'cause...they take longer to smoke, 'cause I read somewhere, on average, it take about an hour or something to get a cigar to, like, maybe to the length of a cigarette, so I think it's more [hazardous], long term, and especially for people who smoke them every day. (Male, FG 4)

In general, marijuana was viewed as not harmful or as less harmful than tobacco, and cigars as somewhat less harmful than cigarettes.

> I just said I'd rather smoke marijuana. I'm just saying that because of the simple fact that I think that if I smoke weed, that's on the earth. God put it there for us, so we ain't gonna catch no kind of cancer, no lung cancer, nothing. But tobacco and all that, you gonna catch it...man kind of made that. (Female, FG 5)
> Now, I ain't never actually heard of nobody really get sick off no weed, but now cigarettes, it make you cough more, it seem like you got more mucus. (Male, FG 1)
> You gotta think about your kids in the near future, whether you want them to start smoking, what you want them smoking—like, I'll let my kid start smoking weed whenever he wants to, but now I ain't gonna let him smoke no tobacco. (Male, FG 5)

3.3. Perceptions of public health and industry targeting

Few group participants could recall receiving cigar-related health education in school or from health practitioners. However, several recalled the television advertisement mentioned above as being the only public health message about cigars that they remembered. They did recall television counteradvertisements against cigarette smoking. Several mentioned one featuring a smoker with a tracheostomy. Groups pointed out that tobacco control media campaigns focused primarily on cigarette smoking, which the participants regarded as more common among White and Asian youth than among African Americans. This absence, when noted, was sometimes interpreted by participants in terms of racial discrimination or disparities in public health efforts, since products they felt were more likely to be used by African Americans (such as Black and Milds and menthol cigarettes) were rarely the focus of such efforts.

> Mostly Asian, White kids, I'm not trying to be racist, but you know, Caucasian kids mostly smoke cigarettes (Male, FG 1)

You don't see no billboards talking about no Black and Milds, or menthol, or something like that. (Male, FG 1)
Yeah, and they don't put no warning on the [Black and Milds] pack, either. (Male, FG 1)
I don't know, we...never really learned no statistics about cigars. (Male, FG 1)
It seems like they stress cigarettes more than cigars. (Male, FG 4)
They don't teach us nothing about cigars. (Male, FG 1)
They're (counteradvertisements) all about cigarettes (Female, FG 6)

Although the group responses were mixed when asked about whether they felt they were targeted by the tobacco industry specifically as African Americans, the majority of groups felt they were being targeted more generally as youth, especially in the marketing of new products. They repeatedly called attention to the development of new blunt-type cigar products, including flavored tobacco leaf "papers" for rolling blunts that had been introduced commercially since this practice had become popularized among youth.

They know kids can't really smoke that much tobacco, buying them like that. That's why they make 'em, like when they came out and people started smoking Phillies [brand of cigar used for blunts] and blunts and stuff, they started bleedin' the shelves from the stores [selling a lot of blunts cigars]. I think they knew what was happening.
They figured it out. (Males, FG 1)
'Cause like when people started smoking blunts there was only one type of Philly, and that was the regular Philly, right, then they came out with the new Chocolate Philly, it's supposed to taste like chocolate when you smoke, and they do, sort of. And now they got these new Philly called Black Tight, which is supposed to be better than a regular Philly...(Male, FG 1)
I think they are targeting kids...since we're talking about cigars, they do have big gum ones that look like cigars, where they [are] in the paper like the Philly, and they got the little cover. But the only [way you can tell the difference] is that they [are] like, pink and green...(Male, FG 4)
They are targeting at kids, because when you're kids, once you get on it, you stuck on it, and that's gonna keep you on it...They trying to get the kids while they young. (Male, FG 4)

Another youth, encapsulating the position of tobacco control advocates who argue against making "kids" the major focus of tobacco control efforts rather than working toward a tobacco-free society for everyone, observed that

Kids nowadays, they trying to be more mature, so they trying to do what older people do, like sneaking into clubs 21 and older, so they gonna smoke just because they see older people doing it. So there's no need to advertise. (Male, FG 4)

Across all groups, most denied ever noticing any cigar advertising. Their marketing exposure seemed primarily derived from viewing rap music videos, movies, and television in which celebrities such as Michael Jordan (sports star), Will Smith (rap artist and actor), Snoop Doggy Dog, Ice Cube, Tupac Shakur, Master P, Notorious B-I-G (all rap artists), and others were frequently noted to smoke cigars. Each of these celebrities was mentioned by youth either in focus group discussions or in written responses to an open-ended question on the questionnaires. Most were mentioned several times.

Little kids, they look up to TV stars like more than we do. I mean, they look at Will Smith and be like, 'wow, he's cool.' You know what I'm saying? They'll be like, wow; it's just like a

fantasy for them, so they see him smoke or something like that, and little kids automatically get in their head, 'I've gotta do that, he's doing it, he's on television.' (Male, FG 6)
You know, in the movies, it's like every time you see somebody smoke some, it's usually a cigar. (Male, FG 1)

3.4. Obtaining cigars

All groups agreed that access to cigars was relatively easy and identified neighborhood convenience stores or liquor stores as places where cigars could be purchased by minors. Several participants felt that it was easier for them to buy cigars in lower income neighborhoods, especially if they were known to the merchants. In general, groups agreed that cigars were at least as easy or sometimes easier to obtain than cigarettes, either through direct purchase, asking an adult to buy them (Ribisl, Norman, Howard-Pitney, & Howard, 1999), or through the informal street marketplace.

Youth 1: Can't get no cigarettes. (Female)
Youth 2: On my side of town, they have signs on the window that say something like no sale without ID or something. (Male)
Interviewer: You mean it's easier to get a Black and Mild than a cigarette?
Youth 2: Yup, and Phillies and all that stuff. (Male; all FG 3)

The whole thing is, regardless of if they make it harder [for minors to purchase tobacco], they can still get it from the big homey on the block, or get it from their older cousin, or somebody out there in the street; you can just go ask. Their brother's homey, whatever, they ask for a cigarette, and they give it to him. So it's like easy access, any way it go. (Male, FG 6)

Familiarity with local merchants was mentioned in several groups as making it easier for youth to purchase tobacco.

Like some stores, they'll sell to some people, they won't sell it to others. 'Cause they might get in trouble. It might be a setup. (Female, FG 6)
My family that doesn't live around here, [if] they with me and they go to the liquor store with me, and they want something and they can't get it, I get it for them, 'cause the people know me, they know I'm not gonna snitch on them. (Female, FG 3)

Groups agreed that youth typically purchased cigars as singles, and several drew attention to the fact that (at the time of the study) cigar wrappers carried no warning labels similar to those required on packs of cigarettes.

The youth were skeptical that adults were genuinely concerned about issues of cigar and blunt use among adolescents. They also noticed when teachers smoked and experienced these adults' admonitions against smoking as hypocrisy or weakness.

Somebody was in the back of my music class just rolled up one, smoked it; the teacher didn't even smell it, teacher kept playing piano and everything, didn't say anything. . .it was a blunt,

right in his face (FG 1, male)
Cops don't even care; they know (FG 1, male)

Interviewer: What about the teachers, do they talk about tobacco sometimes?
V1: No.
V2: They be smoking themself...
V1: They ain't going to do nothing. (FG 2, females)

I think about some teachers, they be trying to pull it off, like, they try to act all goody-goody and teach you in class not to smoke. And like you won't even catch them smoking, but I can smell it on their breath. This one teacher at school, Mr. R., oh, man!...His breath smell like an ashtray. But he try to cover it up with peppermint and coffee. ...They try to teach you smoking is bad, but he come in and you smell it on his breath, and you catch him in the parking lot. (FG 6, male)

4. Limitations

Focus groups do not provide statistically generalizable information. Their usefulness lies in their capacity for uncovering unexplored dimensions, context, and depth on an issue in the participants' own terms. The segment of African American youth who participated in our study should not be viewed as typical or as representative of all African American youth. Youth who did participate were volunteers from two local areas who specifically said they were "willing to participate in a tape-recorded discussion about tobacco." There are likely to be differences in African American youth perceptions in other geographic areas, although our findings are similar to those uncovered in earlier work in other states (Adams et al., 1999b).

5. Discussion

The youth in this study, like youth everywhere, were keen observers. They had noted, for example, the lack of warning labels on cigars, the absence of cigar-specific health education in school or in the media, the use of cigars by the wealthy and successful, including rap celebrities, the relative unconcern of authority figures over cigar use, and the easy availability of cigars (including new, flavored products especially for blunts) in their own neighborhoods. Reasonably, they interpreted these cues as indications that cigars were not a major health risk and that they offered social cachet. Although almost all the youth identified cigars as "bad for health" in the written pre-discussion survey, the study identified a disjuncture between that abstract belief and the situated understandings youth expressed about cigars in the discussions.

The discourse of "naturalness" that emerged from these groups, if shown to be more widespread, may be of concern for tobacco control efforts with youth. Recent cigarette brand

repositionings, such as the Winston "no additives" campaign, have widely publicized the substances added to cigarettes. It appears that some youth may be taking the lack of cigar-specific tobacco education and countermarketing as an indication that cigars do not contain many of these same substances, including nicotine. Regarding some tobacco products as "natural" may also make tobacco control efforts less likely to succeed, since it may in turn make tobacco use appear "natural." As Stone (1989, 1997) and others have pointed out, when something is regarded as "natural," it is more difficult to make a case that intervention is needed to address it.

While focus groups are not statistically projectable, this study's findings corroborate and extend those of an earlier study (Adams et al., 1999b) and suggest the need to address how tobacco control efforts have focused almost exclusively on cigarettes, allowing misperceptions about the risks of cigar and cigar/marijuana smoking to take root. The identification of a "naturalness" discourse in discussing the continuum of perceived risks of using various substances calls for further investigation into the ways this discourse may be shaped by marketing efforts, how youth weigh various risk-taking behaviors and reconcile them with abstract beliefs about risk, and the ways social and policy influences shape their developmentally related discourse of risk.

This study suggests that cigars may be positioned by some African American adolescents along a continuum of risk, in which cigars are viewed as less harmful and more "natural" than cigarettes. Perceptions of risk are not merely interesting "subjective" findings but are important determinants of actual use patterns (Bachman et al., 1998) and are not solely determined by beliefs. School-based educational interventions based on an "information deficit" model have been shown to be somewhat ineffective in youth smoking prevention (Lantz et al., 2000), perhaps because they tap only the abstract reasoning youth use in formulating beliefs and do not address other social and cultural factors that shape engaged reasoning about risk perceptions. Better coordinating such programs with broader efforts to engage youth in the tobacco control policy discourse (such as the highly successful "Truth" campaign in Florida; Hicks, 2001; Sly, Heald, & Ray, 2001; Sly, Hopkins, Trapido, & Ray 2001; Zucker et al., 2000), developing culturally specific interventions that challenge constructions of "naturalness," and ensuring that education, prevention, intervention, and policy efforts address all tobacco products consistently might help reshape risk misperceptions about cigars.

Acknowledgments

This study was funded by an award from the UCSF/Mt. Zion Health Systems Cancer Center Clinical Investigator Research Program (CHR approval # H7628-15776-01). We would like to acknowledge the efforts of Annie Larson, BA for data entry and project assistance, Daniel Halperin, PhD, who consulted on study development and moderated three of the focus groups, Lynn Wenger, MSW, MPH, who assisted with data cleaning, and the participants of the Writing Seminar at the Institute for Health Policy Studies, UCSF, who commented on an earlier draft.

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TC Online First, published on November 18, 2010 as 10.1136/tc.2010.038141

Evaluation of the removal of point-of-sale tobacco displays in Ireland

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Received 27 May 2010
Accepted 21 September 2010

ABSTRACT

Aim To evaluate the short-term impacts of removing point-of-sale tobacco displays in Ireland, implemented in July 2009.

Methods Retailer compliance was assessed using audit surveys in 2007, 2008 and 2009. Using a monthly survey of 1000 adults carried out since 2002, changes in smoking prevalence were assessed; attitudes were measured using extra questions added for a 10-month period before and after the law. Youth responses were assessed using a cohort of 180 13–15 year olds, interviewed in June and August 2009.

Results Immediately following implementation, compliance was 97%. Support for the law increased among adults after implementation (58% Apr-Jun vs 66% Jul-Dec, $p<0.001$). Recall of displays decreased significantly for adults (49% to 22%, $p<0.001$), more so among teenagers (81% to 22%, $p<0.001$). There were no significant short-term changes in prevalence among youths or adults. The proportion of youths believing more than a fifth of children their age smoked decreased from 62% to 46%, $p<0.001$). Post-legislation, 14% of adult smokers thought the law had made it easier to quit smoking and 38% of teenagers thought it would make it easier for children not to smoke.

Conclusions Compliance was very high and the law was well supported. Recall of displays dropped significantly among adults and teenagers post-legislation and there were encouraging signs that the law helped de-normalise smoking.

INTRODUCTION

Point-of-sale tobacco displays remain one of the main channels for tobacco marketing following the implementation of bans on advertising.[1 2] In many countries such as the UK, there is extensive involvement of the tobacco industry in maintaining displays that have grown in prominence and size in recent years, and are frequently found behind cashiers, near sweets and in ways that obscure health warnings.[3 4] Tobacco promotions at the point of sale have also been found to be higher among stores close to schools and in more deprived neighbourhoods.[5–7] The importance of point-of-sale displays for marketing and the resources utilised for this purpose are spelt out clearly in tobacco industry documents.[1 8 9] Research has shown that smokers rarely use point-of-sale displays in deciding which brand of tobacco to purchase, with one study indicating that only 1% of smokers always, and less than 10% sometimes, decided which brand of tobacco to purchase at the point of sale.[10] However, point-of-sale displays can act as cues to purchase tobacco; studies have shown that between 10% and 25% of smokers report that they stimulate unplanned or impulse purchases of cigarettes with some indication that younger smokers may be more likely to notice cigarette displays and make impulse purchases.[11 12] These studies also showed that significant proportions of smokers agree that removing tobacco displays would make it personally easier not to smoke and help to maintain the resolve not to smoke when attempting to quit, a finding supported by qualitative research with smokers in New Zealand.[13] A recent systematic review found strong evidence that point-of-sale advertising and displays increased susceptibility to smoking and uptake of smoking among youths, and concluded that their removal was warranted.[14] This conclusion is supported by recent longitudinal research with schoolchildren.[15]

Over recent years, Ireland has been at the forefront of tobacco control internationally,[16] in particular, being the first country to introduce national comprehensive smoke-free legislation in 2004. On 1 July 2009, Ireland removed point-of-sale tobacco advertising and displays through further provisions of its Public Health (Tobacco) Acts 2002 to 2009, becoming the first country in the European Union to do so, but following similar legislation in Iceland, Thailand and some provinces and territories in Canada. The legislation prohibited advertising of tobacco products in retail premises and mandated that tobacco products must be stored out of view of customers. It also prohibited vending machines except in licensed premises and registered clubs (in accordance with Regulations), and that all persons selling tobacco products by retail had to register with the Office of Tobacco Control (OTC).

There has been very little in the peer reviewed literature assessing the impact of point-of-sale removal. This study reports the findings of a multifaceted evaluation focusing on the removal of the tobacco point-of-sale displays in the Irish legislation, the process of implementation and on the short-term impacts of the legislation. Impact on tobacco sales are reported in a separate paper.[17]

METHODS

We developed a logic model (figure 1) with process and outcome indicators to underpin and structure the evaluation, adapted from similar models developed elsewhere.[18 19] Data sources were identified following literature searches and discussions with funders, stakeholders and academics in Ireland. Extensions to existing data gathering were commissioned to fill some of the identified gaps,

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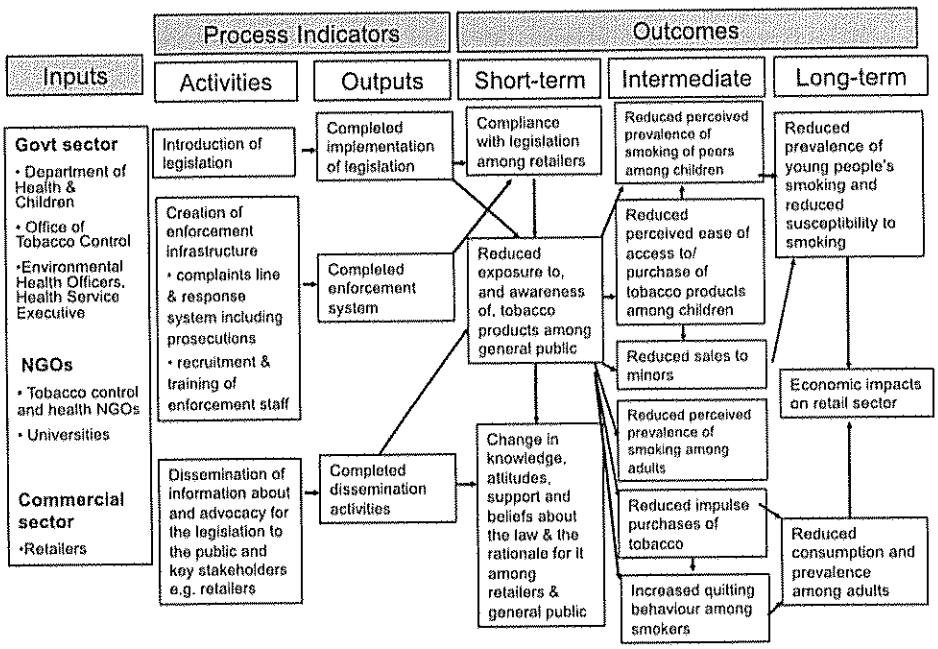

Figure 1 Logic model for evaluation of legislation to remove point-of-sale tobacco displays.

but the extent of this was limited by financial and time constraints. We extracted and analysed relevant data from each source. Ipsos MRBI who carried out the research adhere to the ICC/ESOMAR International Code on Market and Social Research Practice.[20]

Sources of evidence

Document research

Irish websites and legislation were searched to describe contextual information, the process of introduction and implementation of the regulations, enforcement and communication strategies.

Retail audit surveys

Compliance with the legislation was measured using data from three retail audits commissioned by the OTC in Ireland and carried out annually in July and August in 2007, 2008 and 2009 by Ipsos MRBI with quota samples of 1309, 1203 and 1209 retail outlets, respectively. These outlets were visited by two researchers, including one minor (aged 14–17 years old) who attempted to purchase cigarettes using a standardised protocol to ascertain sales to under 18 years old. The adult researcher was responsible for carrying out a visual inspection of the premises to assess for the presence, nature and location of tobacco advertising and tobacco product displays in stores.[21–23]

Adult surveys

Since July 2002, the OTC has commissioned a monthly omnibus telephone survey conducted by Ipsos MRBI. Random digit dialing is used to identify over 1000 participants each month and a stratified quota sampling approach is utilised whereby quotas are set by gender, age, social class (using A, B, C1, C2, D, E occupational groupings[24]) and region to achieve a representative sample of the Irish population over 15 years of age. These surveys (to July 2010) were used to assess any changes in adult cigarette smoking prevalence in the 12 months following the legislation. From April 2009, for a period of 10 months, three questions were added to assess recall of, and views on, tobacco displays and their removal (table 1).

Youth surveys

Ipsos MBRI also carried out two youth surveys before and after the legislation. Face-to-face, in-home interviewing was conducted among 214 Irish teenagers aged 13–15 years, following parental permission, in June 2009. The survey used stratified random sampling based on four regions (Dublin, rest of Leinster, Munster and Ulster), with quotas set for age, gender and social class (of parental occupation,[24]) to ensure the survey participants reflected the national distribution of children aged 13–15 years in Ireland. In August 2009, the original 214 teenagers were invited for a second interview. At both interviews, questions were asked about smoking, attitudes and the removal of tobacco displays (table 1).

Statistical analysis

For the adult surveys, we used data weighted to represent the target Irish population in terms of age, gender, social class and region. The changes in the proportions of subjects recalling seeing tobacco displays in shops, supporting a complete ban on tobacco displays, and among smokers, those believing that the legislation to remove displays would make it easier for smokers to stop, were explored by time series plots. For all of these outcomes, the response 'I don't know' was taken as a negative response (we have done this to be conservative, although we acknowledge that some respondents sincerely did not know or selected this response to reflect the fact that they may have mixed feelings about this complex issue). We also combined the data from each of the surveys pre-legislation and post-legislation and used χ^2 tests to determine the statistical significance of changes in responses to each question before and after the legislation. We used an ARIMA interrupted time series analysis to assess whether the introduction of the legislation altered the level or trend in smoking prevalence in the 12 months post-legislation compared to the previous 84 months, after allowing for underlying trends, and autocorrelation.

For the youth survey, participants who responded to both interviews were included in the analysis. We compared the characteristics of these participants with those responding only to the interview pre-legislation, and used weighted data in

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Table 1 Questions on the tobacco display ban in the adult monthly omnibus survey aged 15+ (n=1000) and youth survey (n=214 at baseline and n=180 at follow-up)

Questions	Responses	Timing
Adults and children		
In the last month, can you recall seeing any cigarette or tobacco packs displayed for sale in shops?	Yes/No/Don't know	Before and after
Adults only		
Do you support or do you not support a complete ban on the display of cigarette and tobacco packs inside shops?	Support/ Do not support/ Don't know or no opinion	Before and after
Do you think that removing cigarette and tobacco packs from view in shops will make (has made) it easier for smokers to quit smoking or will it make (has it made) no difference? (For smokers only)	Will make (Has made) it easier/ Will make (Has made) no difference/Don't know	Before (After)
Children only		
Do you smoke at all nowadays?	Yes, every day/ Yes, at least once a week, but not every day/ Yes, less than once a week/ I used to smoke, but I don't now/ I have never smoked	Before and after
If you, or someone your age, tried to purchase cigarettes in a shop, do you think you would be successful?	Yes/No/Don't know	Before and after
Out of 100 children/classmates your age, how many do you think smoke cigarettes at least once a week? Please record answer between 0 and 100	Number between 0 and 100	Before and after
Do you think that removing cigarette and tobacco packs from view in shops will make it (has made it) easier for young people not to smoke or will it make (has it made) no difference?	Will make (Has made) it easer/ Will make (Has made) no difference/ Don't know	Before (After)
And did you say don't know to the last question because you were not aware that cigarette and tobacco products have been removed from view in shops or did you say don't know for another reason?	Yes/No/Don't know	After

analysis to match sociodemographic (age, gender, social class and region) characteristics to the general population in Ireland. We defined as current regular smokers those who said "yes" to the question about whether they were smoking one or more cigarettes a week. We categorised perception of the proportion of smokers of their age out of 100 who smoke as 0–20% (about right), and 21–100% (overestimate), based on a conservative estimate that around 20% of Irish teenagers of their age smoked.[25] The proportion of current smokers, perceived success if attempting to purchase cigarettes, proportion overestimating the prevalence of children their age who smoke, recall of seeing tobacco displays and opinions on the effects of the legislation on children's smoking were calculated before and after the legislation, and compared using conditional logistic regression on the paired data. For all outcomes, the response "I don't know" was combined with the response "no" or "no difference" for logistic regression analysis, and measures of effect are presented as ORs and 95% CIs estimated in the conditional logistic regression model.

RESULTS

Legislation and implementation

The provisions of the Public Health (Tobacco) Act, 2002 pertaining to retail displays and advertising became the subject of a legislative challenge by the tobacco industry (specifically the three main companies in the Irish market: Gallaher [Dublin] Ltd, PJ Carroll and Co Ltd, and John Player and Sons Ltd) and others, which interrupted the introduction of aspects of the 2002 Act including the point-of-sale legislation. However on 31 January 2007, 6 days before the case was about to go into court, the challenge was withdrawn by the plaintiffs who conceded all costs to the state which facilitated the signing of a commencement order in October 2008 to give effect to the legislation from 1 July 2009 (SI numbers 404 and 405 of 2009). Prior to this, most forms of tobacco promotion had been prohibited except point-of-sale tobacco displays and in-store advertisements and promotion. In May 2009 guidance was provided by the Department of Health and Children and OTC[26] indicating that no advertising of tobacco products was permitted in retail premises; retailers must store tobacco products out of view, within a closed container or dispenser (but not required to be under the counter); retailers could use a pictorial list (in accordance with Regulations) to inform a member of public intending to purchase tobacco as to the products available; and retailers had to display a sign at their premises informing the public that tobacco products could only be sold to persons over 18 years of age. As stated earlier, the legislation also prohibited most vending machines and introduced a registration system for retailers selling tobacco. Enforcement was to be carried out by environmental health officers of the Health Service Executive and if convicted for an offence, the premises to which the conviction related would be suspended from the register of retailers and would not be allowed to sell tobacco for a period defined by the courts. This was in addition to a fine of up to €3000.

Compliance

In 2009 the retail audit found 97% compliance with the requirement to remove cigarettes out of sight, the 3% of stores with tobacco on display post-legislation contrasting with 99% of stores in the audits from 2007 to 2008. Compliance with the legislation varied across type of store, with the chains and larger stores having the highest compliance and smaller independent stores the lowest (95%).[23] Similarly, tobacco advertising in the stores visited was virtually ubiquitous in 2007 (92% of stores) and 2008 (89%) but had virtually disappeared following the legislation (2%). Sales to minors, during test purchases attempted during the audits, decreased from 48% in 2007, to 40% in 2008 to 32% in 2009.

Adult surveys

Point-of-sale assessment

The percentage of interviewees who recalled seeing any cigarette or tobacco packs displayed for sale in shops in the last month,

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dropped from 49% before to 22% after the legislation (Percentage reduction in recall of displays post-legislation versus pre-legislation 27%, 95% CI 25% to 29%; p<0.001; figure x online only). The proportion responding 'don't know' was no more than 5% across all months and did not vary in any consistent way.

Separate analysis of smokers and non-smokers revealed that smokers were more likely to notice tobacco displays before the legislation (59% smokers and 46% non-smokers, p<0.001); however, after the legislation, smokers were less likely to recall noticing tobacco displays than non-smokers (20% vs 23% respectively, p=0.002; figure x online only). The effect of the law on recall was therefore greater in smokers than in non-smokers (p<0.001).

The proportion of people supporting removal of tobacco displays increased from a mean of 58% in the 3 months before the legislation to a mean of 66% in the 7 months afterwards (percentage increase 8%, 95% CI 6% to 11%, p<0.001) (figure 2); support was slightly greater in non-smokers than smokers both before (59% and 54% respectively; p=0.008) and after (67% and 63% respectively; p<0.001) the law. The data suggest that support for the legislation increased shortly after the legislation and the increase was sustained.

There was a small but statistically significant (p<0.001) fall in the proportion of adult smokers who thought that removal of tobacco displays had made it easier to quit smoking from a mean of 20% in the 3 months before to a mean of 14% in the 7 months after the law (percentage decrease 6%, 95% CI 3% to 10%, figure y online only). The proportion believing that the ban made it easier to quit reached a low, at 10%, 3 months after the ban came into force, but appears to have been gradually rising since that time.

Prevalence

The implementation of the legislation caused no immediate significant change in smoking prevalence (p=0.41; estimate of effect −0.171 (95% CI −0.580 to 0.237); figure z online only).

Youth surveys

Of the 214 teenagers interviewed pre-legislation, 180 (84%) were successfully followed up and were thus included in the analysis. The characteristics of those followed up were similar to those lost to follow-up, and to the target population in most attributes, but tended to under-represent the more deprived groups (data not shown).

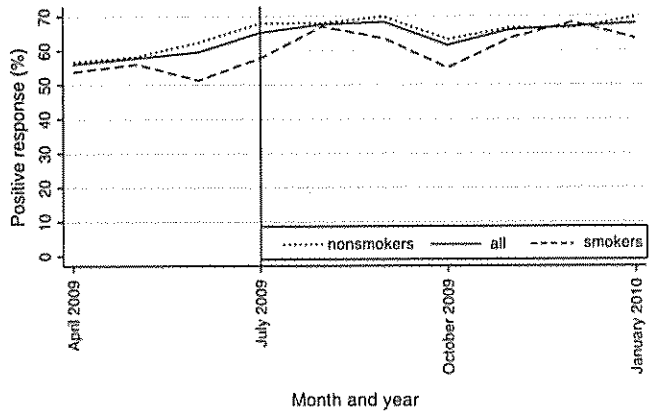

Figure 2 Support for a complete ban on tobacco displays among adults, overall and according to smoking status.

In all, 10% of teenagers reported being current regular smokers pre-legislation, less than 1% reported smoking but less than once a week, and a further 6% of teenagers reported having smoked in the past but not at the point of interview; by post-legislation, 10.5% of teenagers were reporting being current regular smokers, 3% reported smoking but less than once a week, and 5% reported having smoked previously (table 2). The increase in current regular smoking post-legislation was not statistically significant (p=0.90).

Recall of seeing cigarette or tobacco displays in shops in the last month dropped from over 80% of teenagers pre-implementation to 22% post-implementation (p<0.001). Other changes were that the percentage of teenagers thinking that they, or children of their age, would be successful in buying tobacco dropped from 32% before the law to 25% afterwards, though this difference was of borderline statistical significance (p=0.10). The proportion thinking that more than 20% of children their age smoked decreased significantly from 62% before to 45% after the legislation was implemented (p<0.001).

After the legislation, 38% of teenagers thought the removal of tobacco from view had made it easier for children not to smoke. This figure was slightly, but not statistically significantly, lower than the percentage who thought that removing point-of-sale displays would make it easier for children not to smoke pre-legislation (47%, p=0.07).

Discussion and conclusions

This research has demonstrated that the removal of point-of-sale displays in Ireland was largely effective at removing cigarette and tobacco packs from view. A retail audit carried out within 2 months of the new legislation coming into force found 97% compliance with the law pertaining to removal of displays. Less than half the proportion of adults who reported seeing cigarette or tobacco packs for sale prior to the legislation, reported seeing them after the law was implemented. The drop was greater among youths, where just over a quarter of those reporting seeing tobacco packs for sale prior to the legislation, reported seeing them after implementation of the law. The law appeared to be effective at de-normalising smoking, at least in the short term: as evidenced by decreases in the proportion of children thinking that more than 20% of teenagers smoke. Over a third of teenagers, nearly 2 months after the legislation, thought that removal of the displays had made it easier for children not to smoke.

This study has several limitations. The Public Health (Tobacco) Acts 2002 to 2009 legislation removed point-of-sale displays alongside removal of point-of-sale advertising as detailed above. The survey questions were very specific and asked about tobacco pack displays but it is possible that the removal of point-of-sale advertising also impacted on the responses made by the adults and youths in our surveys. The effects of the removal of point-of-sale displays could be confounded by other tobacco control measures introduced in recent years, although apart from the smoke-free legislation introduced in 2004, the only other major policies implemented were annual tax increases on tobacco products (averaging €0.39 increase annually over the last four years) and a ban on packs of 10 cigarettes at the end of May 2007. Both the adult and youth research utilised quota sampling techniques which may have introduced bias. Finally, only short-term impacts of the legislation were measured and it is possible that results would be different if followed up after a longer spell post-legislation. This is particularly pertinent for the youth study where a very short timescale elapsed before follow-up, and together with the small

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Table 2 Youth questionnaire responses before and after legislation, with effect sizes represented by ORs for post-legislation compared to pre-legislation responses from conditional logistic regression

	Pre-legislation (n=180)	Post-legislation (n=180)	OR post-legislation compared to pre-legislation (95% CI)	p Value
Current regular smoker (>1/week or more)				
No	162 (89.7%)	161 (89.5%)	Reference	0.90
Yes	18 (10.3%)	19 (10.5%)	1.10 (0.24 to 4.98)	
If you try to buy, likely to be successful?*				
Yes	57 (31.8%)	45 (25.2%)	0.61 (0.34 to 1.09)	0.10
No	106 (59.1%)	121 (67.2%)	Reference	
Don't know	16 (9.1)	14 (7.6%)		
No out of 100 children your age who smoke weekly?†				
21–100	112 (62.3%)	82 (45.5%)	0.30 (0.16 to 0.57)	<0.001
0–20	56 (31.2%)	78 (43.3%)	Reference	
Don't know	12 (6.5%)	20 (11.2%)		
In last month, recall seeing tobacco displays in shops?*				
Yes	146 (81.4%)	40 (22.3%)	0.05 (0.02 to 0.14)	<0.001
No	28 (15.4%)	131 (72.7%)	Reference	
Don't know	6 (3.2%)	9 (5.0%)		
Will removing cigarette/tobacco packs from view make it easier not to smoke?*				
Easier	84 (46.8%)	69 (38.1%)	0.62 (0.36 to 1.04)	0.07
No difference	82 (45.3%)	88 (48.7%)	Reference	
Don't know	14 (7.9%)	24 (13.2%)		

*'No' (or no difference) and 'Don't know' responses combined for logistic regression analysis. OR is therefore the odds of responding 'Yes' post-ban compared to pre-ban.
†'0–20' and 'Don't know' combined, for logistic regression analysis. OR is therefore the odds of responding '21–100' post-ban compared to pre-ban.

sample size involved, indicates that these findings should be seen as preliminary. Larger samples of youths should be studied over long time periods to allow for seasonal effects such as greater initiation during summer months[27] to be taken into account.

Removals of point-of-sale displays are introduced predominantly to protect children from the pernicious effects of tobacco advertising.[28] In support of this premise, it is noteworthy that a greater proportion of youths (81%) reported seeing the packs before the legislation compared with adults (49%) and there was a greater decline in recall of seeing tobacco packs post-legislation among youths compared to adults. Concerns that point-of-sale displays contribute to the perception that tobacco products are normal consumer products, appear to be corroborated here. The implementation of the legislation contributed to a de-normalisation of tobacco as evidenced by declines in the proportion of children believing that they, or their peers, would be able to purchase tobacco successfully and in the proportion thinking, erroneously, that more than 20% of teenagers smoked. Although we cannot tease out the extent to which these changes are due to the removal of point-of-sale displays, point-of-sale advertising or vending machines, they suggest that measures to reduce visibility of tobacco products and their marketing are effective at de-normalising smoking.[29 30] Furthermore, after the legislation, 38% of teenagers thought the removal of point-of-sale displays had made it easier for children not to smoke, although this proportion was smaller than the 47% believing this before implementation.

There was minimal effect of the legislation on adult smoking prevalence in the 12 months after the ban was introduced. Removal of point-of-sale displays is not hypothesised to have an immediate impact on smoking prevalence (see figure 1); we believe that this is likely to manifest itself in enhanced quit rates among smokers and reduced smoking prevalence and sales over a longer time scale largely because of the addictive nature of smoking and the fact that many smokers who want to stop frequently make several unsuccessful attempts before eventually succeeding. Although the proportion of adult smokers thinking that removal of tobacco displays made it easier to quit smoking decreased slightly post-legislation, nevertheless, in December 2009, 6 months after its implementation, nearly one in five smokers reported that the ban had made it easier to quit smoking. This finding supports other studies which suggest that the presence of cigarette pack displays makes it more difficult for smokers to quit.[31]

The removal of point-of-sale displays was a popular measure being supported by the majority of adults both before and after implementation, with a slight increase over time. This is similar to findings of other research that, in general, tobacco control measures are popular, even among smokers, and support tends to increase over time.[32 33]

It is of some concern that even after the law was implemented, just under a quarter of adults and youths reported seeing tobacco packs for sale. It is unclear where they are seeing these displays as the audit confirmed that almost all retailers were compliant with the law, consistent with findings from other countries.[34] Small independent retailers had the highest level of non-compliance at 5%, which is a possible source.[23] Alternatively, or in addition, it could be that people are reflecting the fact that they are shown a pack during the sales transaction; cigarette sales were still possible through vending machines and although no advertising was allowed, it is possible that these were a source of their recollections. Perhaps also, some adults were mistaken and thought they had seen tobacco packs, but were actually remembering what stores were like before the ban. Further research to check this again over a longer time period and to ask where they saw the displays would be interesting.

The Framework Convention on Tobacco Control[35] recommends that the display of tobacco products at points of sale be prohibited and the evidence from Ireland indicates, for the first time, that implementing the removal of point-of-sale displays is feasible on a national scale. The removal of point-of-sale displays is being challenged by the tobacco industry worldwide, for

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What is already known on this subject

- Point-of-sale displays remain one of the main channels for tobacco marketing following tobacco advertising bans.
- Industry documents clearly spell out the importance of point-of-sale displays for marketing.
- Survey data and experimental research have shown that point-of-sale displays increase susceptibility to smoking and uptake of smoking among youths.
- There is very little published in peer-reviewed literature assessing the impact of point-of-sale removal.

What this paper adds

- This paper reports short-term impacts of legislation which, inter alia, removed point-of-sale tobacco advertising and displays in Ireland, implemented on 1 July 2009 following a protracted challenge involving the leading tobacco companies in Ireland (which they dropped just before coming to court).
- Compliance with the law was very high and recall of displays dropped significantly among adults and teenagers post-legislation.
- The law was well supported among adults.
- There were encouraging signs that the law helped to de-normalise smoking among youths and provided a more supportive environment for adults to quit and children not to smoke.

a variety of reasons[36] and this probably belies the importance of these displays in its marketing efforts. The experience in Ireland, of mounting a legal challenge and then withdrawing it as it was about to come to court, suggests that the motives behind such cases are to deter other countries from adopting similar legislation and ensuring time and financial resources of regulators and governments are converted away from implementation and the development of new tobacco control laws. In Ireland it also had the effect of delaying the introduction of other aspects of planned legislative interventions while the court decisions were awaited.

In conclusion, removal of point-of-sale displays in Ireland was a mostly popular measure, including among smokers. At short-term follow-up, the legislation appears to be contributing positively to the de-normalisation of smoking among children, and providing a more supportive environment for adults to quit and children not to smoke. In our view, any measure, that appears to be having positive impacts on deterring smoking among children and which a significant proportion of young people themselves perceive to be supportive of non-smoking, should be implemented in other jurisdictions without delay.

Acknowledgements We are grateful to Adam Crosier, Yilu Chen and Lisa Szatowski for their contributions to data collection and analysis and to Marie Killeen, Shane Allwright and Norma Cronin who commented on an earlier draft of this manuscript. We are also grateful to Ipsos MRBI for carrying out the research.

Funding Office of Tobacco Control, Ireland; Cancer Research Uk; Irish Cancer Society, ASH New Zealand.

Competing interests None.

Contributors AM developed the study with contributions from RE, MM, LC, SL and GH. SL and CQ carried out the statistical analyses.

Provenance and peer review Not commissioned; externally peer reviewed.

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National Cancer Institute at the National Institutes of Health

Fact Sheet

Reviewed: 10/27/2010

Cigar Smoking and Cancer

Key Points

- Cigar smoke, like cigarette smoke, contains toxic and cancer-causing chemicals that are harmful to both smokers and nonsmokers.
- There is no safe tobacco product, and there is no safe level of exposure to tobacco smoke.
- The more you smoke, the greater your risk of disease.
- Cigar smoking causes oral cavity cancers (cancers of the lip, tongue, mouth, and throat) and cancers of the larynx (voice box), esophagus, and lung.
- All cigar and cigarette smokers, whether or not they inhale, directly expose their lips, mouth, tongue, throat, and larynx to tobacco smoke and its toxic and cancer-causing chemicals.

1. How are cigars different from cigarettes?

Cigarettes usually differ from cigars in size and in the type of tobacco used (1–3). Moreover, in contrast with cigarette smoke, cigar smoke is often not inhaled.

The main features of these tobacco products are:

- **Cigarettes**: Cigarettes are uniform in size and contain less than 1 gram of tobacco each. U.S. cigarettes are made from different blends of tobaccos, which are never fermented, and they are wrapped with paper. Most U.S. cigarettes take less than 10 minutes to smoke.
- **Cigars**: Most cigars are composed primarily of a single type of tobacco (air-cured and fermented), and they have a tobacco wrapper. They can vary in size and shape and contain between 1 gram and 20 grams of tobacco. Three cigar sizes are sold in the United States:
  - **Large cigars** can measure more than 7 inches in length, and they typically contain between 5 and 20 grams of tobacco. Some premium cigars contain the tobacco equivalent of an entire pack of cigarettes. Large cigars can take between 1 and 2 hours to smoke.

20

- **Cigarillos** are a type of smaller cigar. They are a little bigger than little cigars and cigarettes and contain about 3 grams of tobacco.
- **Little cigars** are the same size and shape as cigarettes, are often packaged like cigarettes (20 little cigars in a package), and contain about 1 gram of tobacco. Also, unlike large cigars, some little cigars have a filter, which makes it seem they are designed to be smoked like cigarettes (that is, for the smoke to be inhaled).

2. **Are there harmful chemicals in cigar smoke?**

Yes. Cigar smoke, like cigarette smoke, contains toxic and cancer-causing chemicals that are harmful to both smokers and nonsmokers. Cigar smoke is possibly more toxic than cigarette smoke (3). Cigar smoke has:

- **A higher level of cancer-causing substances**: During the fermentation process for cigar tobacco, high concentrations of cancer-causing nitrosamines are produced. These compounds are released when a cigar is smoked. Nitrosamines are found at higher levels in cigar smoke than in cigarette smoke.
- **More tar**: For every gram of tobacco smoked, there is more cancer-causing tar in cigars than in cigarettes.
- **A higher level of toxins**: Cigar wrappers are less porous than cigarette wrappers. The nonporous cigar wrapper makes the burning of cigar tobacco less complete than the burning of cigarette tobacco. As a result, cigar smoke has higher concentrations of toxins than cigarette smoke.

Furthermore, the larger size of most cigars (more tobacco) and longer smoking time result in higher exposure to many toxic substances (including carbon monoxide, hydrocarbons, ammonia, cadmium, and other substances).

Cigar smoke can be a major source of indoor air pollution (1). There is no safe level of exposure to tobacco smoke. If you want to reduce the health risk to yourself and others, stop smoking.

3. **Do cigars cause cancer and other diseases?**

Yes. Cigar smoking causes cancer of the oral cavity, larynx, esophagus, and lung. It may also cause cancer of the pancreas. Moreover, daily cigar smokers, particularly those who inhale, are at increased risk for developing heart disease and other types of lung disease. Regular cigar smokers and cigarette smokers have similar levels of risk for oral cavity and esophageal cancers. The more you smoke, the greater the risk of disease (3).

4. **What if I don't inhale the cigar smoke?**

Unlike nearly all cigarette smokers, most cigar smokers do not inhale. Although cigar smokers have lower rates of lung cancer, coronary heart disease, and lung disease than cigarette smokers, they have higher rates of these diseases than those who do not smoke cigars.

All cigar and cigarette smokers, whether or not they inhale, directly expose their lips, mouth, tongue, throat, and larynx to smoke and its toxic and cancer-causing chemicals. In addition, when saliva containing the chemicals in tobacco smoke is swallowed, the esophagus is exposed to carcinogens. These exposures probably account for the similar oral and esophageal cancer risks seen among cigar smokers and cigarette smokers (3).

5. **Are cigars addictive?**

Yes. Even if the smoke is not inhaled, high levels of nicotine (the chemical that causes addiction) can still be absorbed into the body. A cigar smoker can get nicotine by two routes: by inhalation into the lungs and by absorption through the lining of the mouth. Either way, the smoker becomes addicted to the nicotine that gets into the body.

A single cigar can potentially provide as much nicotine as a pack of cigarettes (1).

6. **Are cigars less hazardous than cigarettes?**

Because all tobacco products are harmful and cause cancer, the use of these products is strongly discouraged. There is no safe level of tobacco use. People who use any type of tobacco product should be encouraged to quit. For help with quitting, see the National Cancer Institute (NCI) fact sheet *Where To Get Help When You Decide To Quit Smoking* at http://www.cancer.gov/cancertopics/factsheet/tobacco/help-quitting on the Internet.

7. **Do nicotine replacement products help cigar smokers to quit?**

Nicotine replacement products, or nicotine replacement therapy (NRT), deliver measured doses of nicotine into the body, which helps to relieve the cravings and withdrawal symptoms often felt by people trying to quit smoking. Strong and consistent evidence shows that NRT can help people quit smoking cigarettes (4). Limited research has been completed to determine the usefulness of NRT for people who smoke cigars. For help with quitting cigar smoking, ask your doctor or pharmacist about NRT, as well as about individual or group counseling, telephone quitlines, or other methods.

8. **How can I get help quitting smoking?**

NCI and other agencies and organizations can help smokers quit:

- Go online to **Smokefree.gov** (http://www.smokefree.gov), a Web site created by NCI's Tobacco Control Research Branch, and use the Step-by-Step Quit Guide.
- Call **NCI's Smoking Quitline** at **1–877–448–7848 (1–877–44U–QUIT)** for individualized counseling, printed information, and referrals to other sources.
- Refer to the NCI fact sheet *Where To Get Help When You Decide To Quit Smoking* at http://www.cancer.gov/cancertopics/factsheet/tobacco/help-quitting on the Internet.

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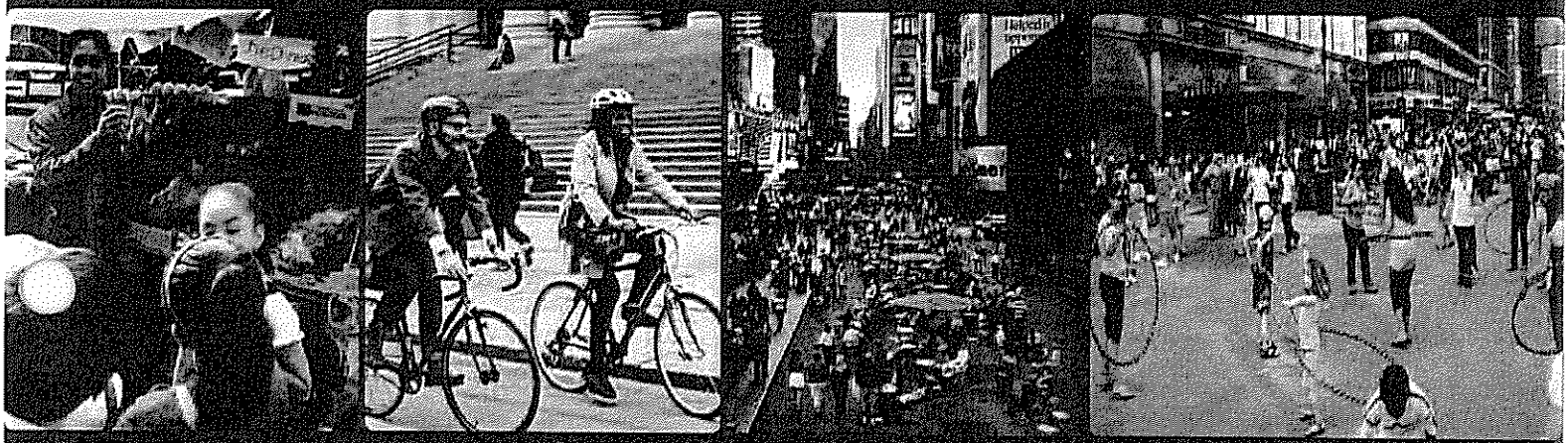
Preventing Non-Communicable Diseases and Injuries



Innovative Solutions from New York City

NYC Health

Michael R. Bloomberg
Mayor

Thomas Farley, M.D., M.P.H.
Commissioner



To download in Arabic, Chinese, English, French, Russian or Spanish,
visit nyc.gov and search for NCD Prevention, or scan here.

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Letter from the Mayor



Dear Colleague:

Protecting our residents' health is one of New York City's highest priorities. No public health agency does more than our City's Department of Health and Mental Hygiene to combat the leading causes of injury and chronic disease.

Non-communicable diseases—including heart and lung disease, cancer and diabetes—and injuries are the primary causes of illness and death across the globe. Deaths from these diseases are more common than those caused by communicable diseases—such as HIV or pneumonia—in the United States and other developed countries, and this pattern is quickly becoming established in less-developed countries.

Since I took office in 2002, I have worked closely with the Health Department and other agencies on programs and policies to help our more than eight million residents live healthier lives. The City has launched many successful initiatives to prevent and reduce the impact of the most devastating non-communicable diseases.

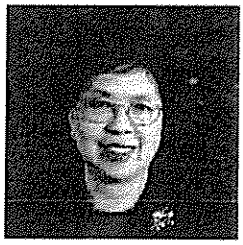
Over the past few years, we have dramatically cut smoking rates, expanded access to nutritious foods, reduced deaths from homicides and traffic crashes, increased options for safe physical activity and improved the quality of preventive health care.

Cities across the globe face many of the same large health challenges we do. By sharing strategies and learning from one another, we have a chance to solve our common problems and to ensure that the world's cities become healthier places.

Sincerely,

Michael R. Bloomberg
Mayor

Letter from the Director-General, World Health Organization



Dear Colleague:

Non-communicable diseases (NCDs) are among our largest and most urgent global health problems. The most common NCDs—heart disease, strokes, diabetes, cancer and chronic lung disease—cause three out of five deaths worldwide. NCDs are particularly devastating in developing countries, where they push millions of people into poverty each year. Eight of ten NCD deaths in 2008 were in low- and middle-income countries.

Millions of these deaths can be prevented. There are proven, cost-effective interventions to prevent NCDs and reduce their effects. Smoking prevention, promotion of healthy eating and physical activity and access to essential health care can substantially improve health and save lives.

New York City has developed many effective solutions for the prevention of NCDs. Many of these ideas could be adapted in other cities around the world. Several of these interventions have been low- or no-cost, or have even generated revenue. It is our hope that policymakers and public health agencies will find New York City's experiences useful as they develop their own programs to take action against NCDs and to protect and promote the health of their residents.

Sincerely,

Dr. Margaret Chan
Director-General
World Health Organization

Introduction

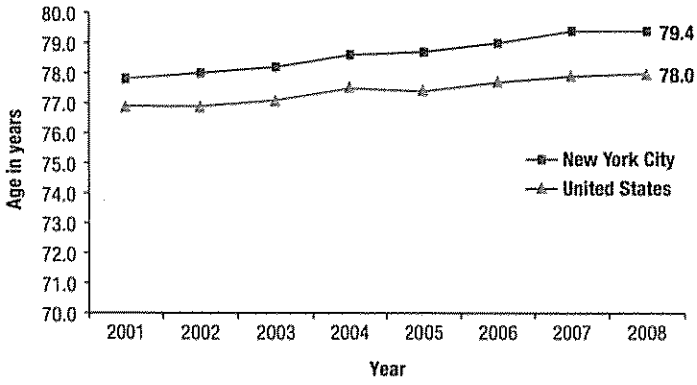
Non-communicable diseases and injuries are global health problems that need local solutions. New York City has a long history of leadership in public health. In previous centuries this work focused on prevention of communicable diseases. For example, in the 1800s New York City improved water quality and sanitation and in the 1900s produced its own vaccines to immunize its residents. In the last decade, New York City has greatly strengthened its efforts to prevent non-communicable diseases (such as heart disease, cancer, diabetes and lung disease) and injuries. The City did this by launching Take Care New York to focus work on the problems with the biggest impact on New Yorkers' health.

Just as New York City defeated communicable disease epidemics of the 19th century through environmental change, the City is addressing non-communicable diseases today by focusing on their underlying environmental causes, through actions such as requiring smoke-free workplaces, increasing access to healthy foods, building safer streets and creating infrastructure that supports physical activity. This report describes these successful efforts. Many of these interventions have cost city government very little, and some have actually generated government revenue. As such, these local efforts may serve as useful models for other cities as they also address these modern health problems.

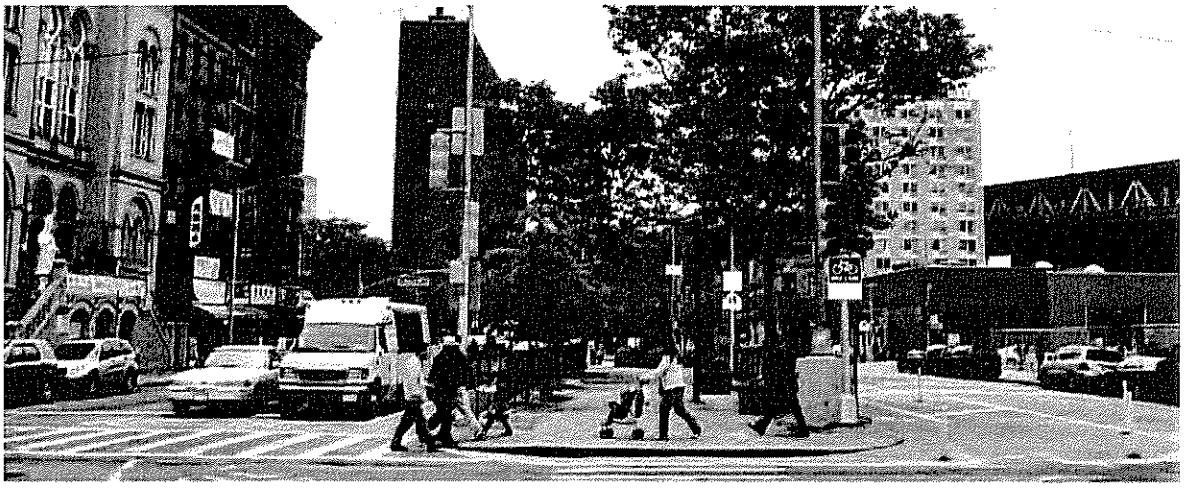
New Yorkers Are Living Longer, Healthier Lives

- New Yorkers' life expectancy has increased faster and remains higher than that of Americans overall.
- By 2008, life expectancy had increased to 79.4 years of age for all New Yorkers—a gain of more than a year and a half since 2001.

Life Expectancy at Birth, New York City and United States, 2001–2008



Sources: New York City — NYC DOHMH, Bureau of Vital Statistics 2001-2009; U.S. — National Center for Health Statistics, "National Vital Statistics Reports," Vol. 58, No 19 and Vol. 59, No. 4.

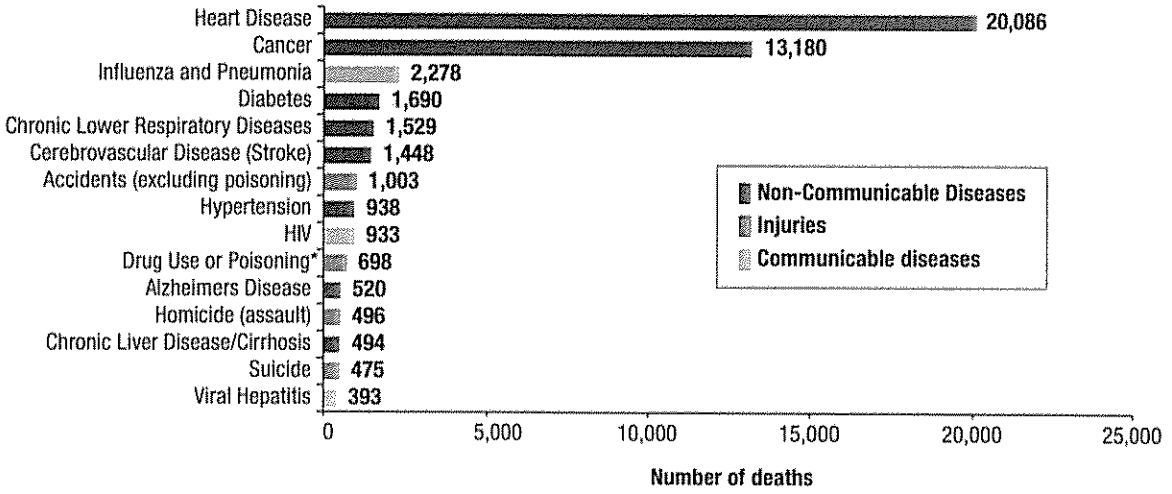


Many New Yorkers walk, rather than drive, as they go about their daily lives, and transportation developments like pedestrian islands increase their safety.
Photo: NYC Department of Transportation

Targeting the Leading Causes of Death

- The leading causes of death in New York City are heart disease and cancer. The most common forms of heart disease are ischemic heart disease (including heart attacks) and heart failure from high blood pressure, and the most common cancers are lung, colon and breast cancers.
- More than nine in 10 deaths in New York City are caused by non-communicable diseases or injuries (87% non-communicable diseases, 5% injuries).

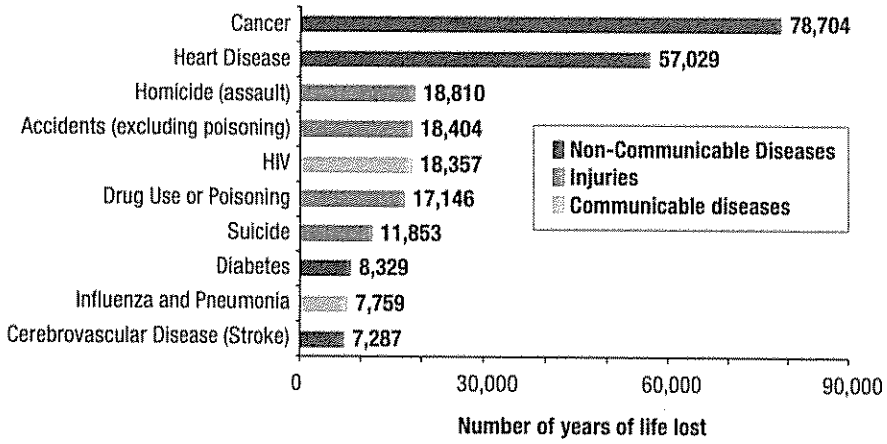
Leading Causes of Death, New York City, 2009



*More than 80% are injury deaths due to accidental drug poisoning (overdose). Remaining deaths are caused by the chronic effects of long-term drug use.
Source: NYC DOHMH Bureau of Vital Statistics 2009.

- People who die before 70 years of age can be thought of as dying early—or prematurely—resulting in years of life lost.
- Injuries often happen in younger people, so injury-related deaths tend to lead to many years of life lost. Four of the top seven causes of years of life lost in New York City are injury-related, resulting in more than 18,000 years of life lost each due to homicide and accidents, 17,000 to drug use or poisoning and nearly 12,000 to suicide in 2009.

Years of Life Lost Before Age 70 by Selected Causes of Death, New York City, 2009

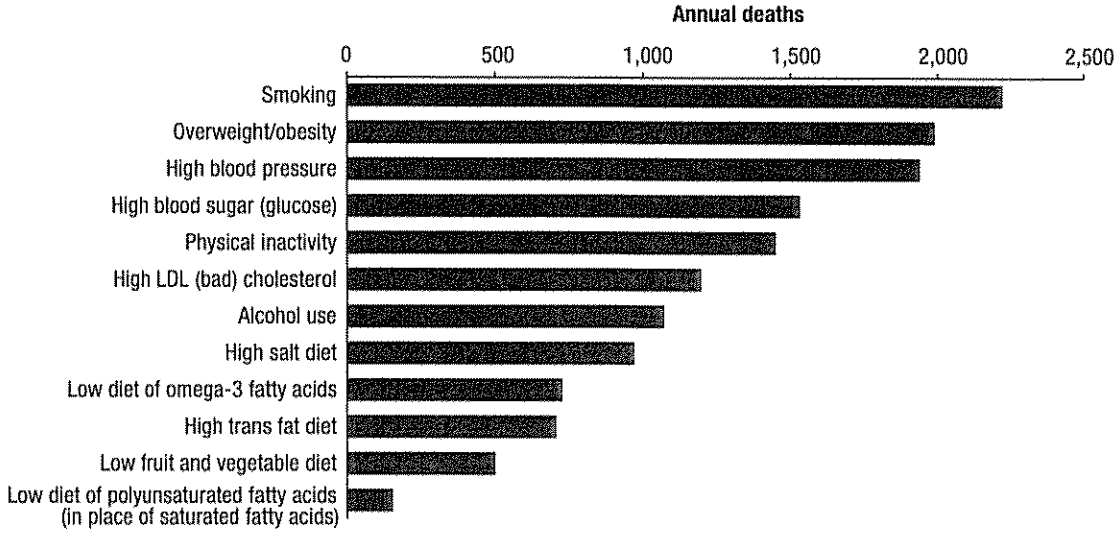


Source: NYC DOHMH Bureau of Vital Statistics 2009.

Reducing Risk

Certain behaviors like smoking, physical inactivity and unhealthy diet are particularly important contributors to poor health. The New York City Health Department estimated the number of premature deaths caused before 70 years of age by selected behaviors, like smoking or unhealthy diet, or by conditions caused by them, like obesity.

Premature, Preventable Deaths Attributable to Individual Risk Factors, New Yorkers Aged 30-69 Years, 2005-2007 Average



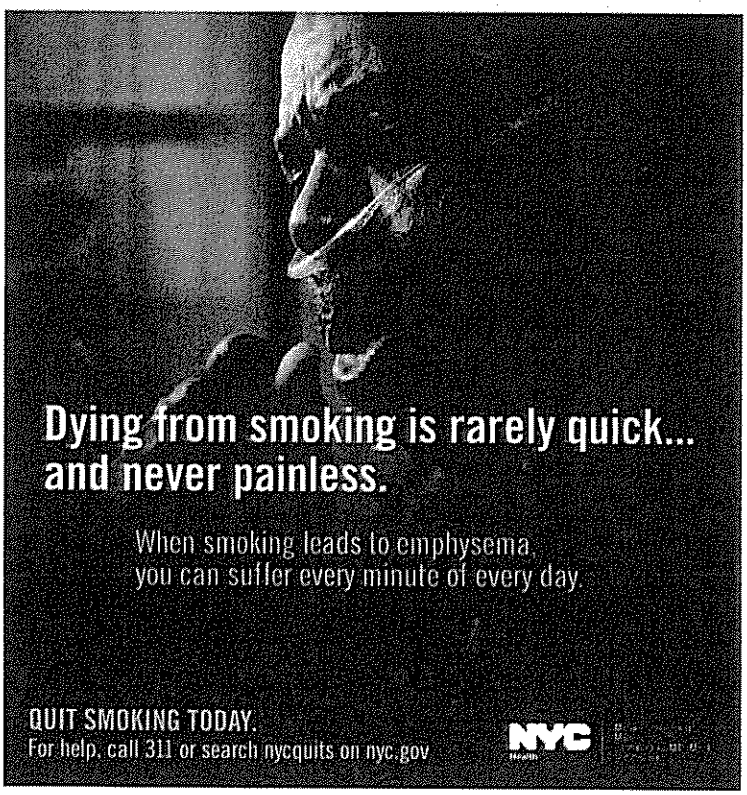
Deaths that could be prevented by reductions in more than one factor (such as quitting smoking and becoming more physcially active) are counted for each relevant risk.
Sources: NYC DOHMH Bureau of Vital Statistics 2005-2007, NYC Community Health Survey 2005-2007, NYC Health and Nutrition Examination Survey 2004, National Health and Nutrition Examination Survey 2003-2006, Continuing Survey of Food Intakes by Individuals 1989-1991.
See Technical Notes for information on estimation methods.

- Despite the City's successes, smoking remains a leading risk factor for preventable death in New York City, responsible for more than 7,000 deaths each year among New Yorkers 30 years of age and older and approximately 2,200 premature deaths.
- Overweight/obesity and physical inactivity are among the top risk factors for premature death citywide.
- In New York City, diets high in trans fat and salt are responsible for 700 and 1,000 premature deaths a year, respectively. If New Yorkers ate more fruits and vegetables, it could prevent 500 deaths a year.
- Environmental factors, such as air pollution, have also contributed to non-communicable disease deaths in New York City. Fine particulate air pollution from sources such as vehicle traffic and buildings burning high-sulfur heating oil is responsible for more than 3,000 deaths from heart and lung disease annually, contributing to 6.4% of deaths citywide.[1]
- Premature death can be prevented by creating environments that support New Yorkers in making healthier choices, such as quitting smoking, eating better and exercising more. The Health Department's initiatives to address non-communicable diseases have focused on these environmental changes.

Reducing Smoking Rates

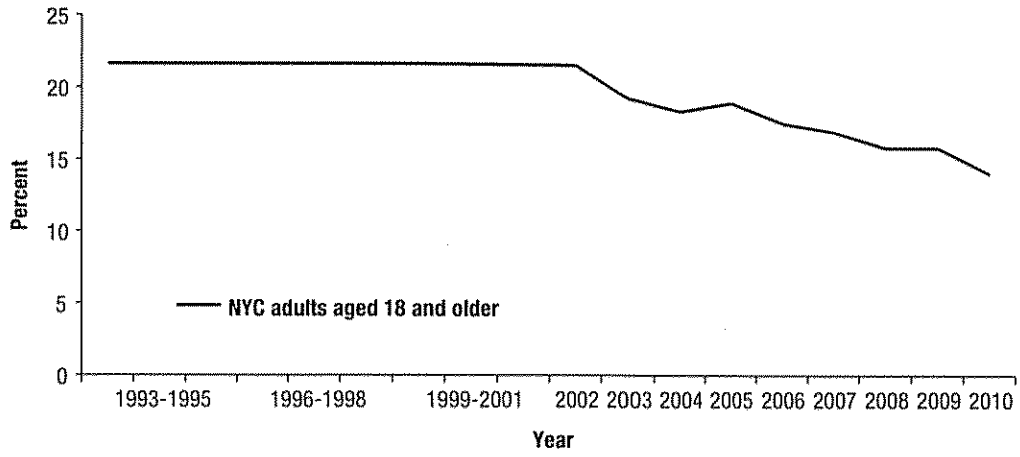
Smoking is the leading cause of preventable, premature death in the United States and New York City. Smoking is responsible for about one in seven deaths overall in the city. In 2002, New York City launched an aggressive, comprehensive tobacco control program to protect people from second-hand smoke, discourage smoking and make it easier for smokers to quit.

- Virtually all workplaces in New York City, including restaurants and bars, have been smoke-free since 2003 because of the Smoke-Free Air Act. Compliance with the law has been very high—at or above 97%.
- Increases in excise taxes on cigarettes by New York City and New York State in 2002, 2008 and 2010 made New York City's cigarettes the most expensive in the nation. In 2011, cigarette packs cost on average $11.20, approximately $7 of which is taxes.
- From the time New York City's excise tax went into effect in July 2002 until June 2011, New York City and New York State excise taxes on cigarettes sold in New York City generated about $4.4 billion in revenue.
- To reach smokers directly and shift New Yorkers' attitudes about smoking, the Health Department has developed and run anti-tobacco educational media campaigns, starting in 2006. Ads graphically depict the health consequences of smoking and feature testimonials from sick or dying smokers.
- Nearly all (92%) New York City smokers and recent quitters reported seeing at least one advertisement from the 2006 campaign. Of those who had seen an advertisement, more than half (57%) reported that it increased their motivation to quit.[2]
- Following initiation of the media campaigns, calls to 311, New York City's information line, for help quitting smoking increased almost four-fold, from about 11,000 to more than 40,000 annually.
- Since the start of the Health Department's tobacco control program, smoking among youth has decreased dramatically. Among public high school students (ages 14 to 18), smoking declined more than 50% between 2001 and 2009, from 18% to 8%.



This bold campaign serves as a poignant reminder that smoking causes devastating health consequences, causing victims to suffer every minute of every day.

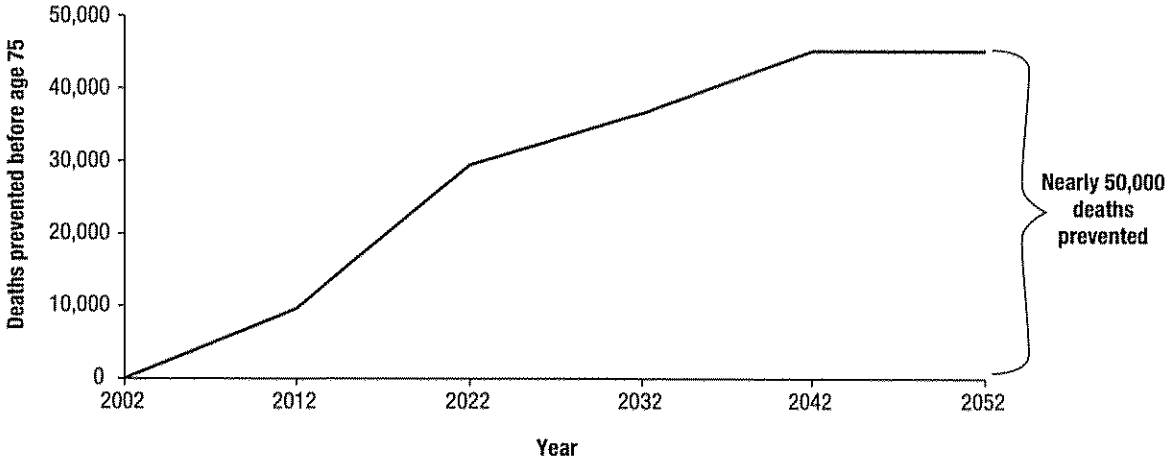
Adult Smoking in New York City, 1993–2010



Sources: U.S. Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 1993-2001: three-year averages presented. NYC Community Health Survey (CHS) 2002-2010. Data are age-adjusted to the U.S. 2000 standard population.

- Before 2002, the proportion of adult New Yorkers who smoked was about 22% for a decade. Between 2002 and 2010, smoking among adult New Yorkers dropped from 22% to 14%, resulting in more than 400,000 fewer adult smokers in New York City.
- The decline in smoking in recent years will prevent deaths from smoking-related disease for many years to come.
- The New York City Health Department estimates that nearly 50,000 adult New Yorkers who quit smoking as a result of tobacco control efforts from 2002-2010 will avoid a premature smoking-related death before age 75.

Estimated Cumulative Deaths Prevented Due to Decreased Smoking Between 2002 and 2010 in New York City



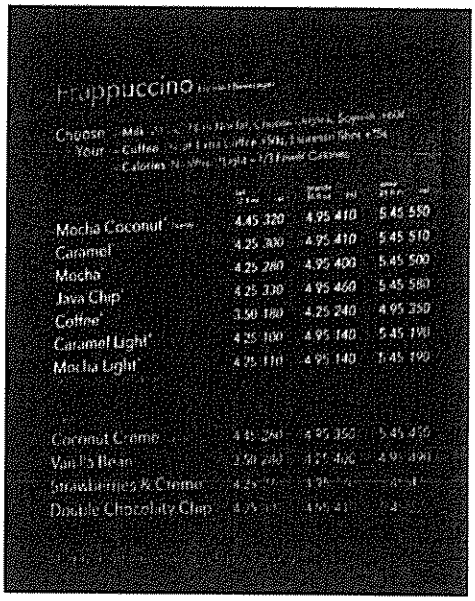
Sources: NYC Community Health Survey 2002, 2010; U.S. Census Intercensal Estimates Program, 2002. See Technical Notes for information on estimation methods.

Promoting Healthier Eating

Unhealthy diets contribute to many non-communicable diseases, including heart disease and diabetes. A diet that includes more fruits and vegetables, and less sodium and trans fat, can prevent many premature deaths.

Calorie Information in Restaurants

- Over the past several decades, Americans have been eating more away-from-home meals and snacks, which now account for approximately half of total food expenditures.[3]
- People often underestimate the number of calories in restaurant meals and other prepared foods. This can lead to excess calorie consumption and weight gain.
- In 2006, New York City became the first jurisdiction in the United States to require restaurant chains to post calorie information on menus and menu boards.
- After the regulation took effect in 2008, customers who used the calorie counts bought fewer calories: 15% of customers reported using the calorie information, and these customers purchased approximately 100 fewer calories at lunch than customers who did not see or use calorie information.[4]



Calorie counts displayed on a menu board at Starbucks in New York City.

Restriction of Trans Fat in Food Service Establishments

Trans fat raises bad cholesterol, which increases the risk of heart disease. While small amounts of trans fat occur naturally in meat and dairy, most trans fat in foods is artificially produced through the partial hydrogenation of vegetable oils. These partially hydrogenated vegetable oils are used in processed foods because of their properties in cooking and in increasing product shelf life. Leading health organizations—including the American Heart Association, the National Academy of Sciences and the Institute of Medicine—recommend that people strictly limit their consumption of trans fat.

- In 2006, the New York City Board of Health restricted artificial trans fat in foods served in licensed food service establishments, such as restaurants, schools, cafeterias, caterers, senior centers and street-food vendors. As of July 1, 2008, all products used or served by food service establishments must contain less than 0.5 grams of trans fat per serving, if they contain partially hydrogenated vegetable oil. Foods served in the manufacturer's original, sealed packaging are exempt.
- As of March 2009, more than 93% of food service establishments in the city had achieved full compliance with the rule.
- This was the first legal restriction of artificial trans fat in the United States. Since New York City restricted trans fat, 16 cities and states have passed similar restrictions.
- The restaurant industry has followed suit, with more than 40 restaurant chains implementing similar reductions in artificial trans fat use across the nation.

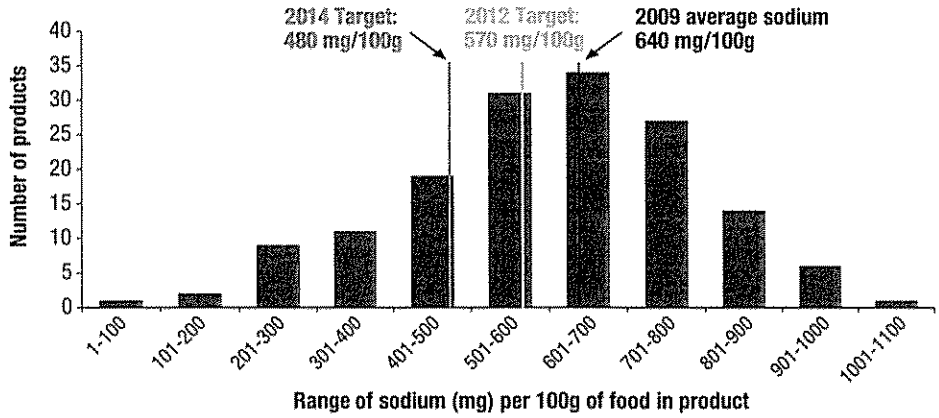
National Salt Reduction Initiative

Most adults consume far too much sodium, or salt. Experts recommend that most adults consume no more than 1,500 mg of sodium per day, but average consumption in the United States is twice that amount. Reducing the amount of salt people eat will lead to lower blood pressure and subsequent lower risk for cardiovascular disease.[5] A reduction of two grams of salt per day would prevent *per year* in the United States an estimated[6]:

- 29,000 – 63,000 deaths
- 36,000 – 68,000 heart attacks
- 22,000 – 45,000 strokes

- Nearly 80% of the sodium consumed by Americans comes from packaged and restaurant food, so individuals have little control over their sodium intake.
- The New York City Health Department-led National Salt Reduction Initiative (NSRI) aims to reduce Americans' salt intake by 20% over five years by reducing the sodium levels in packaged and restaurant foods by 25% during that time. More than 70 state and local health authorities and national health organizations, in partnership with the Department, are working with the food industry to achieve this goal.
- Modeled on a salt reduction campaign in the United Kingdom, the NSRI has set voluntary salt reduction targets for 62 packaged food categories and 25 restaurant food categories. Food categories group similar products (e.g., canned soup). Targets for 2012 and 2014 are based on the sales-weighted average sodium content of the products in each food category. This means that companies have flexibility to sell products with higher and lower sodium content, but the overall amount of sodium that people consume will be reduced if food companies all work to meet the NSRI targets.
- The chart below shows the number of products in each sodium content range for a sample food category. In this example in 2009, the average sodium for products in this category was 640mg/100g of food. The NSRI targets are 570mg/100g by 2012 and 480mg/100g by 2014. As companies lower sodium in their products to meet the NSRI targets, there will be more products in the lower sodium ranges, decreasing the average sodium level in each food category.

Example: Distribution of Products by Amount of Sodium in a Sample Food Category, 2009



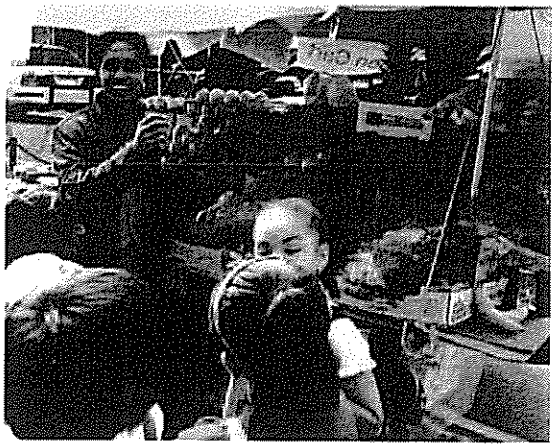
Data presented here are for illustrative purposes only.

- So far, 28 manufacturers, supermarkets and restaurant chains have committed to NSRI targets. These include some of the world's largest food companies, including Kraft, Heinz, Unilever, Subway and Delhaize America (Food Lion, Hannaford). The NSRI continues to encourage commitments from companies in all sectors of the food industry.

Increasing Access to Fresh Fruits and Vegetables

Eating more fresh fruits and vegetables can reduce the risk of many diseases, such as heart disease, stroke and cancer.

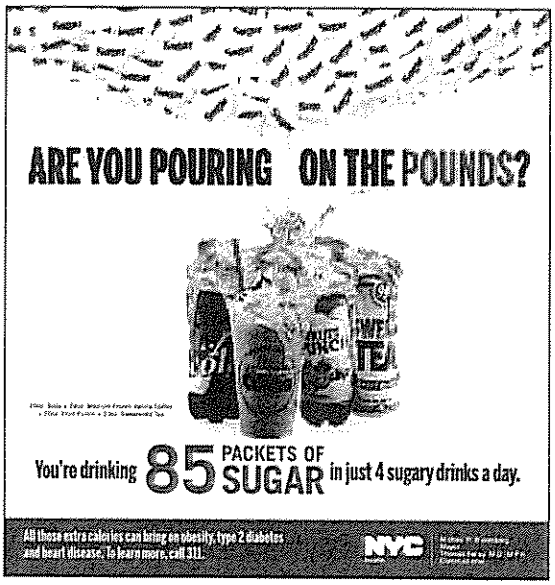
- In New York City, mobile street vendors are a regular part of the streetscape, selling everything from pretzels to t-shirts. The City regulates this market and puts a cap on the number of vendors.
- To promote healthier eating, the City raised the cap on the number of vendors in 2008, but only for those who would sell fresh fruits and vegetables in neighborhoods with the lowest fruit and vegetable consumption and highest rates of diet-related diseases. The City also helps potential Green Cart vendors to obtain a license, a cart permit and a wholesale source of produce.
- Currently there are 459 carts with permits, readily accessible on the streets in many low-income neighborhoods.



Green Cart vendor selling fruits and vegetables on a New York City street.

Reducing Consumption of Sugar-Sweetened Beverages

- Sugar-sweetened beverages are a major contributor to the obesity epidemic in the United States. Americans consume 200 to 300 more calories per day than 30 years ago, with the largest increase due to sugar-sweetened beverages. Today, nearly half of the added sugar Americans consume comes from sugar-sweetened drinks.
- Consumption of sugary drinks is also linked to increased risk of diabetes and heart disease.[7,8,9]
- To educate New Yorkers about the potentially serious health effects of consuming sugary drinks, the New York City Health Department launched an anti-sugar-sweetened beverage media campaign, including print, internet videos and television ads. The campaign showed how typical drinks are loaded with sugar, which the body converts to fat.
- Between 2007 and 2009, the percentage of adults who reported consuming at least one sugar-sweetened beverage per day in New York City declined from 36% to 32%, and the percent of teenagers drinking one or more sugar-sweetened sodas daily declined from 28% in 2005 to 22% in 2009.



This and similar images ran in New York City subway cars during February 2011. The print campaign corresponded with the New York City Health Department's first television ad targeting sugar-sweetened beverages.

New York City Food and Beverage Standards

New York City, through its schools, programs and contracts, serves approximately 260 million meals and snacks each year. The New York City Food Standards were created to improve the health of all New Yorkers served by City agencies. The standards promote better eating through requirements that limit the purchase of sugar-sweetened beverages, increase fruits and vegetables served and decrease the amount of sodium served in meals.

Food and Nutrition Standards

In 2008, New York City adopted food and nutrition standards for 11 City agencies that purchase or serve food to clients. These agencies operate facilities such as schools, senior centers, correctional facilities, child care centers and public hospitals.

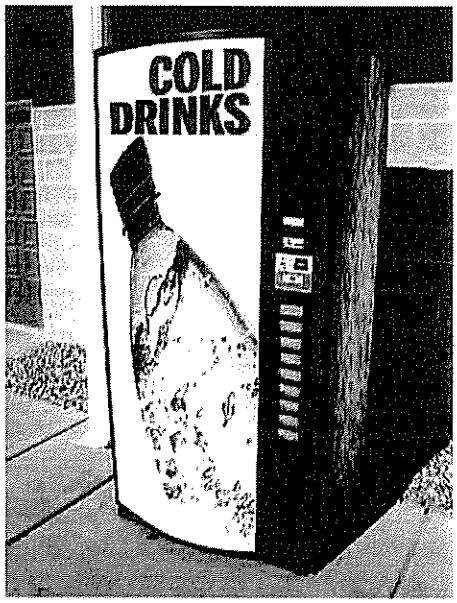
Examples include:

- Lunches and dinners must contain a minimum of two servings of fruits and/or vegetables, and five servings of fruits and/or vegetables must be served per day, if serving three meals.
- Deep-fried foods are not allowed.
- Beverages must have fewer than 25 calories per 8 ounces except for 100% fruit juice and milk; milk must be nonfat or 1%.
- Meals must meet calorie, sodium, fiber and other nutrient standards.

Beverage Vending Machines

The standards for beverage vending machines were adopted in May 2009 and apply to City-contracted vending machines. The standards ensure that water and other low-calorie options are readily available. For example:

- High-calorie beverages like regular sodas (greater than 25 calories per 8 ounces) are restricted to two slots, must be placed the farthest from eye level, and can be no larger than 12 ounces in size.
- Machines must post calorie information for each product.
- Promotional material on machines is limited to low-calorie beverages.
- Standards for children are stricter. High-calorie beverages and beverages that contain artificial flavors, colors and sweeteners are prohibited in machines in locations that offer programming for children, including all public schools.



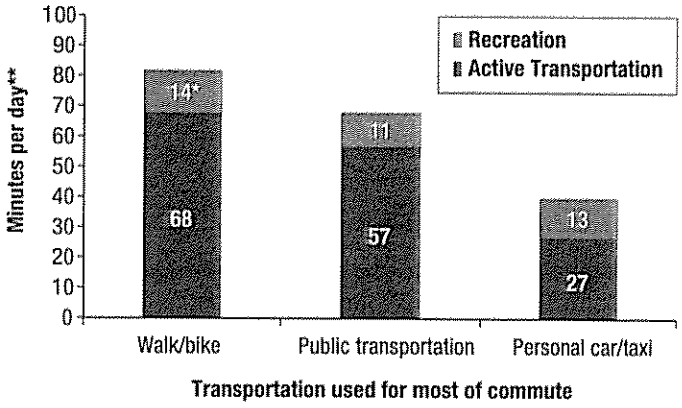
Beverage vending machine that complies with New York City standards.

Promoting Physical Activity

Physical activity not only helps prevent weight gain but also reduces the risk of high blood pressure, heart disease, stroke, diabetes, colon cancer, depression and osteoporosis. Increased physical activity could prevent an estimated 6,300 preventable deaths annually in New York City.[10]

- People are more likely to be physically active if they routinely use active transportation (for example, walking or biking to get to work or other places) rather than driving an automobile.
- On average, New Yorkers report that they do more than an hour of combined transportation and recreation physical activity each day. Active transportation makes up more than 50 minutes of activity, while less than 15 minutes of exercise come from recreational activities per day.
- Among adults who work outside the home, people who walk or bike to work report an average of more than an hour of active transportation time daily.
- New Yorkers who take public transportation for most of their commute get almost half an hour more daily combined transportation and recreation physical activity than those who use a personal car or taxi.
- Obesity in New York City has remained lower than in the US overall. In 2009, the prevalence of obesity in New York City was 23%,[11] compared with 27% nationally.[12] The reasons why New York City has lower obesity rates are not clear, but New Yorkers' reliance on active transportation may partly explain it.

Average Daily Transportation and Recreation Activity Reported by Those Who Work Outside the Home



*Due to small numbers, estimate should be interpreted with caution.
**Minutes of at least moderate physical activity.
Source: NYC Physical Activity and Transit Survey Wave 1, 2010.

Active Design

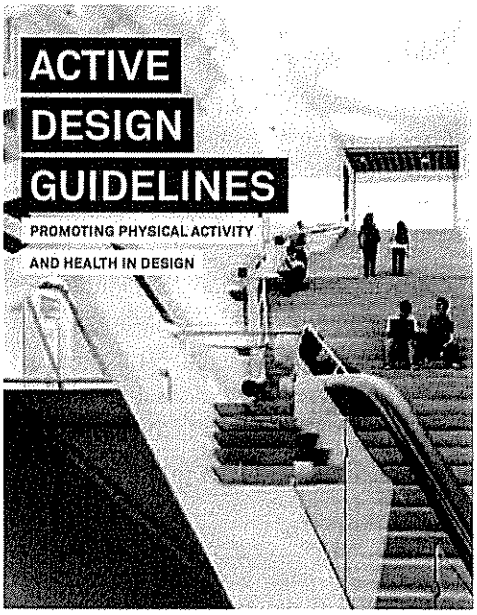
One way to increase physical activity is by designing neighborhoods and buildings to make active transportation and recreation appealing and easy.

- The New York City *Active Design Guidelines* (nyc.gov/adg) is a manual of evidence-based, best-practice strategies for increasing physical activity through the design and construction of neighborhoods, streets and buildings. Among the design features the *Guidelines* recommend are bicycle storage rooms in buildings, easier access to open stairways and locating workplaces and residences near parks and public transportation.



Pedestrian area on Broadway in Manhattan – buffering pedestrian areas from traffic can help increase walking.
Photo: NYC Department of Transportation

- The *Guidelines* were developed by the New York City Departments of Design and Construction, Health and Mental Hygiene, Transportation, City Planning and Office of Management and Budget. Agencies worked with leading architectural and planning academics and the American Institute of Architects' New York Chapter.
- The City has distributed more than 12,000 copies in print and electronic format. Approximately one-fifth of downloads have been in New York City, and the remaining downloads are roughly split between the United States and more than 100 other countries.
- More than 1,200 architects and designers have been trained in use of the *Guidelines*.
- The recommendations are being incorporated into the City's contracting processes for construction, and some are recommended for incorporation into building codes and zoning amendments.



Active Design Guidelines
Photo: Iwan Baan

Promoting Bicycling

Walking and bicycling for transportation is a convenient way to increase physical activity. Building bicycle lanes and bicycle parking facilities can make it easier for people to bicycle.

- In June 2009, the New York City Department of Transportation completed the City's ambitious goal of building 200 bike-lane miles in all five boroughs in just three years, nearly doubling the citywide on-street bike network. The City also installed 4.9 miles of bike paths physically separated from car traffic lanes, 20 sheltered bike parking structures and 3,100 bicycle parking racks.



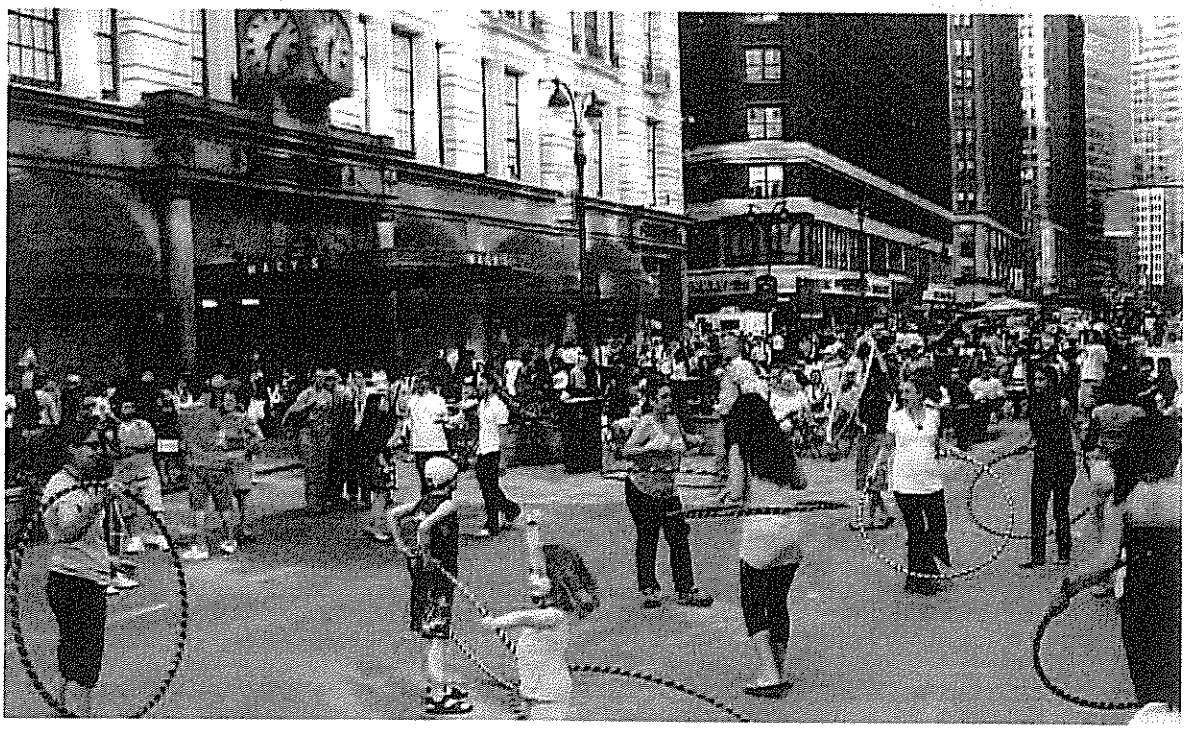
Shared-use paths encourage walking and bicycling, especially in areas with viewing attractions. Riverside Park, Manhattan.
Photo: NYC Department of Transportation

- In 2007, a New York City Council law required commercial and community parking lots to provide outdoor bicycle parking facilities. Laws passed in 2009 required secure bicycle parking in new, multifamily residential, commercial and community facility buildings and in existing parking garages and lots. Existing office buildings with freight elevators also had to allow tenants to bring bicycles into buildings.
- The New York City Department of Transportation conducts bicycle counts on selected roadways. These counts indicate that commuter cycling doubled from 2006 to 2010.
- Bicycle lanes in New York City have a good safety record. A New York City report on bicyclist injuries from 1996 to 2005 found that only one fatal crash with a motor vehicle occurred when a bicyclist was in a marked bicycle lane.[13]

Block Closures

Increased access to places for active play and recreation is associated with increased physical activity[14] and decreased weight in children and youth.[15,16,17,18]

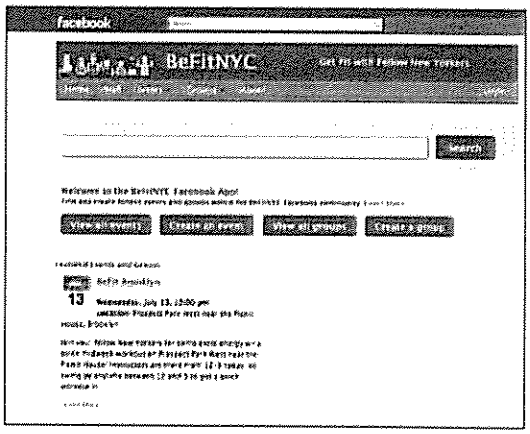
- Playstreets are single blocks of streets that are closed to cars weekly to daily to increase children's active play space and promote physical activity. Community Playstreets are open in the summer, and school Playstreets during the school year.
- In surveys of parents from 2010's community Playstreets, the majority reported that their children would most likely have been indoors or watching television if the Playstreet had not been available.



Pedestrian plazas provide space for recreational activities.
Photo: NYC Department of Transportation

Promoting Exercise Groups

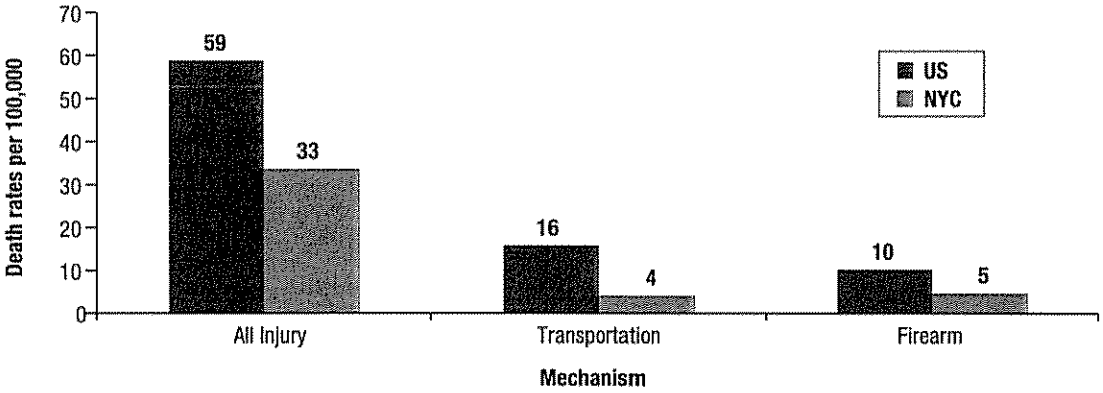
- In an effort to promote physical activity, the New York City Health Department, in conjunction with the Department of Parks and Recreation, created the BeFitNYC website. The BeFitNYC search engine lists nearly 1,000 free and low-cost fitness opportunities throughout New York City, such as lunchtime walking groups, after-work runs, or yoga meet-ups.
- New Yorkers can join a class in their neighborhood or organize their own fitness activity, using social networking media like Facebook to invite others to join.



Preventing Injuries

Injuries are major contributors to premature death in New York City. However, the city's injury rates are much lower than those of the United States, mainly because of its far lower transportation and firearm death rates: the city's transportation death rate is one fourth the U.S. rate (4 vs. 16 deaths per 100,000 people), and its firearm death rate is about half of the U.S. rate (5 vs. 10 per 100,000 people).

Death Rates by Type of Injury, United States and New York City

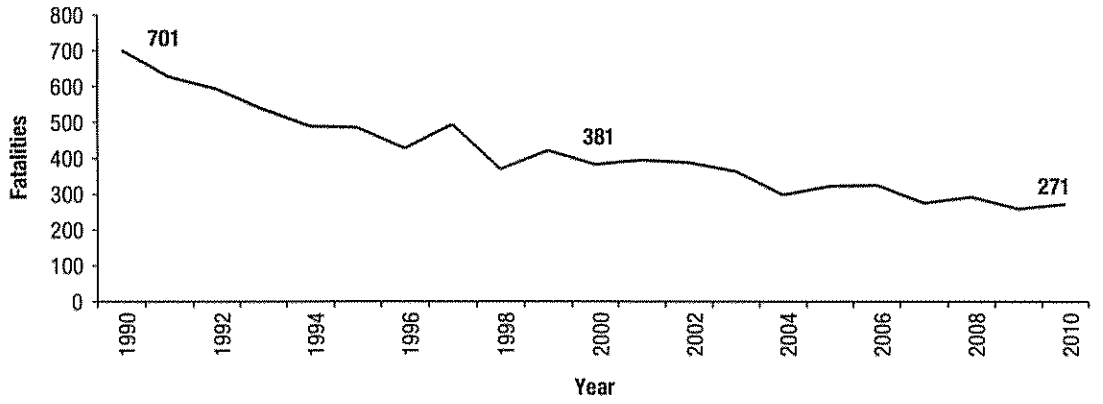


Sources: New York City – NYC DOHMH Bureau of Vital Statistics, 2007-2009, U.S. Census Bureau Population Estimate Program, 2007-2009; U.S. – National Center for Injury Prevention and Control, WISQARS, 2005-2007.

Transportation

- Widespread use of public transportation instead of personal automobiles is a likely reason for New York City's low traffic death rates. More than half of workers regularly use public transportation to get to work. Nationally, for every 100 million miles traveled, passenger death rates on mass transit are 95% lower than passenger death rates in motor vehicles.[19]
- Traffic deaths have declined about 30% in New York City from 381 fatalities in 2000 to 271 in 2010. Decreases in pedestrian deaths, which make up the largest portion of traffic deaths in the city, have been a major contributor to the overall decline in traffic deaths.

Total New York City Traffic Deaths, 1990-2010



Source: NYC Department of Transportation Traffic Fatality Database.



Pedestrian islands shorten distances across major streets, making it safer to walk.
Photo: NYC Department of Transportation

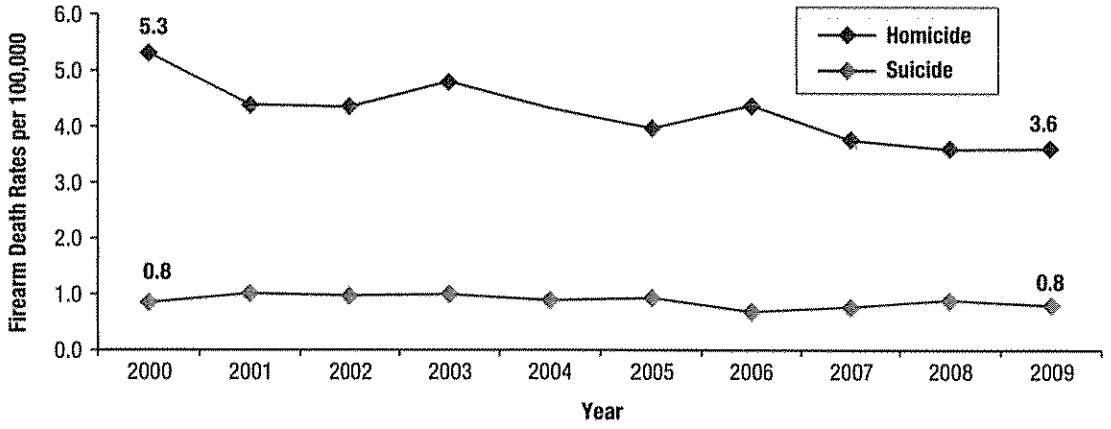
- New York City's Department of Transportation regularly monitors roadway hot spots, where crashes are concentrated, and prioritizes those areas for road improvements. Engineering interventions, such as lane reconfigurations and sidewalk extensions, are important ways to further improve safety, especially along high-risk traffic corridors.

Firearm Injuries

- New York City has some of the strongest gun laws in the United States. New York City rigorously reviews applications for firearms permits, and state law carries one of the nation's highest penalties for illegal possession of handguns. In other parts of the country, places with weaker gun laws have higher homicide and suicide death rates.[20]
- Since 2000, firearm-related homicides have declined 32%, from 5.3 deaths per 100,000 in 2000 to 3.6 deaths per 100,000 in 2009.
- New York City's firearm homicide rate for 2006–2007 was less than half the rate of cities in the 50 largest metropolitan areas in the United States (4.0 vs. 9.7 per 100,000).[21]

- Firearms are a small contributor to suicide in New York City, used in only 14% of suicides in 2009. The New York City firearm suicide rate is one sixth that of the United States (0.8 vs. 5.6 per 100,000), and according to recent CDC comparisons, it is one fifth that of cities in the 50 largest metropolitan areas (5.0 per 100,000).[21]

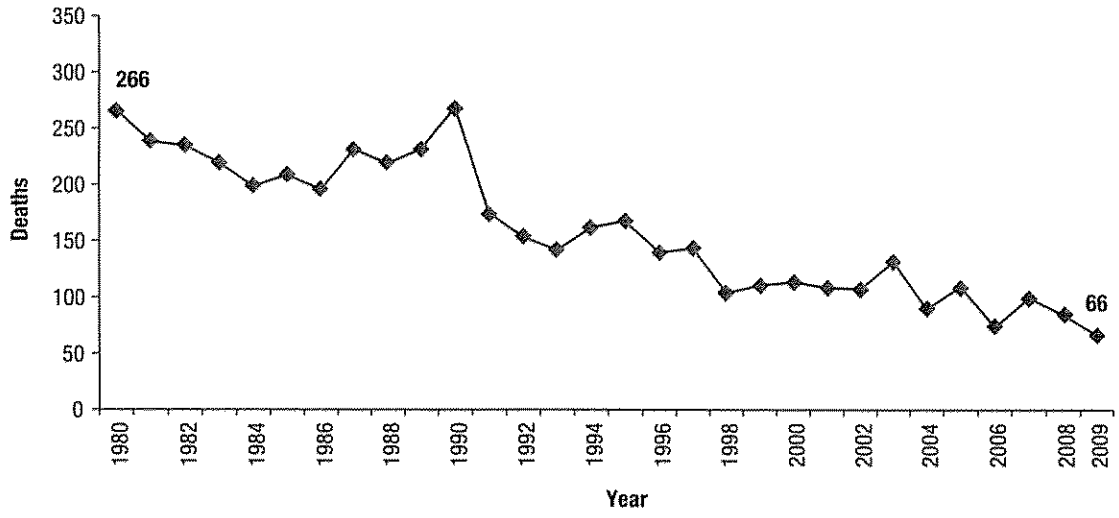
Firearm Death Rates, New York City, 2000-2009



Sources: New York City – NYC DOHMH Bureau of Vital Statistics, 2000 to 2009, analyzed by the Injury Surveillance and Prevention Program; U.S. Census Bureau Population Estimate Program, 2000 to 2009.

Fire Injuries

Fire Deaths, New York City, 1980-2009



Source: New York City DOHMH Bureau of Vital Statistics.

- In just under 30 years, fire-related deaths in New York City have decreased by more than half (266 fire related deaths in 1980 to 66 deaths in 2009). Many efforts have contributed to this decline, including improved fire codes for buildings, faster fire department response times to emergencies, and aggressive public outreach and education on fire prevention.

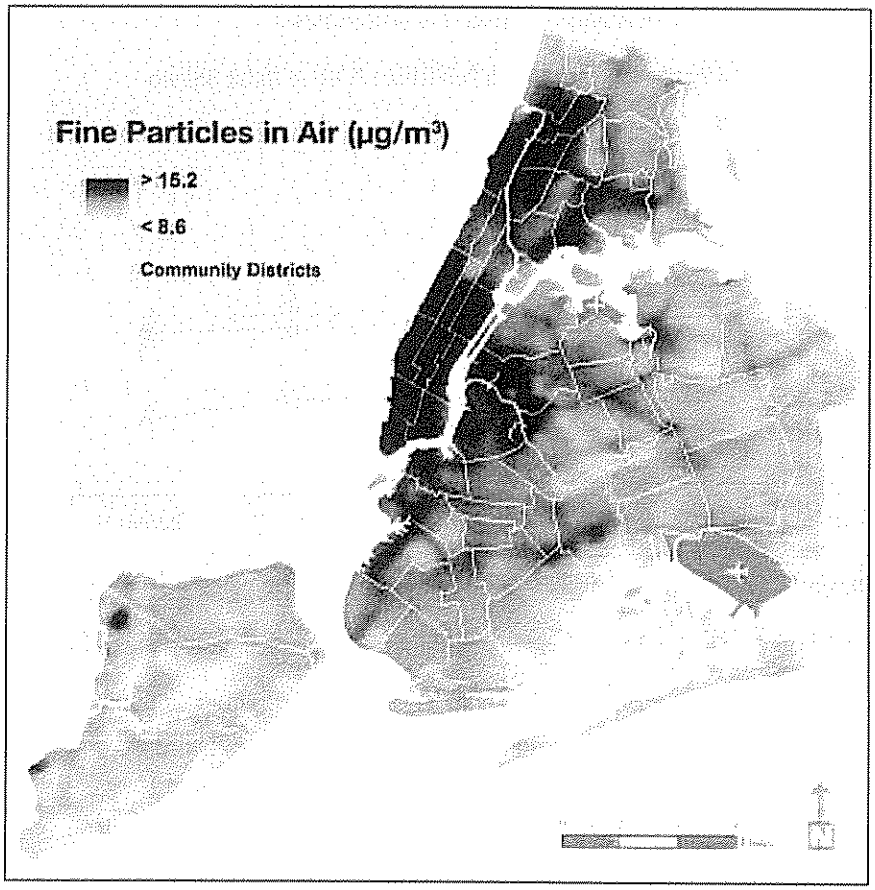
Improving Air Quality

Air pollution is a leading environmental threat to the health of most urban residents. Fuel combustion (from motor vehicles, industry, electric power generation, heating and cooking) is the source of urban air pollutants with the greatest impact on public health. Federal and state clean air regulations have reduced harmful pollutants across the United States. These lower concentrations still take a major toll on New York City residents, contributing to more than 3,000 deaths and 8,000 emergency visits and hospitalizations a year due to lung and heart conditions.

Measuring Air Quality

New York City's air quality is affected by sources outside and within the city. Sources in the city cause some neighborhoods to have much higher air pollution levels than others. To assess neighborhood air quality and identify important local sources, the New York City Health Department conducts the New York City Community Air Survey, measuring air pollutant levels at 100 street-level sites throughout the city.

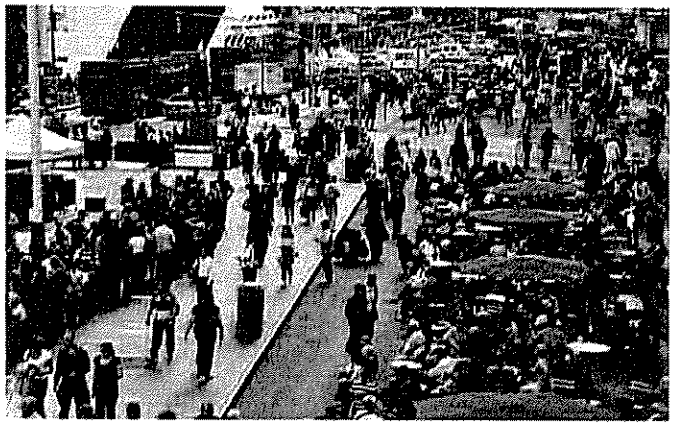
Fine particles ($PM_{2.5}$) are small enough to be inhaled deep into the lungs. These particles contribute to heart and lung disease. New York City Community Air Survey monitoring has found that annual average fine particle levels are 30% higher in regions with higher density of boilers burning "residual fuel oil" and 22% higher at sites with higher traffic density.



Source: New York City Community Air Survey, NYC DOHMH.

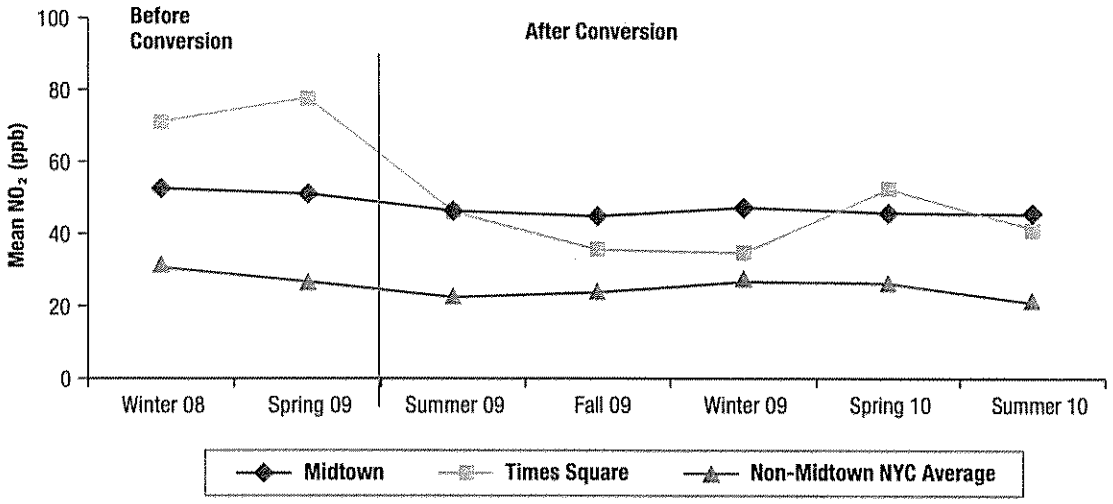
Reducing Air Pollution

- In 2010 the New York City Council enacted a Local Law that cut in half the maximum allowable sulfur content of No. 4 oil, one of the "dirtiest" fuel oils, to 1,500 ppm. That same year New York State enacted a bill lowering the maximum sulfur content of No. 2 home heating oil to 15 ppm, reducing sulfur levels by 99% in the most commonly used heating oil across the State.
- New York City fuel oil rules issued in January 2011 will require rapidly phasing out the use of the most heavily-polluting residual fuel oil (No. 6) by 2015 and all residual fuel oils by 2030.
- Together these rules could lower the overall concentration of fine particles in the city's air by up to 5%, preventing an estimated 200 deaths, 100 hospitalizations and 300 emergency room visits each year for illnesses caused by air pollution.



Times Square pedestrian plaza in Manhattan.
Photo credit: NYC Department of Transportation

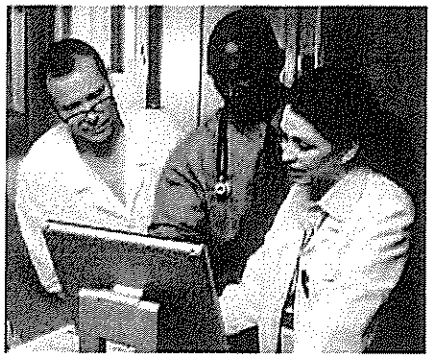
Nitrogen Dioxide Concentrations Before and After the Conversion to a Pedestrian Plaza at Times Square



Source: New York City Community Air Survey, NYC DOHMH.

- The best way to reduce exposure to traffic pollutants is to shift more travel from cars to public transit, walking and biking. Doing this requires investments in public transit, bicycle lanes and safe places for pedestrians to walk.
- In congested urban centers, reducing pedestrians' proximity to heavy traffic can reduce their exposure to harmful pollutants. For example, the City's creation of a car-free pedestrian plaza in Times Square in 2009 reduced levels of nitrogen dioxide in the plaza by more than 40%.

Improving the Quality of Preventive Medical Care



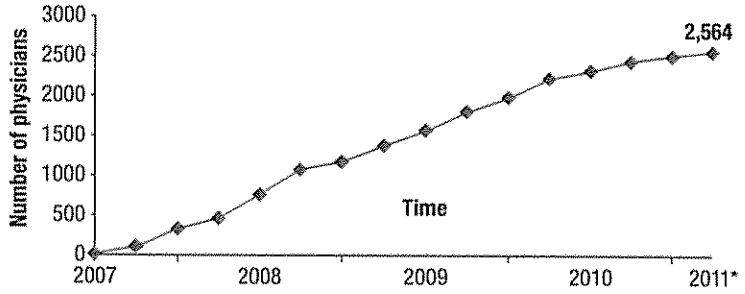
Physicians use electronic health records to identify gaps in preventive care.

Preventive medical care, such as advice to quit smoking and early detection and treatment of conditions including high blood pressure and colon cancer, can reduce illness and deaths. However, people in the United States receive these preventive health services at half the recommended rate.[22] Strategic use of prevention-oriented electronic health records can improve delivery of preventive medical care.

- Automated reminders built into an electronic health record can alert providers that patients need specific preventive services.
- Patient registries allow providers to generate lists of patients who have gaps in care. Providers can then contact these patients to return for preventive services.

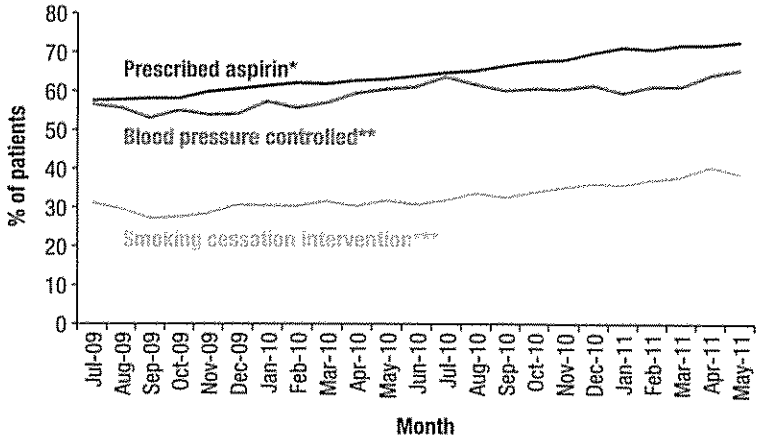
- The Primary Care Information Project has extended prevention-oriented electronic health records to more than 2,500 New York City primary care providers caring for more than two million patients, many in low-income neighborhoods.

Number of physicians using electronic health records with the Primary Care Information Project by quarter, New York City, 2007-2011



*through May 14
Source: NYC DOHMH Primary Care Information Project.

Improvements in the percent of patients receiving clinical preventive services in practices and community health centers using prevention-oriented electronic health records



*Among patients with vascular disease or diabetes
**Among patients with high blood pressure
***Among patients who currently smoke
Source: NYC DOHMH Primary Care Information Project.

- Data from the Primary Care Information Project show improvement in the delivery of clinical preventive services among participating providers. Providers using an electronic health record that prompts them to consider needed preventive services are increasing their rates of aspirin therapy for patients with vascular disease or diabetes, control of blood pressure for patients with hypertension, and smoking cessation interventions for patients who smoke.

Lessons Learned

For centuries, public health efforts throughout the world have made substantial progress in fighting communicable diseases. Today, non-communicable diseases and injuries have become leading global health problems. City governments can play an important role in preventing non-communicable diseases and injuries, just as they have in preventing communicable diseases.

The New York City Health Department has taken effective steps to reduce non-communicable diseases and injuries in New Yorkers. Several important factors contributed to this success:

- Approaches that change the physical and social environment have been more effective than efforts to change individual behaviors alone. Changing everyday settings into smoke-free spaces where it is easy to safely walk, bike and find healthy food makes it easier for individuals to make healthy choices.
- Effective interventions require support from the highest levels of government. Support from elected officials made it possible to pass smoking laws and tobacco tax increases, require calorie posting in chain restaurants, restrict use of artificial trans fat, and phase out air-polluting fuel oils.
- Cities can increase the impact of these policies by fostering interagency collaboration. Because all New York City agencies that purchase or serve food have adopted food and nutrition standards, millions of healthier meals and snacks are served in New York City each year.
- Some public health improvements can create positive health effects in more than one area. For example, bicycle lanes promote physical activity and decrease injury, and also improve air quality. Better air quality in turn prevents disease and promotes physical activity.
- Preventing non-communicable diseases is not necessarily costly. Policies such as the restriction on use of trans fat, the requirement for calorie posting in restaurants and the Smoke-Free Air Act cost virtually nothing in public funds to implement. Other initiatives, such as cigarette taxes, can generate revenue for governments to pay for prevention programs.

These ideas can be used in cities around the world.

New York City Global Partners, Inc. connects New York City with leading cities worldwide by encouraging cities to learn from one another's innovative solutions to common problems. For more information, visit **nyc.gov/globalpartners.**

Technical Notes

Life expectancy data: Life expectancy data for the United States are from the National Center for Health Statistics (NCHS), which used a revised methodology for the 2000–2006 calculations presented here, so data may differ slightly from those previously published. In addition, U.S. data for 2008 are preliminary.

Death rate analyses: All death rates presented or discussed were age-adjusted to the Year 2000 Standard Population.

Preventable, premature death analysis: Methods for estimating NYC premature deaths (30-69y) attributable to individual risk factors were reported in a national comparative risk assessment analysis by Danaei et al.,[23] except for NYC alcohol attributable deaths (20-64y; plus certain infant and injury deaths occurring <20y) estimated using Alcohol Related Disease Impacts (ARDI), and NYC smoking attributable deaths (35-64y) estimated using Smoking Attributable Mortality, Morbidity and Economic Costs (SAMMEC). The number of deaths should not be summed across individual risk factors because many diseases are caused by more than one risk factor and because the effects of some risk factors are partly mediated through other risks. Consequently some deaths appear more than once in the chart and could be prevented by intervening on one or more risk factors. For example, heart disease deaths can be prevented by reducing smoking or increasing physical activity, so the same death would be counted under both risk factors. The effect of high dietary sodium on cardiovascular disease deaths was estimated through its effect on systolic blood pressure.

Prevented deaths due to smoking decrease: Smoking prevalence estimates for 2002 and 2010 from the NYC Community Health Survey were applied to the 2002 NYC population (U.S. Census Intercensal estimates program, 2002). Age- and sex-specific mortality rates by smoking status[24] were used to estimate numbers of deaths, assuming a 10-year quit rate of 20%. The difference in deaths in the two scenarios was projected until age 75 or the year 2052. For more information, visit nyc.gov and search for CHS.

Physical activity analysis: The Physical Activity and Transit Survey was made possible by funding from the U.S. Department of Health and Human Services. Data are weighted to the NYC adult population per the American Community Survey (2006–2008) and are age-adjusted to the year 2000 Standard Population.

Injury death rate analyses: Injury deaths rates for the U.S. are generated by the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Web-based Injury Statistics Query and Reporting System (WISQARS), 2005–2007. Injury deaths rates for NYC are computed by the Health Department's Injury Surveillance and Prevention Program using mortality data from the Office NYC DOHMH Bureau of Vital Statistics, 2007–2009. Population estimates were produced by the Department based on the U.S. Census Bureau Population Estimate Program and housing unit data obtained from the NYC Department of City Planning (DCP).

Air quality analysis: For more information, see The New York City Community Air Survey: Results from Year One Monitoring 2008–2009 (visit nyc.gov, search for Air Survey).

Endnotes

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Acknowledgements

New York City Department of Health and Mental Hygiene Current and Former Program Leadership
Mary Bassett, Christina Chang, Nancy Clark, Louise Cohen, Carolyn Greene, Thomas Farley, Thomas Frieden, Andrew Goodman, Susan Kansagra, Dan Kass, Bonnie Kerker, Elizabeth Kilgore, Jessica Leighton, Thomas Merrill, Nancy Miller, Farzad Mostashari, Amanda Parsons, Sarah Perl, Lynn Silver, Lorna Thorpe

Many other health department staff and other individuals contributed to the work described in this report. We thank all the leaders and collaborators who made these solutions for prevention of non-communicable diseases and injuries a reality. Cover photos: Second photo, John Midgely and Georgia Kokolis. Third and fourth photos, NYC Department of Transportation.

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Suggested Citation

New York City Department of Health and Mental Hygiene. Preventing Non-Communicable Diseases and Injuries: Innovative Solutions from New York City. New York: New York City Department of Health and Mental Hygiene, 2011.



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A data report from the New York City Health Department

TAKE CARE NEW YORK

NYC Health

NYC Vital Signs

New York City Department of Health and Mental Hygiene March 2013 Volume 11, No. 4

Promotion of Tobacco Products in New York City Retailers

In 2011 in NYC, an estimated 930,000 adults and 19,000 New York City public high school students younger than 18 currently smoke. Further, 28,000 public high school students under the age of 18 tried smoking for the first time. Those living in high-risk neighborhoods characterized by high rates of poverty and health disparities smoke at higher rates than other adult New Yorkers (18% in high-risk neighborhoods vs. 14% for the rest of the city). Data also suggest that smoking rates are higher among adults in low-income neighborhoods (17%) than those in high-income neighborhoods (13%).

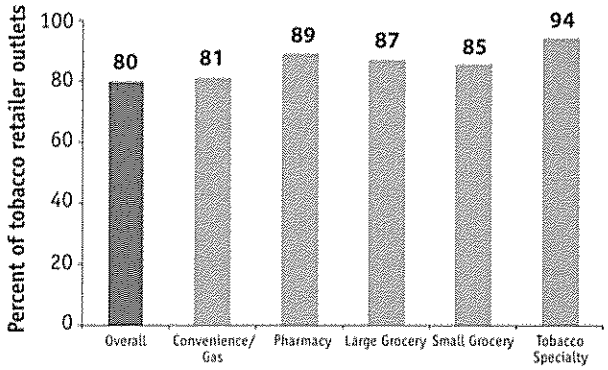
According to the 2012 Surgeon General's report, tobacco advertising and marketing increase youth tobacco use. Recruiting new tobacco users is important for the industry, as more than half of adult smokers die prematurely from tobacco-related disease. The tobacco industry now spends 90% of its $8 billion annual marketing budget in the retail setting to promote cigarettes and other tobacco products. This makes retail stores the primary source of youth exposure to tobacco marketing.

There are about 10,000 licensed tobacco retailers in NYC, including small and large groceries, convenience stores, gas stations, tobacco specialty stores, and pharmacies. Most adult New Yorkers (73%) report purchasing their cigarettes from convenience stores/gas stations and small groceries. The tobacco industry often provides tobacco display cases and pays retailers to prominently display their tobacco products more visibly. For popular brands, it is common to see multiple rows of the same cigarette pack stocked in display cases.

In order to monitor the NYC retail tobacco environment, the Retail Advertising Tobacco Survey, an observational survey of about 2,000 licensed tobacco retailers, was conducted in the summer of 2011. This Vital Signs presents the findings of this survey and includes recommendations for retailers, community organizations, and current tobacco-users.

Tobacco displays are common in NYC retail outlets

Percentage of retail outlets using the majority of the area behind the counter to display tobacco products



*Three types of retail outlets are not displayed: "Other Outlets" (e.g. stationery, video, card), "Mass Merchandiser" (e.g. Wal-Mart) and "Gasoline station only."

Source: Retail Advertising Tobacco Survey 2011

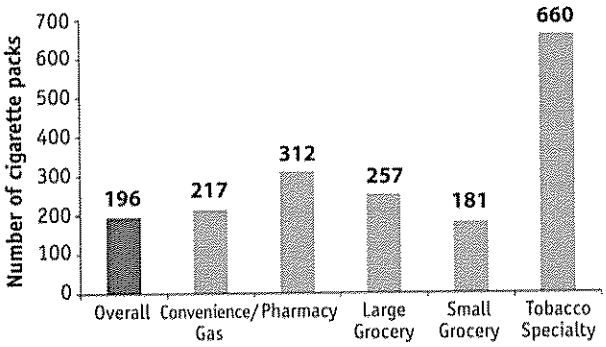
High-risk neighborhoods: Neighborhoods were designated "high risk" because they have the highest morbidity and mortality rates in the city. The Health Department operates District Public Health Offices in the boroughs where these neighborhoods are located.

- Most (80%) NYC retailers have the majority of the area behind the checkout counter devoted to the display of tobacco products.
- More retailers in high-risk neighborhoods have tobacco product displays covering the majority of the area behind the checkout counter than retailers in other neighborhoods (86% of retailers in high-risk neighborhoods compared with 79% of retailers in other neighborhoods).
- Almost 90% of retailers in the Bronx and Queens have the majority of the area behind the counter devoted to the display of tobacco products, compared with an average of 73% in other boroughs.
- Pharmacies selling tobacco tend to devote much more space to the display of tobacco products (49 sq ft) than the average of all other tobacco retailers (29 sq ft).

Most NYC retailers have pack displays and tobacco advertising

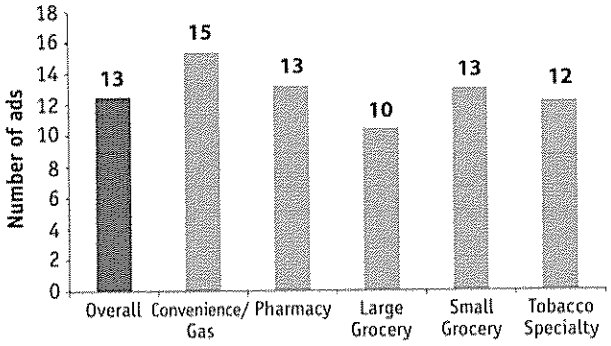
Pack display and advertising in NYC retailers

Cigarette packs displayed by type of store



Source: Retail Advertising Tobacco Survey 2011

Interior and exterior ads by type of store



Source: Retail Advertising Tobacco Survey 2011

- Tobacco advertising is widespread, with more than 95% of all NYC tobacco retailers having interior ads and almost 60% having exterior ads.
- The average combined number of advertisements per store (interior and exterior) varies by outlet type: convenience/gas stores (15), pharmacies (13), small groceries (13), tobacco specialty stores (12), and large groceries (10).
- The average number of packs displayed is 196. The stores with the most packs displayed include tobacco specialty stores (>660 packs) and pharmacies (312 packs).

More than two thirds of NYC tobacco retailers have cigarette price promotions

Tobacco product displays and price promotions are common in NYC retail outlets

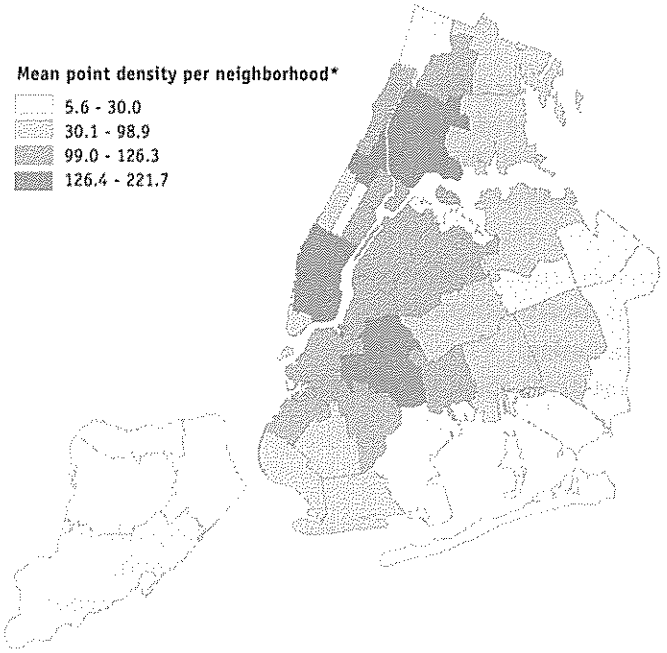


Surveyors recorded promotional pricing offers for Marlboro Red, Newport Green and Doral Red cigarettes. Promotional pricing offers for other brands were not assessed as part of this survey.

- Price promotions for cigarettes are common, with almost 70% of tobacco retailers offering a promotional discount at the time of the survey.
- Special price offers were the most common discount (66%), followed by bundles, or multi-pack discounts (3%). Coupons, free packs and mail-in-rebates were the least common discount (less than 1%).
- Stores with price promotions tend to be more common in high-risk neighborhoods than in other neighborhoods (72% vs. 66%).

Exterior tobacco advertising is more common in high-risk neighborhoods

Exterior tobacco advertising density by neighborhood



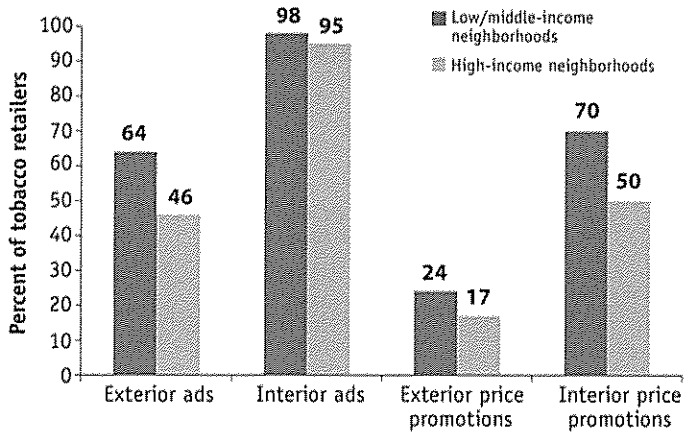
*Mean point density: average number of exterior ads that are within one half mile of any point in a neighborhood.
Neighborhoods are based on the United Hospital Fund zip-code groupings.

Source: Retail Advertising Tobacco Survey 2011

- Exterior tobacco advertising exposes residents and visitors to messages about tobacco, even if they are not users or are not shopping for it. One way to measure exposure to advertising is "mean point density," which represents the average number of exterior ads that are within one-half mile of any point in a neighborhood.
- Tobacco retailers in high-risk neighborhoods have more exterior advertisements per store than retailers in other neighborhoods (three vs. two ads/store).
- Retailers with exterior advertisements are more common in high-risk neighborhoods (69% vs. 57%).
- Among the 10 neighborhoods with the highest exterior advertising density, six are considered high-risk: Crotona-Tremont, Highbridge-Morrisania and Hunts Point-Mott Haven in the South Bronx, Bedford Stuyvesant and Williamsburg-Bushwick in North and Central Brooklyn, and Central Harlem-Morningside Heights in Manhattan.

High-income neighborhoods are less likely to have tobacco advertising and price promotions

Tobacco advertising and price promotions by neighborhood income



Neighborhood poverty is based on the percent of residents living 200% below the federal poverty level in United Hospital Fund neighborhoods. Low- and middle-income neighborhoods are in the highest and middle third of the distribution; high-income neighborhoods are in the lowest third of the distribution.

Source: Retail Advertising Tobacco Survey 2011

- High-income neighborhoods are less likely to have tobacco price promotions than lower-income neighborhoods in NYC.
- Retailers in high-income neighborhoods were almost 30% less likely to have exterior ads than those in low- and middle-income neighborhoods.
- Retailers in high-income neighborhoods had an average of 11 total ads (interior and exterior) per store compared with 13 ads per store in low- and middle-income neighborhoods.
- Retailers in high-income neighborhoods were almost 30% less likely to have an interior or exterior price promotion than retailers in low- and middle-income neighborhoods.

Recommendations

Retailers can help create a healthy tobacco-free community.

- Voluntarily decide not to sell or advertise tobacco products.
- Use promotional space for marketing healthy goods, such as fresh fruit and vegetables, instead of tobacco products.
- Do not place tobacco products next to toys, candy, snacks or other products attractive to youth.
- Train all employees in verifying that tobacco customers are at least 18 years old. More information about New York State Certified Tobacco Sales Training Programs can be found here: http://www.health.ny.gov/prevention/tobacco_control/certlist.htm

Community organizations can support tobacco control efforts in the retail environment, particularly in neighborhoods suffering from health disparities.

- Support efforts to decrease tobacco product marketing.
- Educate youth, local retailers and community residents about tobacco company marketing tactics and their impact on youth.

Tobacco users who quit can improve their health.

- Quitting tobacco has both immediate and long-term benefits. If you have trouble quitting, talk to your doctor about nicotine replacement therapy and other medications that can help you quit.
- Ask a fellow tobacco user to quit with you, or find someone who has already quit to provide support.
- For information on becoming tobacco free, call 311 or visit nyc.gov (keywords: 'nyc quits').

Data Source: The data presented here are from the Retail Advertising Tobacco Survey, a survey of randomly selected licensed tobacco retailers in New York State (NYS) conducted annually by the NYS Department of Health since 2004. In 2011, a random sample of 2,188 NYC retailers (23% of all NYC retailers) was surveyed using a standardized data collection tool to examine the prevalence of tobacco product displays, promotions, and advertisements. The sample was stratified based on outlet type (convenience/gas, pharmacies, large and small groceries, and tobacco specialty stores), neighborhood racial characteristics (predominantly black neighborhoods with more than 50% black residents and neighborhoods with less than 50% black residents), and inclusion in the 2010 survey. The sample was weighted to adjust for unequal probability of selection and to ensure representativeness of NYC retailers. Data on NYC smokers are from the NYC Community Health Survey 2010. For more information, visit www.nyc.gov/health/survey.

NYC Vital Signs
A data report from the New York City Health Department
New York City Department of Health and Mental Hygiene March 2013 Volume 11, No. 4

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Trends in cigar smoking and perceptions of health risks among Massachusetts adults

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Tobacco Control 2002;11(Suppl II):ii25–ii29

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Objective: To track trends in cigar smoking and assess perceptions of cigar related health risks among Massachusetts adults.
Design: A random digit dial telephone survey conducted in 1993 and a subsequent monthly random digit dial survey conducted March 1995 to June 2000.
Participants: 4733 adults who completed the 1993 survey and 14 868 adults who completed the monthly survey between 1995 and 2000.
Main outcome measures: Trends in current and experimental cigar use and perceptions of health risks.
Results: Current cigar usage increased significantly among men aged 18–34 years between 1993 (5.8%) and 1997-98 (18.2%), but began to decrease in 1999-2000 (13.5%). Young men were much more likely than older men or women of any age to have experimented with cigars in the year before interview, but this trend appears to have decreased slightly since 1998. Young male cigar smokers were increasingly those who never smoked cigarettes. Former cigarette smokers were not smoking cigars in greater numbers. Cigar smokers were roughly three times as likely as those who do not smoke cigars to believe cigars are a safer alternative to cigarettes, and that perception did not appear to change much over time.
Conclusion: Cigar usage increased dramatically among young men in Massachusetts in conjunction with national increases in sales and marketing of cigars, but now appears to be decreasing.

A generation ago, cigar smoking was a declining trend. Prevalence rates fell immediately following the enactment of a 1973 ban on television and radio small cigar advertisements, and continued to decline steadily over subsequent years.[1] Then, two decades later, a startling reversal became apparent. Cigar sales in the USA between 1993 and 1998 increased by almost 50% to 4.5 billion. Substantial increases in the prevalence of cigar use were noted following 1996.[1]

The sudden increase in the prevalence of cigar use attracted the attention of the Federal Trade Commission (FTC), which in 1998 ordered five major cigar manufacturers to issue reports detailing sales and advertising/ promotional expenditures for 1996 and 1997.[2] The companies reported a 32% increase in advertising and promotional expenditures over the two year period, from $30.9 million to $41 million. The FTC report stated that "the dramatic increase in cigar use in America has occurred in tandem with the increase in promotional activities surrounding cigar smoking" (page 2 of press release). The FTC also cited significant increases in the number of brands being marketed (up 54% in 1997) and sold (up nearly 41%).[2] Noting that people appear poorly informed about the risks associated with cigar smoking, the FTC recommended that health warning labels be placed on cigar packages.

Tobacco control researchers and media journalists shared an interest in understanding the nature of the sudden increase. Preliminary studies indicated unprecedented numbers of underage smokers choosing cigars.[3] Politicians and celebrities were featured in new magazines like Cigar Aficionado, and cigars were somehow managing to garner overwhelmingly positive media attention.[4] Instead of focusing on the potential hazards of cigar smoking, journalists began chronicling the curious genesis of a glamorous new cigar culture and tended to portray cigar smoking in a favourable light.[4 5]

The level of success of recent cigar marketing strategies can be measured not only by sales figures, but also by behavioural and attitudinal trends assessed before, during, and after the course of these commercial phenomena. In this paper we present the cigar smoking prevalence rates for a sample of Massachusetts adults between 1993 and the first half of 2000. Specifically, this paper explores trends in usage and experimentation by demographic characteristics, the potential relation between cigarette and cigar smoking, including the possibility that cigarette smokers may be switching to cigars, and perceptions of health risks associated with cigar smoking. It addresses the following questions:

(1) Have the cigar smoking rates of Massachusetts adults changed during the period of high levels of marketing?

(2) If so, are particular populations more vulnerable?

(3) Are the cigar smokers new tobacco users or have they moved on from cigarette smoking?

(4) How are the risks of cigar usage perceived?

METHODS

Sample

Since the implementation of the Massachusetts Tobacco Control Program in 1993, The Center for Survey Research at the University of Massachusetts, Boston has been collecting data on the evolving tobacco related attitudes and behaviours of adults and teenagers across the state. The Massachusetts Tobacco Survey (MTS), conducted in 1993, supplied baseline data for both youth and adults on their prevailing beliefs and practices at the programme's initiation. The Massachusetts Adult Tobacco Survey (MATS) began in 1995 and continued through to December 2000, surveying approximately 225 adults each month on various programme and policy related topics. Both the MTS and MATS are random digit dial telephone surveys that feature two distinct components. The first, a brief interview with any one adult in the household, enumerates the adults in each household and provides demographic and smoking status information for each adult. From

Abbreviations: FTC, Federal Trade Commission; MATS, Massachusetts Adult Tobacco Survey; MTS, Massachusetts Tobacco Survey

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Table 1 Trends in percentages of cigar smoking by sex and age

Age (years)	Sex: cigar smoking	MTS: 1993 (n=4733) %	±CI	MATS: 1995-96 (n=4929) %	±CI	MATS: 1997-98 (n=5690) %	±CI	MATS: 1999-2000* (n=4249) %	±CI
18–34	Men: pipe/cigar smoker	5.8	3.0	11.5	5.7	18.3	5.8	13.6	6.3
	Men: cigar smoking	5.8†		11.5†		18.2	5.8	13.5	6.3
	Women: pipe/cigar smoker	1.2	1.2	1.1	1.7	1.1	0.9	2.5	2.4
	Women: cigar smoker	1.2†		1.1†		1.1	0.9	2.5	2.4
35–49	Men: pipe/cigar smoker	9.6	4.1	11.1	4.9	9.8	3.8	13.9	5.5
	Men: cigar smoker	9.3†		10.8†		9.5	3.8	13.8	5.5
	Women: pipe/cigar smoker	0.7	0.8	1.6	1.8	1.2	1.4	0.2	0.2
	Women: cigar smoker	0.7†		1.6†		1.2	1.4	0.1	0.1
50+	Men: pipe/cigar smoker	9.6	5.6	6.3	3.6	4.8	3.3	8.7	4.7
	Men: cigar smoker	6.4†		4.2†		2.9	2.8	8.2	4.6
	Women: pipe/cigar smoker	0.9	0.9	1.4	1.4	0.3	0.4	0.1	0.1
	Women: cigar smoker	0.9†		1.4†		0.3	0.4	0.1	0.1

All percentages are weighted to adjust for sampling design. Ns are unweighted.
*First half of 2000 only.
†Estimated by deducting approximate number of pipe smokers. There were virtually no pipe smokers among the 18–34 year old group.
MATS, Massachusetts Adult Tobacco Survey; MTS, Massachusetts Tobacco Survey; CI, 95% confidence interval.

this interview, one adult is then randomly selected to be interviewed in depth. The MTS employed an additional oversampling strategy, whereby smokers and minorities were oversampled, while MATS did not employ the oversampling procedure. Response rates for MTS were 78% for the household interview and 78% for the in-depth interview. For MATS, response rates for the household interview have ranged from 68–76% and for the in-depth interview have been between 79–81%.[6 7]

Measures

Cigar smoking prevalence and experimentation

Both the MTS in 1993 and the ongoing MATS included a question designed to estimate the smoking prevalence of non-cigarette forms of tobacco. The question mirrored that used to determine current cigarette smoking prevalence and was worded as follows: "Do you now smoke a pipe, cigar, or cigarillos, every day, some days, or not at all?" In order to focus solely on the prevalence of cigar and cigarillo smoking, in December of 1996 a question was added to help distinguish these from pipe smoking: "Which of these tobacco products do you use?" Using this question, estimated proportions of pipe smoking (according to sex and age) were removed retrospectively from data that was collected before the introduction of the new question. These estimated proportions of pipe smokers were compared across the years for which there existed data (1997–2000) in order to determine the stability of the estimates. Proportions of pipe smokers in each demographic group were deemed very stable across these years of data collection, lending support to the rationale for applying them to data collected in prior years. Beginning in December of 1996, a question was inserted before the questions on current cigar smoking: "In the past 12 months, have you tried smoking a cigar—even a puff?" Respondents answering "yes" to this question were classified as having at least experimented with cigar smoking in the prior year.

Cigarette smoking prevalence

Determination of cigarette smoking prevalence followed established criteria: current smokers had smoked at least 100 cigarettes in their lifetime and smoked either "every day" or "some days" at the time of the survey; former smokers had also smoked at least 100 cigarettes in their lifetime, but smoked "not at all" at the time of the survey; and never smokers were those who had not smoked 100 cigarettes in their lifetime. This measure of smoking prevalence was used as a comparison characteristic of those who smoked cigars.

Perceptions of health risks

A measure of the perceptions of health risks was obtained by asking respondents, "Do you believe that switching from cigarettes to cigars reduces a smoker's chance of illness?" This question was also added in December of 1996 and was asked of all respondents.

Data analysis

All data were weighted and analyses were conducted using SUDAAN,[8] in order to account for the complex stratified sampling design. Trends in cigar smoking were assessed using combined sample years, for the purpose of comparing similarly sized groups.

RESULTS

Trends in cigar smoking

Table 1 depicts trends in cigar smoking across time, by demographic predictors sex and age. As shown, there occurred a significant upward trend in use by young men (ages 18–34 years) between the years of 1993 and 1998; in fact, there was a tripling in the rate of current use over the course of six years (from 5.8% in 1993 to 18.2% in 1997-98). Following the 1997-98 period, however, there was a decrease, though not significant, in cigar use among young men (13.5% for the period between 1999 and the first half of 2000). In contrast to patterns among young men, cigar smoking prevalence for women was consistently very low and virtually unchanged across the years in question. Similarly, rates of usage for older men were found to be more stable and substantially lower than those for younger men. Aside from the increase in cigar usage by young men between 1993 and 1997-98, there were no other significant differences noted. It is also important to mention that the majority of the young men using cigars reported smoking them "some days" (98%) rather than "every day" (2%).

Cigarette smoking status of young male cigar smokers

Table 2 compares across time the cigarette smoking status of young, male cigar smokers. The percentage of cigar smokers who had never been cigarette smokers increased (from 23.3% in 1993 to 55.2% in 1999-2000), while the percentage of cigar smokers who were former cigarette smokers declined slightly (from 17.1% in 1993 to 9.4% in 1999-2000). Because of large confidence intervals, the differences between these estimates were not significant. The findings suggest that cigars were not

Table 2 Cigarette smoking status of cigar smokers: men 18–34 years

	MTS: 1993 Male cigar smokers 18–34 (n=56)		MTS: 1995–96 Male cigar smokers 18–34 (n=72)		MATS: 1997–98 Male cigar smokers 18–34 (n=123)		MATS: 1999–2000* Male cigar smokers 18–34 (n=62)	
	%	±	%	±	%	±	%	±
Never cigarette smoker	23.3	17.8	50.4	27.3	40.1	17.1	55.2	24.2
Former cigarette smoker	17.1	24.4	8.5	10.3	10.4	8.8	9.4	7.9
Current cigarette smoker	59.6	25.2	41.2	28.1	49.5	18.1	35.4	22.6

All percentages are weighted to adjust for sampling design. Ns are unweighted.
*First half of 2000 only. See footnote to table 1 for explanation of abbreviations.

being used increasingly as a substitute for cigarettes among those who had quit.

Experimentation

Results regarding levels of experimentation with cigars, by sex and age, are shown in table 3. Proportions were compared across time. Once again, young men appear to have been the primary experimenters, followed by their older counterparts. While slightly more than one in 10 young women admitted to experimenting with cigars, fewer older women reported this type of experimentation. In comparing trends across time, it appears that experimentation with cigars may be on the decline among young males (42.4% in 1997-98 *v* 35.6% in 1999-2000), but this change was not significant.

Perception of risk

Data collected between 1996 and 1999 were analysed by cigar smoking status, and results indicated a significant difference between the beliefs of cigar smokers and cigar non-smokers, with the former being three times as likely to believe cigars are a safer alternative to cigarettes (32.3% *v* 11.2%) ($p < 0.05$). Perceptions among cigar smokers were additionally examined by cigarette smoking status. Former cigarette smokers were shown to be much more likely to believe that cigars are a safer alternative to cigarettes (47.9%) than current cigarette smokers (22.9%) or those who have never smoked cigarettes (28.8%), though these differences are not significant at the 0.05 level.

DISCUSSION

Our results indicate that the recent glamorisation of cigars corresponds with an increase in both experimentation with, and current usage of, cigar products by young men in Massachusetts. The trend may have peaked in 1997-98. Current use of cigars rose from 5.8% in 1993 to 18.2% in 1997-98 among this group, constituting a highly significant increase ($p = 0.001$). Data collected in California in the years 1990 and 1996 show a similarly large increase in the proportions of young men currently using cigars during this time period.[9] These increases have also been seen nationally among young men.[1] Interestingly though, while marketing has appeared to focus on both young men and women, women seemed to be more resistant to the lure of current cigar smoking. Though data show a small proportion of 18–34 year old women had experimented with cigars, these women did not display the same patterns of current usage that characterised men of the same age group. Fortunately, data collected since 1998 suggest that the explosive increase in cigar use among young men may be slowing, with prevalence figures for this group down to 13.5% for the period between 1999 and the first half of 2000. In addition, data on per capita consumption of cigars show a decrease for the entire US population, as well as for adult males, between 1999 and 2000.[10]

We thought it important to assess whether the cigarette smoking status of the young male cigar smoker had changed over time, as their numbers increased. Whether the new cigar smoker was a current, former, or never smoker of cigarettes is a variable crucial to understanding the nature of the cigar phenomenon. Analysis of the cigarette smoking status of the young male cigar smoker over time revealed that more of the new cigar smokers were those who had *never* smoked cigarettes (23.3% of the cigar smokers in 1993 *v* 55.2% of the cigar smokers in 1999-2000). In addition, a slight decline was revealed in the proportion of cigar smokers who were *former* cigarette smokers; an important finding that suggests cigarette smokers are not overwhelmingly turning to cigars as a substitute for cigarettes. Although the statistical power of these analyses is quite low because of small samples sizes of young male cigar smokers, the estimates are suggestive of trends for this population.

Though former cigarette smokers do not appear to be turning to cigars in increasing numbers, this situation does occur. An important question here concerns the potential for cigar smokers to view cigar smoking as a "safe" alternative to cigarettes. Since former or current cigarette smokers who smoke cigars have been shown to inhale more deeply than do those who have never smoked cigarettes,[1] and the health risks have been shown to be much greater with deeper inhalation,

Table 3 Trends in experimentation with cigars by sex and age

	MATS: 1997-98 (n=5690)		MATS: 1999-2000* (n=4249)	
Sex, age	%	±CI	%	±CI
Men 18–34	42.4	7.1	35.6	8.1
Women 18–34	15.8	4.7	11.2	4.2
Men 35–49	25.6	5.8	23.0	6.4
Women 35–49	5.3	2.8	4.1	2.5
Men 50+	11.8	5.1	12.8	5.5
Women 50+	1.5	1.5	0.2	0.2

Data shown are based on the question, "Have you ever tried smoking a cigar—even a puff—in the past 12 months?", and were collected from samples between December 1996 and December 1999.
All percentages are weighted to adjust for sampling design. Ns are unweighted.
*First half of 2000 only. See footnote to table 1 for explanation of abbreviations.

What this paper adds

During the mid 1990s, cigar sales rose substantially in conjunction with an increase in cigar related promotional activities. Data collected in California in 1990 and 1996 revealed large increases in the proportion of young men using cigars on an ongoing basis during this period. The dramatic rise in use warranted further detailed examination of the cigar phenomenon in other geographic areas, as well as an assessment of cigar use trends after 1996.

This study looked specifically at Massachusetts adults to identify cigar usage trends and to examine perceptions of the health risks of cigar use. Results showed cigar use increased dramatically among young men in Massachusetts in conjunction with national increases in sales and marketing of cigars in the mid '90s, but appeared to be decreasing in subsequent years. Additional findings suggested that young men were much more likely than older men or women of any age to have experimented with cigars in the year before interview, up until 1998. When cigarette smoking status was considered, it was found that young male cigar smokers were increasingly those who never smoked cigarettes. Additionally, former cigarette smokers were not found to be smoking cigars in greater numbers. With regard to perceptions of health risks, cigar smokers were found to be about three times as likely as those who do not smoke cigars to believe that cigars are a safer alternative to cigarettes.

perceptions by cigar smokers of the safety of their cigar smoking are an important concern. Indeed, our results show cigar smokers to be three times as likely as those who do not smoke cigars to believe that switching from cigarettes to cigars reduces a smoker's chance of illness (32.3% *v* 11.2%), with former cigarette smokers the most likely among cigar smokers to believe that cigars are a safer alternative (47.9%). It will be important to continue monitoring trends in marketing and advertising of cigars over the next few years. This will allow for further examination of the links between activities of the cigar industry and population smoking patterns.

ACKNOWLEDGEMENTS

This work was supported by the Massachusetts Department of Public Health, Massachusetts Tobacco Control Program (Health Protection Fund).

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Point of sale tobacco displays and smoking among 14–15 year olds in New Zealand: a cross-sectional study

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Received 28 August 2008
Accepted 13 May 2009

ABSTRACT

Objective: To examine the association between exposure to tobacco displays at the point of sale and teenage smoking and susceptibility to the uptake of smoking.

Design: The sample comprised a national cross-section of 14–15 year olds with two measures of exposure to tobacco displays at the point of sale and three outcome measures. The outcome measures were susceptibility to smoking initiation, experimenting with smoking or current smoking.

Results: Compared with visiting stores less often than weekly, a greater frequency of store visits was related to increased odds of being susceptible to smoking (daily visits, adjusted OR 1.8, 95% CI 1.6 to 2.2) and experimenting with smoking (daily visits, adjusted OR 2.7, 95% CI 2.4 to 3.1). The likelihood of being a current smoker increased with a greater frequency of store visits among students of medium and high socioeconomic status, but not among those of low socioeconomic status.

Conclusion: Although these findings are cross-sectional in nature, they are consistent with the notion that greater exposure to tobacco displays at the point of sale increases youth smoking, and suggest display bans are needed.

Promotion of tobacco contributes to initiation of smoking by adolescents[1 2] yet tobacco continues to be promoted at the point of sale (POS) in most jurisdictions. Tobacco companies invest significantly in the promotion of tobacco at the POS[3 4] using in-store advertising, prominent displays of tobacco products, or both. The volume and type of POS tobacco promotion permitted varies considerably between jurisdictions but most have few or no restrictions. However, implementation of restrictions on POS promotion is increasing. For example some Canadian provinces and Iceland do not permit any advertising or display of tobacco products at the POS. Ireland will introduce a similar ban on 1 July 2009, and consultations on a POS ban are underway in England and New Zealand.

Some jurisdictions have limited restrictions on POS displays. In New Zealand, restrictions include that "Smoking kills" signs must be displayed, tobacco product displays are limited to 100 packets per point of sale, tobacco products may not be within 1 m of children's products, and tobacco product displays should not be visible from outside the store (http://www.moh.govt.nz/moh.nsf/wpg_Index/About-smokefreelaw-retailers#1). However, compliance with the regulations is often poor.[5] In a compliance study in New Zealand, the most common breaches of the regulations were: failure to appropriately display a "Smoking kills" sign (30% of all stores), POS display visible from outside the store (25%), tobacco products displayed within 1 m of children's products (24%) and displaying more than 100 packets per point of sale (16%).

In a recent systematic review, uptake of smoking or increased susceptibility to smoking was significantly associated with tobacco promotion at the POS in seven of eight observational studies and two experimental studies of teenagers.[2 3 6–13] However, most studies that have investigated the association between POS tobacco promotion and smoking or susceptibility to smoking were conducted in the USA.[6 10–12] In the USA there are few restrictions on tobacco promotion (including on advertising and display of tobacco at POS), and in-store tobacco promotion is usually extensive.[14 15] Therefore, findings may not apply to different settings such as those with greater restrictions on tobacco promotion. In addition, the large amount of in-store advertising in the US means it is not possible to separate the impact of POS tobacco displays on smoking uptake from other types of in-store advertising in these studies.

We investigated the association between exposure to POS displays of tobacco products and smoking, experimenting with smoking and susceptibility to smoking uptake among teenagers in a jurisdiction where most tobacco advertising (including POS advertising) is banned, and where tobacco promotion is restricted to a limited, but still prominent, display of tobacco products at the POS.

METHODS

All schools in New Zealand with Year 10 (age 14–15) students were identified from the Ministry of Education database and invited to participate in this study. Schools that agreed to participate were provided with an information sheet, brief instructions, questionnaires and a reply-paid envelope for returning the questionnaires. Schools were asked to administer the questionnaire to all their Year 10 students. Students were informed that the survey was anonymous, and that they could refuse to participate at any time. Teachers remained in class while the students completed the pen and paper questionnaires, but were instructed not to examine the surveys for completeness or response. The Auckland Ethics Committee of the Ministry of Health granted a waiver of the formal review and consenting processes.

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Smoking behaviour and susceptibility variables

Smoking status was measured using two questions: (i) "have you ever smoked (even just a few puffs)?" with yes/no response categories; and (ii) "how often do you smoke now?" with the response categories, "I have never smoked/I am not a smoker now", "less often than once a month", "at least once a month", "at least once a week" and "at least once a day". If students said they smoked at least daily, weekly or monthly they were defined as "current smokers". "Experimental smokers" were defined as students who had smoked a cigarette but were not a smoker at the time of the survey or smoked less than once a month. "Never smokers" were those who had never smoked.

Susceptibility for smoking uptake among students who had never smoked was assessed using two questions developed and validated by Pierce and colleagues,[16–18] and employed by the Global Youth Tobacco Surveillance team.[19] Students were defined as being non-susceptible if they reported that they definitely will not smoke in the next year and definitely would not smoke if offered a cigarette by their best friend. Students who answered "probably not", "probably" or "definitely yes" to either of these questions were defined as being susceptible.

The outcomes of interest in this study were: (1) being a student who has never smoked but is susceptible to smoking initiation compared to being a non-susceptible never smoker, (2) being an experimenter compared to having never smoked and (3) being a current smoker compared to all other students.

Exposure and perception of tobacco displays at the point of sale (POS)

Two measures were used to assess exposure to tobacco displays. Firstly, students were asked how often they visited three store types: corner shop/convenience stores, petrol/service stations and supermarkets. They could answer on a response scale from "more than once a day" to "less than once a week" and "never". These store types are the main retail settings where tobacco products are sold in New Zealand, and nearly all prominently display POS tobacco products.[20] A variable "store visit frequency" was derived by using the response from the most frequently visited of the three store types for each participant to divide students into the categories "at least daily", "2–3 times/week", "weekly" and "<1 time/week". Previous work examining student exposure to POS advertising collapsed POS exposure to different store types into two categories, high exposure or low exposure.[10]

Secondly, based on questions used in the US National Youth Tobacco Survey (http://www.cdc.gov/tobacco/data_statistics/surveys/NYTS), students were asked separately for each store type visit, how often they noticed tobacco. Response options were "every time", "most times", "sometimes", "hardly ever", "never" and "I never go to this type of store". Subjects' exposure status was assessed from their response for the store type they most frequently visited.

Covariates

Questions about age, gender, ethnicity, peer/parental smoking and smoking in the home were also included. Smoking in the home is assessed by asking, "Do people smoke inside your home?" The response options are yes, no or sometimes. As students were free to choose more than one ethnicity, ethnic classification here used a priority ordering of Māori, Pasifika, Asian, New Zealand European and other for multiple specifications. This order of prioritisation is consistent with the method used in other New Zealand surveys including the New Zealand Tobacco Use Survey.[21]

Socioeconomic status (SES) was measured using school decile. This is a measure of the characteristics of the local community, whereby "low" decile usually indicates "low" socioeconomic status. Every school in New Zealand is assigned a decile by the Ministry of Education and participating schools were grouped according to their decile. In line with New Zealand reporting conventions, we collapsed deciles into three groups: low SES (deciles 1–3), medium SES (deciles 4–7) and high SES (deciles 8–10). In New Zealand there are 21 geographically defined District Health Boards (DHBs) which provide health and disability services for their local population.

Statistical analysis

Data checks and descriptive statistics were undertaken for all variables. The χ^2 goodness of fit test was used to compare the distribution of response across store type and visit frequency. Three-level mixed-effect logistic regression models were used to investigate the association between the three outcomes (ie, being susceptible to initiation among all those who have never smoked, an experimenter among those who do not currently smoke or a current smoker among all students) and the two measures of POS tobacco exposure: "store visit frequency" and self-reported perception of tobacco at the POS entered simultaneously into the models. The first level was defined using DHB, and school defined the second level of the regression models. Students defined the third level. Adjusted odds ratios controlled for age, sex, ethnicity, peer and parental smoking, school socioeconomic status and whether or not smoking occurs in the home. Analyses were conducted using Stata version 10 (StataCorp, College Station, Texas, USA). Interactions between the two exposure variables and between the exposure variables and school socioeconomic status (decile) were examined.

RESULTS

Every secondary school in New Zealand with Year 10 students was invited to participate in this survey (n = 511). Almost half (47.4%) of all eligible schools agreed to participate (n = 242). In total, 27 757 (44.8%) student questionnaires were returned from the national population of 62 018 Year 10 students. Most (98.2%) Year 10 students were 14 or 15 years old. Younger and older Year 10 students were excluded due to the potential confounding effect of age on smoking behaviour, and the difficulty of adjusting for this given the small number of Year 10 students who are younger than 14 years and older than 15 years of age.

Demographic characteristics and smoking behaviour of the participants are shown in table 1. The distribution of age, ethnicity and gender of respondents matched that of the national Year 10 population. However, the lowest decile schools were underrepresented in the sample. A total of 30% of schools with Year 10 students are deciles 1 and 2 compared to 20% of the sample schools. The lowest socioeconomic category comprised 46 schools, most schools were in the medium decile category (113) and 80 schools were in the high socioeconomic category.

Corner shop/convenience stores were the most frequently visited store type with 74% of students visiting them weekly or more often. Petrol/service stations and supermarkets were visited at least weekly by 57% of students. Descriptive statistics for store visit frequency and noticing tobacco in the most frequently visited stores for each subject are described in table 2.

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Table 1 Distribution of sociodemographic characteristics and relationship with smoking among 14–15-year-old survey participants

Variable	Not susceptible and never smoked	Susceptible and never smoked	Experimented	Current
n	10 798	4273	7845	3415
Gender:				
Female	5296 (38.0%)	2292 (15.9%)	3969 (28.5%)	2027 (14.5%)
Male	5451 (41.7%)	1954 (14.3%)	3816 (29.2%)	1348 (10.3%)
Missing	51 (21.4%)	27 (9.2%)	60 (25.2%)	40 (16.8%)
Age:				
14 years	7137 (40.9%)	2877 (15.9%)	4875 (27.9%)	2041 (11.7%)
15 years	6636 (37.6%)	1380 (13.6%)	2944 (30.5%)	1357 (14.0%)
Ethnicity:				
New Zealand European	7123 (42.4%)	3026 (17.5%)	4697 (27.9%)	1564 (9.3%)
Māori	1116 (21.5%)	498 (9.2%)	2000 (38.6%)	1332 (25.7%)
Pasifika	697 (34.1%)	247 (10.8%)	662 (32.4%)	317 (15.5%)
Asian	1619 (60.8%)	429 (15.2%)	352 (13.2%)	151 (5.7%)
Other	183 (47.7%)	56 (14.3%)	96 (25.0%)	26 (6.8%)
Missing	60 (36.6%)	17 (9.1%)	38 (23.2%)	25 (15.2%)
Smoking in the home:				
No	9446 (45.2%)	3433 (16.1%)	5551 (26.6%)	1862 (8.9%)
Sometimes	637 (19.5%)	372 (11.0%)	1229 (37.6%)	900 (27.5%)
Yes	686 (24.8%)	392 (13.9%)	961 (34.8%)	614 (22.2%)
Missing	29 (8.9%)	76 (3.7%)	104 (32.0%)	39 (12.0%)
Parental smoking:				
None	7916 (48.7%)	2890 (17.4%)	3865 (23.8%)	1132 (7.0%)
One	2054 (31.0%)	889 (13.0%)	2381 (35.9%)	1084 (16.3%)
Two	736 (19.2%)	375 (9.6%)	1441 (37.7%)	1129 (29.5%)
Missing	93 (17.4%)	119 (9.2%)	158 (29.5%)	70 (13.1%)
Peer smoking:				
None	9022 (55.9%)	2785(16.9%)	3439 (21.3%)	389 (2.4%)
One	1496 (21.2%)	1174(16.3%)	3133 (44.4%)	1032 (14.6%)
Two or more	187 (5.3%)	195 (5.4%)	1115 (31.6%)	1924 (54.6%)
Missing	93 (17.4%)	119 (9.2%)	158 (29.5%)	70 (13.1%)
School socioeconomic status:				
Low	1292 (32.1%)	411 (9.7%)	1304 (32.3%)	834 (20.7%)
Medium	4689 (38.9%)	1726 (13.7%)	3624 (30.1%)	1594 (13.2%)
High	4817 (43.1%)	2136 (18.5%)	2917 (26.1%)	987 (8.8%)

The frequency of noticing tobacco varied by store type and frequency of visiting stores (χ^2 goodness of fit test, $p<0.001$). For example, students visiting corner shop/convenience stores were significantly more likely to report noticing cigarettes "every time" or "most times" whereas students visiting petrol/service stations were less likely to report noticing cigarettes "every time" or "most times". Moreover, students were significantly more likely to visit corner shop/convenience stores at least 2–3 times weekly compared with petrol/service stations or supermarket ($p<0.001$). Most never smokers (88%) reported visiting stores weekly or more often.

Table 2 Frequency of store visits and noticing cigarette displays by survey participants

Frequency	n, (%)
Store visit frequency*:	
Less than weekly	3091 (11.7%)
Weekly	6324 (24.0%)
Two to three times a week	12 080 (45.8%)
Daily	4878 (18.5%)
Noticing cigarette frequency*:	
Never	2716 (10.5%)
Hardly Ever	4561 (17.7%)
Sometimes	5116 (19.8%)
Most times	5357 (20.7%)
Every time	8098 (31.3%)

*Most frequently visited store.

Table 3 shows the crude and adjusted associations between the exposure variables and smoking-behaviours. Among never smokers, the adjusted odds of being susceptible to smoking uptake among those visiting stores at least 2–3 times per week were approximately double compared to students who visited stores less than weekly. The odds of a student being susceptible to initiation were also about double if the student reported noticing tobacco "most" or "every" time they visited their most frequently visited store type compared to those who never noticed tobacco products. Odds of being susceptible to smoking increased with increasing exposure or reported noticing of tobacco.

Analysis of the association between exposure variables and experimenting with smoking or current smoking yielded very similar results (table 3). The adjusted odds of being a current smoker were over three times greater among subjects who reported noticing tobacco products at every visit compared to those who report never noticing tobacco.

When other variables associated with smoking are adjusted for exposure to tobacco displays and noticing tobacco, parental smoking significantly increased the odds that a teenager had experimented with smoking (odds ratio (OR) 1.7 one parent

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Table 3 Frequencies, percentages, crude and adjusted odds of being in the outcome group of interest using three-level mixed-effect logistic regression models

			Crude analysis		Adjusted analysis	
	Total	n (%)	OR (95% CI)	p Value	OR (95% CI)	p Value
Susceptible to initiation						
Store visit frequency:				<0.001		<0.001
At least daily	1603	503 (31.4)	2.0 (1.7 to 2.4)		1.8 (1.6 to 2.2)	
Two to three times/week	6365	2038 (32.0)	2.1 (1.9 to 2.4)		1.9 (1.7 to 2.2)	
Weekly	4292	1075 (25.0)	1.5 (1.3 to 1.7)		1.4 (1.3 to 1.6)	
Less than weekly	2288	409 (17.9)	1.0 (reference)		1.0 (reference)	
Notice cigarettes frequency:				<0.001		<0.001
Every time	3523	1138 (32.3)	2.3 (2.0 to 2.7)		2.0 (1.7 to 2.3)	
Most times	3018	1006 (33.3)	2.5 (2.1 to 2.8)		2.2 (1.9 to 2.5)	
Sometimes	3008	869 (28.9)	2.0 (1.7 to 2.3)		1.8 (1.6 to 2.1)	
Hardly ever	2554	617 (24.2)	1.6 (1.3 to 1.8)		1.5 (1.3 to 1.7)	
Never	2059	328 (15.9)	1.0 (reference)		1.0 (reference)	
Experimented						
Store visit frequency:				<0.001		<0.001
At least daily	3425	1805 (52.7)	4.4 (3.9 to 5.0)		2.7 (2.4 to 3.1)	
Two to three times/week	10329	3919 (37.9)	2.6 (2.3 to 2.8)		2.0 (1.8 to 2.2)	
Weekly	5704	1396 (24.5)	1.4 (1.3 to 1.6)		1.4 (1.2 to 1.6)	
Less than weekly	2835	528 (18.6)	1.0 (reference)		1.0 (reference)	
Notice cigarettes frequency:				<0.001		<0.001
Every time	6321	2769 (43.8)	2.1 (1.9 to 2.3)		1.5 (1.3 to 1.7)	
Most times	4697	1666 (35.5)	1.6 (1.4 to 1.8)		1.3 (1.2 to 1.5)	
Sometimes	4335	1310 (30.2)	1.3 (1.1 to 1.4)		1.1 (1.0 to 1.3)	
Hardly ever	3666	1100 (30.0)	1.3 (1.2 to 1.5)		1.2 (1.1 to 1.4)	
Never	2710	633 (23.4)	1.0 (reference)		1.0 (reference)	
Current smoker*						
Store visit frequency:				<0.001		
At least daily	4759	1249 (26.2)	4.1 (3.4 to 4.9)		*	
Two to three times/week	11931	1434 (12.0)	1.9 (1.6 to 2.3)		*	
Weekly	6260	461 (7.4)	1.3 (1.1 to 1.6)		*	
Less than weekly	3052	170 (5.6)	1.0 (reference)		*	
Notice cigarettes frequency:				<0.001		<0.001
Every time	8418	1978 (23.5)	6.6 (5.3 to 8.1)		3.5 (2.8 to 4.4)	
Most times	5373	607 (11.3)	3.1 (2.5 to 3.8)		2.2 (1.7 to 2.8)	
Sometimes	4797	384 (8.0)	2.2 (1.7 to 2.8)		1.8 (1.4 to 2.3)	
Hardly ever	3911	187 (4.8)	1.3 (1.0 to 1.6)		1.2 (0.9 to 1.6)	
Never	2869	102 (3.6)	1.0 (reference)		1.0 (reference)	

Susceptibility to initiation: interaction between Store visit frequency and Notice cigarettes frequency non-significant ($p = 0.76$); interaction between Store visit frequency and SES non-significant ($p = 0.08$); and interaction between Notice cigarettes frequency and SES non-significant ($p = 0.20$). In adjusted analyses, p values for confounders were: ethnicity ($p<0.001$), parental smoking ($p = 0.98$), peer smoking ($p<0.001$), smoking in the home ($p<0.001$), gender ($p<0.001$), age ($p = 0.25$) and SES ($p<0.001$). Experimental smoking: interaction between Store visit frequency and Notice cigarettes frequency non-significant ($p = 0.06$); interaction between Store visit frequency and SES non-significant ($p = 0.09$); and interaction between Notice cigarettes frequency and SES non-significant ($p = 0.13$). In adjusted analyses, p values for confounders were: ethnicity ($p<0.001$), parental smoking ($p<0.001$), peer smoking ($p<0.001$), smoking in the home ($p<0.001$), gender ($p = 0.83$), age ($p<0.001$) and SES ($p = 0.75$). Current smoking: interaction between Store visit frequency and Notice cigarettes frequency significant ($p = 0.02$) but relatively small; interaction between Store visit frequency and SES significant ($p<0.001$); and interaction between Notice cigarettes frequency and SES non-significant ($p = 0.26$). In adjusted analyses, p values for confounders were: ethnicity ($p<0.001$), parental smoking ($p<0.001$), peer smoking ($p<0.001$), smoking in the home ($p<0.001$), gender ($p<0.001$), age ($p<0.001$), SES ($p = 0.001$) and interaction between Store visit frequency and SES significant ($p<0.001$).

*Note that table 4 includes the main effect and interaction terms of SES, so this does not appear in table 3.

SES, socioeconomic status.

smoking, OR 1.8 both smoke) or was a current smoker (OR 1.3 one smoker, OR 1.4) but was not significantly associated with susceptibility to initiation of smoking. Smoking in the home was still significantly associated with all three outcomes (OR ranging from 1.2 to 1.4) but the effect was slightly less than frequent exposure to displays and noticing tobacco. Females were slightly more likely to be susceptible to initiation and current smoking but gender was not significantly associated with experimenting. There were no significant interactions between ethnicity and exposure to displays for all three outcomes. Māori, Pasifika and Asians were slightly but significantly less likely to be susceptible to initiation (OR 0.84) but Māori were more likely to have experimented or be current smokers compared to New Zealand Europeans. Students at low or medium SES schools had slightly lower odds of being susceptible to initiation (OR 0.74 medium, OR 0.63 low) but school SES had no association with experimenting. Peer smoking remains significantly and strongly associated with all three outcomes (one friend OR 2.4, two or more 3.0 for being susceptible to initiation, OR one friend 3.3, two or more 6.0 for experimented and one friend OR 5.2, two or more 28.3 for being a current smoker).

An interaction between socioeconomic status and store visit frequency was present when examining the odds of being a current smoker, so these results are not displayed in table 3. Table 4 shows the results of the analysis of the association

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Table 4 Adjusted ORs together for current smoking by store visit frequency stratified by school socioeconomic status (SES)

	School SES		
Store visit frequency	Low OR (95% CI)	Medium OR (95% CI)	High OR (95% CI)
At least daily	2.6 (1.8 to 3.9)	2.6 (1.8 to 3.8)	2.5 (1.7 to 3.7)
Two to three times/week	2.0 (1.3 to 2.9)	1.6 (1.1 to 2.3)	1.6 (1.1 to 2.3)
Weekly	3.1 (2.0 to 5.0)	1.7 (1.1 to 2.5)	1.3 (0.9 to 1.9)
Less than weekly	2.7 (1.6 to 4.7)	1.6 (1.0 to 2.5)	1.0 (reference)

between store visit frequency and current smoking stratified by SES. The association between current smoking and store visit frequency was strongest in students from high socioeconomic status (SES) schools, intermediate in medium school SES and minimal in low school SES groups (where all subjects had increased odds of being a current smoker regardless of their store visit frequency).

DISCUSSION

We investigated the association between exposure to tobacco displays in shops and three different measures of smoking susceptibility and behaviour in teenagers. Two-thirds of teenagers visited stores where tobacco products are prominently displayed at least 2–3 times per week, and most reported that they always or most times noticed cigarettes in these settings. Strong statistically significant associations were found between both measures of exposure and all three outcome measures after adjustment for a range of known determinants of smoking susceptibility and initiation. Both measures of exposure were independently associated with susceptibility to smoking uptake, experimenting or current smoking. The association between exposure to point of sale tobacco displays and susceptibility to smoking uptake or experimenting is comparable to the associations between these outcomes and parental smoking, smoking in the home and school SES.

A dose response (ie, increasing odds of being susceptible, or an experimenter or currently smoking when exposure increased) was present. The only exception to this was elevated odds of being a current smoker for all frequencies of store visits among students from low SES schools. One explanation for this could be that low SES students have other significant determinants, which have greater impact and were not included in this analysis, such as more smoking among non-parental adult role models and siblings. Another explanation may be a greater reliance by low SES current smokers on less expensive social supplies of tobacco rather than purchasing from retail sources. However this needs to be verified by further investigation.

Strengths and limitations

This is the first study that the authors are aware of to explore the association between exposure to POS tobacco displays and smoking uptake in a jurisdiction where tobacco advertising is banned, and where retail displays of tobacco products are the only form of tobacco promotion. The study had a very large sample size, and used three different outcome measures and two different exposure measures. Store visit frequency is a neutral measure of exposure, which may be less susceptible to biased recall because it is not an overtly tobacco-related enquiry. The analysis adjusted for a range of established influences on smoking behaviours in this age group, including ethnicity, school socioeconomic status and parental and peer smoking.

A possible weakness is that the school response rate to this census survey (47%) was modest and was lower in 2007 compared to previous levels for the same survey (57% to 67%). Decreasing survey response rates is a global phenomenon.[22] However, all deciles and DHBs are represented and the sample includes almost half of all Year 10 students in New Zealand. Another possible criticism is that this study does not investigate the impact of POS displays stipulated by the current New Zealand regulations due to the high level of non-compliance that has been demonstrated.[5] However; our study investigates the association of POS exposure which actually occurs in New Zealand with smoking-related outcomes. This is a more relevant investigation, since this is how POS displays are experienced in practice in New Zealand, and we suspect non-compliance will be a common feature in jurisdictions with such policies. Finally, the descriptive data about the frequency of visiting stores and noticing tobacco products focused only on the most frequently visited store type so will be an underestimate of total adolescent exposure to tobacco displays.

Comparison with literature and implications

Seven out of eight cross-sectional studies which have investigated this issue have found statistically significant associations between exposure to POS tobacco promotion and smoking.[3] One of these studies also found a statistically significant association between exposure to POS tobacco promotion and susceptibility to smoking.[10] Tobacco promotion at the POS was a significant predictor of smoking initiation in a longitudinal study conducted in California, USA.[12] A statistically significant association between student smoking and the density of stores selling tobacco has also been described.[23] This New Zealand study is therefore consistent with previous studies conducted in other countries.

The discovery of an independent association of the two different measures of exposure, frequency of visits and reported noticing of tobacco (ie, perceived exposure) is also consistent with findings of Feighery *et al*[10] who suggested that self-reported perceived exposure measures a different construct compared to a frequency of store visit measure and may reflect a bias in attention to tobacco.

The use of cross-sectional data prevents us from assigning cause and effect definitively to visiting stores or noticing tobacco displays and smoking behaviour. In particular an association between current smoking and increased store visiting or noticing of cigarettes in stores may be due to smokers buying their cigarettes from those stores, or becoming more aware of cigarettes as a result of being a smoker. Youths contemplating or curious about smoking may also be drawn to the displays. However industry documents and general marketing principles indicate that displays and other types of marketing create and enhance curiosity about products, so the direction of effect is highly unlikely to be solely from outcome to exposure.

Tobacco company investment in promotion at the POS has grown as other modes of promotion are banned.[4 24 25]

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What this paper adds

- Previous research about the impact of point of sale displays on children has come largely from the US (mostly California), where there are few marketing restrictions on tobacco, and in-store retail advertising is allowed. This makes it more difficult to demonstrate a specific effect of point of sale displays.
- We found a significant association between two different measures of exposure to point of sale displays and three different measures of smoking behaviour or susceptibility in a jurisdiction where tobacco marketing is banned, other than point of sale displays.
- Our study includes far more participants than most previous research, and adjusts for other well known predictors of smoking uptake. Therefore, the present work increases evidence for bans on tobacco displays at points of sale.

Information about the purpose of POS displays as described in internal tobacco industry documents is consistent with an association between smoking and exposure to tobacco displays. For example, Philip Morris sales representatives are advised that one of their most important jobs in to gain optimal product exposure and effective in-store visibility because this attracts new consumers.[24] The purposes of POS merchandising are described clearly by British American Tobacco: (1) to inform the consumer of the presence of the brand, (2) to promote recognition of the brand, (3) to generate interest and excitement about the brand and (4) to stimulate trial purchase and repurchase.[26]

The reason for the impact of POS promotion of tobacco have been analysed by several authors using tobacco industry documents. The widespread, conspicuous presence of tobacco displays at every corner store creates an impression of perceived popularity and normalises the use of tobacco within society.[4] Young people often overestimate the prevalence of smoking and this overestimation is associated with an increased risk of smoking.[27] School students seeing photos with POS tobacco advertising were significantly more likely to overestimate smoking prevalence than students seeing photos of POS without tobacco promotion.[28] Also, in this study, students exposed to a photo of a POS where cigarettes were displayed without tobacco advertising were more likely to perceive it would be easier to buy tobacco in these stores and more likely to recall displayed brands popular among adults. The proximity of tobacco to staple consumer items and attractive sweets creates a "friendly familiarity" impression of tobacco.[29] Any notion that a child may have that tobacco is addictive and dangerous is undermined because tobacco is sold in the same way as treats, bread and milk, and it is not sold or restricted in the same way as other dangerous legal products such as medicines.

Conclusions

This study provides evidence that young people's exposure to tobacco displays at the POS is significantly associated with being susceptible to smoking, experimenting with smoking and current smoking. The use of cross-sectional data means that cause and effect cannot be attributed to the exposure and outcome variable. Further prospective studies and research to investigate the impact of POS bans on smoking uptake should be undertaken.

Acknowledgements: A survey of this size depends on the time and effort volunteered by many New Zealand secondary school principals, teachers and students and we are duly appreciative. Questionnaire development relies on input from the research coordinating group, to whom we are very grateful, and at the time of development of this survey comprised (in addition to JP and IM): Associate Professor Robert Scragg, Dr Judith McCool, Dr Tony Reeder, Sharon Ponniah and Jehan Eltigi. Thanks finally to Becky Freeman, former director of ASH, who proposed the use of the survey for investigation of the impact of retail displays on New Zealand teenagers. The authors thank the reviewers for their time and attention to detail, which has led to improvement of the paper.

Funding: The survey is funded by the New Zealand Ministry of Health (MOH) and is managed cooperatively by Action on Smoking and Health New Zealand and the Health Sponsorship Council. The MOH was represented by Sharon Ponniah on the research coordinating group at the time of questionnaire development, who made useful recommendations on the questions prior to conduct of the survey. The MOH had no part in the decision to conduct this specific data analysis, write the report and has not reviewed or contributed to this paper other than to fund the survey.

Competing interests: RE has previously undertaken contract work for not-for-profit organisations involved in tobacco control.

Ethics approval: Ethics approval was given by the Auckland Ethics Committee of the Ministry of Health.

JP contributed to questionnaire development and approved the questionnaire, execution of the survey, coordinated interpretation and analysis of the data and wrote the first draft of the report and revised the report. RE independently, in addition to, Becky Freeman, suggested use of this survey to investigate the impact of retail displays on New Zealand teenagers, contributed to questionnaire development, made suggestions on data analysis and reviewed the results and drafted papers. PS improved and conducted the data analysis, reviewed drafts of the paper. IM contributed to questionnaire development; prepared and checked the data file used for analysis and reviewed drafts of the report.

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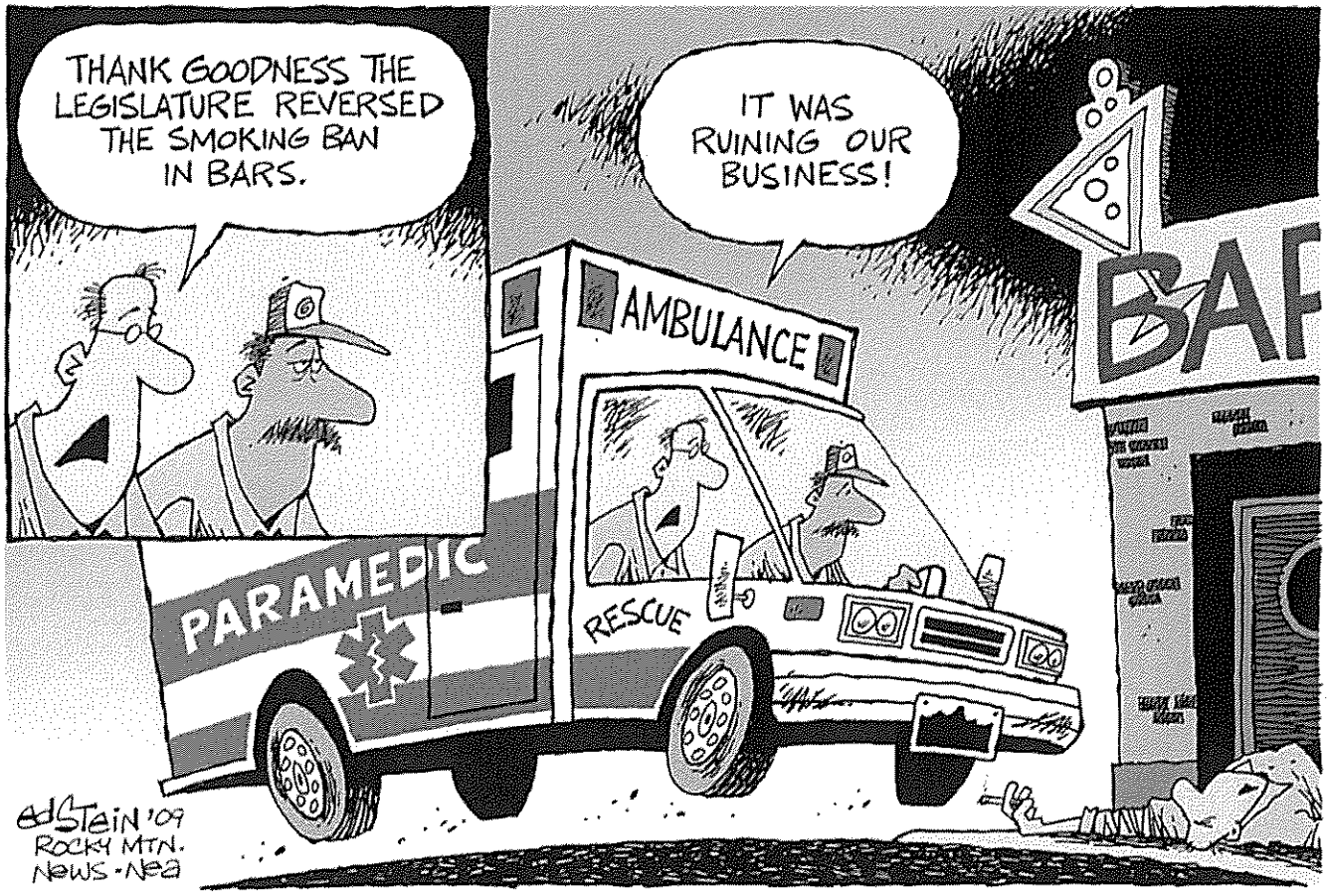
The lighter side



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SPECIAL COMMUNICATION

More than meets the eye: on the importance of retail cigarette merchandising

Richard W Pollay

Tobacco Control 2007;16:270–274. doi: 10.1136/tc.2006.018978

Point-of-sale activity is important enough to get the attention of the senior management of transnational firms and to be the subject of sophisticated research aimed to realise "intrusive visibility" better through creative design, command attention and convey brand imagery. The result of this is the promotional "positioning" of products, and the creation of both friendly familiarity and perceived popularity. The intended results include increased sales of cigarettes as a product or "category growth".

Lavack and Toth[1] called our attention to the importance of point-of-purchase (POP) promotion or retail merchandising, the total cost of which now commands an impressive 85% of the whopping total of over US$15 billion spent in promoting cigarettes in the US. Like them, I have reviewed corporate documents in the course of preparing expert opinion for the governments of Canada,[2] UK[3] and Ireland.[4] My experience supplements theirs as I reviewed many British American Tobacco (BAT) documents from around the world, and also reviewed the retail merchandising textbook and trade literature. Although not in major disagreement, I fear that Lavack and Toth might leave the erroneous impression that competition for market share is the sole intent and effect of retail promotion. On the contrary, point-of-scale (POS) promotions, like other forms of advertising, are carefully crafted, creatively executed, well-financed, well-researched promotional efforts supervised by senior management and aimed at realising intrusive visibility to convey brand imagery (to the extent allowed) with the goals of enhancing category image and category growth.

DEFINITIONS AND FUNCTIONS OF POS

POS or POP merchandising displays and signage are clearly a medium of advertising and are explicitly referred to as such in the title of the relevant global trade association, the Point of Purchase Advertising International (POPAI). One text comments that "Displays should accomplish the five steps of selling, just as advertising and personal selling should". The five steps mentioned are as follows: (1) attract attention, (2) arouse interest, (3) create desire, (4) build confidence and (5) direct action.[5] Industry documents offer similar ideas.

The purposes of POS are multiple. On one level, POS materials are designed to attract attention and to enhance brand images. On another level, they are used to convey the "presence" of the brand to consumers, to create the perceived popularity of brands, and hence of smoking. These serve the ultimate strategic goals of differentiating brands from one another so as to minimise competitive substitution and the associated price competition that squeezes profitability.

The purpose of POS promotion, like other advertising, is to sell, *not* to convey material information, contrary to common claims in litigation. The functional purposes of POS materials were articulated in one 1979 BAT document: (1) to inform the consumer of the presence of the brand; (2) to promote recognition of the brand; (3) to generate interest and excitement about the brand; and (4) to stimulate trial purchase and re-purchase.[6] It is noteworthy that the provision of information about the physical properties of the product, its ingredients or the performance characteristics of the brand, much less its risks or probable health consequences, was not an objective of POS marketing.

SENIOR MANAGEMENT ATTENTION AND INTERNATIONAL STANDARDS

As Lavack and Toth noted, the management of cigarette-selling firms has been spurred to pay closer and closer attention to retail promotion by regulation. In-store activity has been of ever-growing importance since at least 1970, as a consequence of restrictions on other means of promoting sales. For example, BAT took the view in 1970 that a "key sales executive" needed to study merchandising:

> [T]he role of merchandising is likely to become increasingly important in the event of ad restrictions, and considerably more attention is, therefore, being given to this activity, both in Millbank and a number of associated companies. ... The main purpose of these activities are ... (c) to create conditions which give an immediate stimulus to purchase at point-of-sale ... It is therefore recommended that a key sales executive should be appointed to study the subject of merchandising ...[7]

Twenty years later, in 1991, senior BAT executive Paul Bingham stated:

> So in a market where no promotion of cigarettes is allowed, you could expect to see the following ... more efficient use of the trade, and in-store communications, i.e. permanent merchandising material and point of sale temporary material (e.g. stickers). The aim is to create a better impact—to let the retail environment communicate the values of the product more effectively.[8]

Note that this refers to the product (cigarettes) not to the brand (eg, Marlboro). Two new transnational positions were created in 1993, presumably within each operating region, in support of in-store marketing: Regional Trade Marketing & Distribution Manager and Regional Merchandising Manager (see Pedlow, [8] at 500316641).

A multivolume manual was developed in the early 1990s, for the entire global operation of BAT that "selected the best

Abbreviations: BAT, British American Tobacco; ITL, Imperial Tobacco Company Ltd; POP, point of purchase; POS, point of sale; POPAI, Point of Purchase Advertising International, Washington DC, USA

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practices from the field of in-store marketing and applied it to the tobacco industry. It can be used as a tool to train and develop personnel as well as provide guidelines to implement more effective in-store marketing".[9] The manual consisted of four books covering in-store marketing, merchandising, promotion and providing a catalogue of BAT-approved merchandising. The first three books had "full distribution to all operating companies and field forces" (see BAT,[9] at 500316629). Despite this wide distribution, to my knowledge, not one of these three books has yet been produced in litigation, even that focused on POS issues.

HIGH-TECH POS RESEARCH

BAT suggested three types of research to evaluate POS effects, before, during and after an operation, and suggested that measurements and targets could include awareness, trial, brand usage, believability, comprehension, interest, attitudes and over-the-counter sales.[10] In 1972, BAT felt the need to do its own practical research effort. "Merchandising and promotions. The biggest problem in this area is to measure and assess the effectiveness of merchandising, in terms of cost and obtaining objectives, and this must be a priority area for further work".[11] BAT stated in 1979:

> Maximum perceptual recognition should be achieved at point-of-sale by the appropriate pack style and design, by dynamic display layout, and by point-of-sale advertising materials ... All these factors should be the subject of continuous research. To this end, we should seriously consider the merits of setting up experimental in-stores so that, for example, label designs, pack sizes, POS materials, etc. can be evaluated. (see BAT,[6] p 6)

Two very high-tech devices have long been used to research displays by BAT on behalf of its operating companies: (1) a tachistiscope to flash visuals at high speed (short duration) to study how readily displays could be apprehended and (2) an eye gaze camera to monitor eyeball movement when encountering displays. In 1982, BAT's Project Bristol used eye gaze monitoring equipment to study how "consumers visually interact with their environment". The planned analysis included the effects of shop window displays.[12] In 1986, BAT used a tachistiscope to assess the eye-catching qualities of various designs when amassed. It was judged, in the executive summary, that "... the style of tachistiscopic testing reported here represents a high time/cost effective addition to the process of pack development. It allows the assurance that the various symbolism carried by the pack is achieving the desired effect in terms of impact".[13]

The Psychology Group of BAT's Market Research operation contracted at least 18 months of research on the efficacy of POS, further adapting the eye gaze equipment. "This technique makes use of an eye-gaze monitor to make the measurements and an infra-red technology and computorised [sic] digitization to analyze the results. By examining the routes of tracking over the display the output of the analysis provides a cumulated picture of the visual hot spots on the display. With this information it is possible to better position our brands on the gantry in order to receive the maximum amount of visual attention". Because the technique was complex, this research was conducted by Charter Research Associates, with the aim to produce "a handbook providing guidelines on maximizing the potential of the POS display" for use by all operating companies in diverse jurisdictions. Subjects were drawn from both the UK and the Far East to understand better whether reading styles affected eye patterns while shopping and to help make this relevant to Asian as well as to Western cultures.[14] Like the merchandising manuals, this research by Charter Research Associates has not yet been located despite considerable effort.

INTRUSIVE VISIBILITY

BAT stated in 1970:

> Tobacco products must be positioned so that they will be easily visible, readily accessible to shop assistants and displayed in such a way as to generate a strong impulse to buy. A special in-store promotion will be most effective if it is positioned so that it can be seen by the customer before he actually reaches it. ... By adjusting shelf-heights and by the use of shelf extenders, shelf-talkers, arrows, etc., it is possible to make facings stand out to give additional impact. ... Directional arrows, day-glow material, flashes, stars and similar eye-catching methods can be used to attract the attention of specific brands or temporary offers. ... With these and other aids, the trained merchandiser can bring an additional attraction quickly and cheaply to his product situated in a market stall, vending machine or in the tobacco department of a large supermarket ... Pictures and slogans should be kept to a minimum and be placed near the product but designed to be clearly visible at a distance from which the customers will normally view it.[15]

Similarly, Philip Morris stated in 1991:

> Key Point: We should have Marlboro (and other PM brands) positioned in the store to take advantage of the impulse shopper. ... Where are the best spots for promotional offers, POS, etc.? We are after intrusive visibility.[16]

Similarly:

> 'Eye Level is Buy Level' because items placed at eye level are more likely to be purchased that those on higher or lower shelves. ... Place posters in line with the main customer flow into the shop. Look for uncluttered locations to gain maximum visual impact for the poster. Place posters at eye level. In-shop, position posters in main traffic flow from point of entry to point of purchase or place in uncluttered position near point-of-purchase or place material above eye level if it can be seen at a distance.[10]

CREATIVE DESIGN

Modes or types of POS advertising include banners, displays, posters, easels, shelf signs, streamers, wall units, window displays and cards, floor stands, dump bins, counter-top units, illuminated signs, cash register tools (eg, change trays, customer merchandise dividers, receipt coupons and message imprints), shopping carts and baskets, end-of-aisle displays, racks, gantries, kiosks, overhead hangers, price cards, interactive units, aisle directories, waste baskets, mechanical product dispensers, ashtrays, closed circuit television and radio broadcasts, electronic scrolling ads, clocks, "hours open" signage, carpets and floor mats, laser projections onto floors and walls, oversized mock-ups of packets, newspaper and magazine racks, etc. New computer and projection technologies are being employed to create displays with interactivity, customisation of messaging, dynamic and vivid illuminated images. For another example, see the video monitors at the ready in fig 1.

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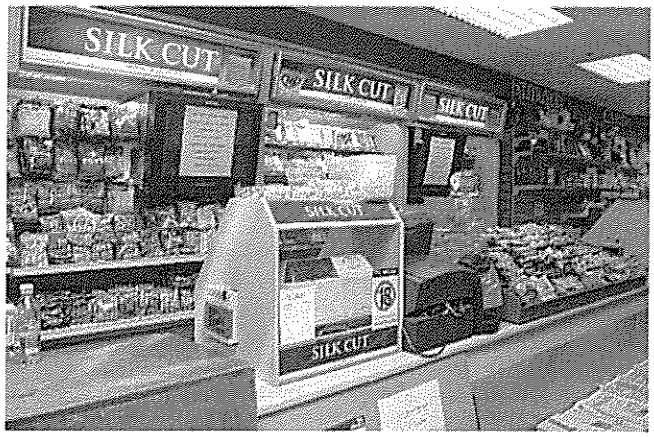

Figure 1 Intrusive visibility. Cash register in an unneeded branded box, repeated back lit overhead signage, and two video terminals provided by the tobacco firm. (Ireland 2006)

The creation of advertising within regulatory restraints can serve as a goad to creativity. Prohibitions and limitations "should not be allowed to discourage the cigarette advertiser, but rather exhilarate him to be able to meet the new confining conditions (of 1972) more effectively than one's competitors is a challenge to creativity and ingenuity".[17] In 1998, shortly after the signing of the US Master Settlement Agreement, "RJR provided elegant display racks for Camel, Winston and Doral brands, while B&W splurged on displays for Kool and Lucky Strike, including an elaborate guitar wall display for Lucky Strike".[18] In 1999, POPAI awarded its "Permanent Display of the Year" award to RJ Reynolds Tobacco for its Camel trade store program.[19] New eye-catching technologies are also employed, such as the translucent cigarette packs with lightning dancing inside used by BAT's American subsidiary, Brown & Williamson, for their Kool brand. This "lightning pack" display won Kool an Outstanding Merchandising Achievement Award from the Point of Purchase Institute.[20] The new "Power Walls" in Canada contain a diversity of design elements as seen in fig 2.

CONVEYING BRAND IMAGERY

With ever more regulations, "agreements" and voluntary restrictions on conventional forms of tobacco advertising, "The biggest promotion issue becomes how to build image with little more than tombstone ads. It is the biggest marketing dilemma of the century, and *the solution will be on-premise promotion*, coupled with highly targeted direct marketing".[16]

In Canada, POS materials were developed in the 1990s by most major brands to convey their brand imagery. The 1996 Communication Plans for the Player's brand specified that "merchandising must reflect youthfulness and be contemporary", and was recognised as having the ability to "aid in the development of a highly image-driven campaign".[21] Historically, the brand image was more fully described as "youthful self-expression of freedom and independence and self-reliance/inner confidence".[22] Similarly, the Belvedere brand was positioned as "youthful, fun, informal, casual, modern and sociable".[23] Therefore, the "Belvedere merchandising 'look' should communicate its desired positioning elements as young, fun, informal and sociable".[24] Imperial Tobacco Company Ltd's Plans for Matinee in 1997 called for merchandising activities "to reflect the desired imagery" with communication that "reinforces the trademark's attributes (modernity, popularity) and maintain current perception of femininity, mildness as well as communicating self-indulgence and relaxation".[25]

Canadian marketing documents, authored while the federal legislation tightened controls on media advertising, show that retail activities sought to use fonts, colours, graphic elements and display design to convey various brand images or brand personality traits, such as classy, elegant, fashionable, informal, sociable, young, fun, distinctive, international, modern, contemporary, high tech, a "wellness" product, masculine, macho, independent and rugged.

The BAT Global Policy was to use POS materials to "strengthen brand image". The entire in-store efforts of BAT were governed by the global standards for consistency and quality in message, signage and brand representation. These standards were to ensure that all BAT efforts around the globe "must reflect, add to and strengthen the brand's image" (see BAT,[9] p 1.13 or 500316640).

PRESENCE AND PERCEIVED POPULARITY

In 1986, Imperial Tobacco, BAT's Canadian operation in Montreal, Quebec, initiated Project HARPO, almost certainly named after the mute Marx Brother. No complete research report for this effort has yet been located, but Project HARPO anticipated regulatory restrictions that "would virtually eliminate our traditional means of expressing lifestyle positioning", as well as the possibility of "the loss of conventional image material in all media (retail included). ... [T]hese interventions would severely impede our ability ... to influence market presence and perceived popularity".[26]

Subsequently, ITL felt that "popularity will take on an even larger role than it has today and the job of communicating it will be located almost exclusively in the retail environment."[27] By 1992, it was noted that "regulatory imposition has also affected the retail environment. By the end of next year, all brand/trademark imagery communication will be disallowed. Consequently, the role of the store as image carrier will change substantially. In future, the store's most vital function will be generating presence".[28]

CATEGORY GROWTH

The POPAI official textbook states: Point-of-purchase promotions have been found to have a significant influence on consumer shopping behavior..". After gaining understanding of consumers, "point-of-purchase professionals can then exploit these consumer decision processes and *increase product category or brand sales*".[29]

The historical role of marketing was to offer "support of smokers and the smoking habit, and try, at least, *to maintain the*



Figure 2 The new "power walls" in Canada displaying a diversity of design elements.

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Figure 3 Conveying brand image using only brand element. Obviously promoting Marlboro though not babelled as such.

incidence of smokers in the population, as well as increase daily consumption". In the conclusion to this document, the following goal is reiterated:

> The marketing perspective should be broadened ... specifically towards maintaining the smoking habit at current levels, and if possible to increase those levels. We should not rest content with the traditional role of marketing, which aims to increase market share.[30]

The stated objective of BAT's global policy and practice standards for retail activity circa 1993 includes: "*To achieve long-term dependable growth of the category* and our brands. Use of innovative in-store marketing techniques by trade channels will help achieve our growth objectives" (see BAT,[9] p 1.10). Later POS communication is stated as yielding enhanced brand image and enhanced "category image" and "category growth"— that is, cigarettes as a group look more appealing and more are sold as a result (see BAT,[9] p 1.29).

DISCUSSION

Given the regulation of cigarette advertising in conventional media, cigarette marketing strategy has been paying more and more attention to retailing or POS merchandising. Given its importance and the resources at their disposal, this attention has involved senior management, international coordination and substantial sophisticated research efforts. This has resulted in deploying creative displays, with very substantial budgets spent to buy the continuing cooperation of retailers.

The fact that the retailers are being handsomely paid should not be overlooked. The fact that they need to be paid strongly suggests that the size and nature of the displays and signage that the tobacco firms seek to install are more substantial than the retailers' natural inclination without this financial inducement. This indicates that the racks, gantries and other dispensing equipment are more than what retailers find necessary to handle the logistics of inventory and dispensing. It also suggests that the displays and signage are more than the retailers would normally deploy, given the sales volume and profit margins.

This heavy spending could be the result of indisciplined competitive spending. The difficulty with this explanation is that tobacco is definitely not an indisciplined industry. Also, this sort of heavy spending and massive displays occurs even in markets dominated by one or a few firms characterised by gentlemen's agreements, if not outright collusion. The heavy spending on retail displays by a monopoly or oligopoly is understandable as an investment, however, if this spending assists in the recruitment of new smokers, the future of the industry.

Because consumers use the retail presence as an indicator of how popular products are, a substantial oversized display conveys that many people are smokers. This is in addition to whatever else might be conveyed regarding special offers, pricing, brand imagery, etc. This perceived popularity effect occurs at the brand level, as consumers discern which brands are the more popular. It also occurs at the product level, as consumers discern the popularity of cigarettes by their centrality and predominance in the retail milieu. This perceived popularity effect would occur even if all firms (for the sake of argument) had only market share intentions for their spending on displays.

Note, also, that this perceived popularity effect and its contribution to the total category sales occur even if regulation restricts the ability of firms to convey brand imagery, but do not otherwise restrict their retail presence. It is constructive to restrict the conveyance of brand imagery in POS advertising, as in other media, lest cigarettes be romanticised and made particularly appealing, but doing only this may be insufficient, however necessary. Similarly, regulation that does not restrict the use of brand elements will be relatively ineffective, even if brand names are banned, as can be seen in fig 3.

CONCLUSIONS

On the basis of the additional corporate documents and additional trade literature that I have reviewed, I conclude that retail POS merchandising within the tobacco industry has the following traits.

Well researched and financed: Trade research undertakings, while only partially documented, appear to be very sophisticated efforts, designed to create POS materials that are successful in attracting attention and conveying brand imagery. The manufacturing of these items, and their deployment in the retail trade, is fully supported financially.

Crafting brand images, not conveying information: Transmission of information is rarely the objective of marketing plans for tobacco, even incidentally, while establishing a noticeable presence and conveying brand imagery is almost universally the prime objective. The only exceptions are for brands wanting their low prices to be noticed. POS materials do not yield better-informed consumers.

Intended to reassure and recruit: Tobacco/cigarette advertising, by apparently both intent and consequences, has the function of simultaneously reassuring existing smokers, lest they quit, and recruiting new smokers to start. Recruitment of youth as new smokers is enhanced by POS materials because children are exposed to cigarette promotion throughout their young lives with each and every store visit.

With intrusive visibility: If left unregulated, tobacco merchandising in the retail environment may be vivid in design and intense in density, as the retail venue then becomes the primary advertising medium for the tobacco industry. Firms can seek, can well afford and are readily able to obtain the needed cooperation from retailers. Both design and deployment and retail POS signage make it prominent to the point where it is highly likely to be noticed by a very high proportion of store customers.

Creating perceived popularity: The resulting presence has the intention and effect of influencing perceived popularity. This perceived popularity effect is true for individual brands, and consequently for the product category of cigarettes as a whole. Thus, in addition to whatever might be communicated about the differentiated character of various brands, the size and volume of retail display creates a message to the entire retail traffic—that is to both smokers and non-smokers—about the popularity of cigarette smoking. Beyond this, specific brand images may also convey that smoking is glamorous, part of the good life, enjoyed by people of social status, etc.

POS has enormous reach: A proliferation of POS advertising activity may reach a very large fraction of the population,

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What this paper adds

- Supplementing Lavack and Toth (TC, 2006), this paper provides documentary evidence that retail promotions intend to increase total cigarette sales, not just market share for competing brands. This is the result of extensive sophisticated research and well-funded creative efforts conveying brand images (to the extent regulations allow) and the creation of perceived popularity.

essentially everyone who goes to market. It would expose all shoppers, regardless of age and smoking status, to what are easily seen as pro-smoking messages and imagery.

POS yields high frequency: Average consumers would be exposed to these messages repeatedly, every time they shop, whether through repeat visits to neighbourhood stores or even if shopping around at various retail establishments. This would be many, many times a year at the least, and for some people many times a week.

Shaping perceptions: In-store advertising materials serve the same functions as traditional advertising materials: the crafted shaping of perceptions, attitudes and beliefs about the brands within a product category, and hence inevitably about the product category itself. Attitudes will change as a function of mere exposure to branded communications even if these are nominally without substantive content, because of the "friendly familiarity" effect.

In sum: POP advertising exposes and potentially affects everyone: the young who grow up seeing tobacco as a benign cultural commonplace in the market on a par with milk and bread and come to underestimate its risks; the adult smoker who is reminded and cued to smoke now and more often; the occasional smoker who is cued to consume more; the would-be quitter whose intentions to quit are undermined; and the ex-smoker tempted to relapse and resume smoking. Regulation of both the amount (size) and character (brand imagery) of POS advertising is, therefore, a legitimate and important component of the tobacco control strategy, with substantial potential for advancing public health, particularly in jurisdictions where it is the predominant mode of sale promotion.

EPILOGUE: TOBACCO FIRMS DROP POS CASE AGAINST IRELAND

On 31 January 2007, with the trial imminent, the legal challenge to the Public Health (Tobacco) Acts, 2002 and 2004, in Ireland, put forth by a number of tobacco companies and others, was discontinued, at their request, with all costs awarded to the State. This sudden abandonment of the litigation challenge to legislation, knowing the evidence like the above that the judge would see, probably reflected their judgement that victory was very unlikely and that a loss might set an international example. The Irish Office of Tobacco Control can now focus on getting gantries taken out of shops, POS advertising for cigarettes and tobacco products removed, and tobacco products placed in sealed containers and out of view of customers. In their view, this is the most significant development in tobacco control in Ireland since the introduction of the smoke-free workplaces legislation.

Competing interests: I am a university business school scholar and have been called often to testify in tobacco litigation to educate judges and juries in several countries as to the firms' marketing practices and the history thereof.

This research was undertaken while preparing expert reports for the federal governments of Canada, the United Kingdom and Ireland.

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Received 17 October 2006
Accepted 7 February 2007

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ARTICLE

The Impact of Retail Cigarette Marketing Practices on Youth Smoking Uptake

Sandy J. Slater, PhD; Frank J. Chaloupka, PhD; Melanie Wakefield, PhD; Lloyd D. Johnston, PhD; Patrick M. O'Malley, PhD

Objective: To examine the differential associations of cigarette retail marketing practices on youth smoking uptake.

Design: Analyses from annual, nationally representative, cross-sectional surveys of 8th, 10th, and 12th graders in the United States.

Setting: The February 1999 through June 2003 Monitoring the Future surveys involved 109 308 students and data on retail cigarette marketing collected from 966 communities in which the students reside, as part of the Bridging the Gap Initiative: Research Informing Practice and Policy for Healthy Youth Behavior.

Participants: A total of 26 301 students were selected for this study.

Main Exposures: Point-of-sale advertising, promotions, prices, and placement.

Outcome Measure: Using a smoking uptake measure to account for stages that identify the process by which adolescents begin smoking, we calculated odds ratios and confidence intervals through generalized ordered logit analyses, with weighted data that controlled for demographic and socioeconomic characteristics and accounted for clustering at the community level.

Results: Higher levels of advertising, lower cigarette prices, and greater availability of cigarette promotions were associated with smoking uptake. Advertising increased the likelihood of youth initiating smoking, price increased the likelihood of smoking at most levels of uptake, and availability of promotions increased the likelihood that youth will move from experimentation to regular smoking.

Conclusions: Cigarette retail marketing practices increase the likelihood of smoking uptake. These findings suggest that specific restrictions on retail cigarette marketing may reduce youth smoking.

Arch Pediatr Adolesc Med. 2007;161:440-445

CHILDHOOD EXPERIMENTATION with cigarettes and progression to regular use remains a public health concern. Research[1] shows that initiating smoking at a younger age is associated with eventually smoking more cigarettes per day than initiating smoking at an older age, suggesting that delaying the onset of smoking may affect the likelihood of becoming addicted to cigarettes or becoming a heavy smoker. It is also estimated that adolescents who started smoking in the mid to late 1990s will smoke for at least 16 years if male and 20 years if female.[2] Thus, smoking will be a long-term addiction for many current adolescent smokers. Furthermore, youth who initiate smoking at an early age are at an increased risk for developing long-term health consequences.[3] Because increasing levels of smoking experience increase the likelihood of future smoking,[3] many researchers[4-7] have begun to use stages of smoking experience to predict the transition to future established smoking.

In an attempt to determine what is causing adolescents to progress toward regular smoking, several studies have linked tobacco industry marketing practices to adolescent susceptibility to smoke[8-10] and progression toward established smoking.[11-19] Existing

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evidence shows that initiation of daily smoking among youth seems to increase during periods of high promotional activity by the tobacco industry.[16] Furthermore, a similar study[13] examining smoking initiation trends in adolescent subgroups from 1979 to 1989, with trends in cigarette pricing and tobacco marketing expenditures, shows that although cigarette prices increased during the study's time period, so did tobacco marketing expenditures for coupons, value-added items, and promotional allowances. Thi

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suggests the industry may have increased its promotional activity to offset the increasing cost of cigarettes. Furthermore, although provisions were agreed on to restrict certain types of marketing and youth access to tobacco as part of the 1998 Master Settlement Agreement (MSA), there is evidence the tobacco industry is turning more and more to retail stores as outlets for its marketing efforts.[20] In fact, in 2003, the tobacco industry spent $14.2 billion on retail advertising and price and other promotions, which accounts for 94% of all its 2003 advertising and promotional spending.[21]

In this study, we examine the influence of cigarette retail marketing strategies on the progression of adolescents from experimentation to established smoking using data collected from February 1999 through June 2003 in nationally representative samples of 8th-, 10th-, and 12th-grade students. To our knowledge, this is the first study to examine the differential effects of these retail marketing strategies on smoking uptake at the national level. The strengths of this study are that most of the data were collected after the implementation of the MSA provisions, allowing for an examination of the post-MSA retail cigarette environment; and its ability to simultaneously examine the impact that objectively collected measures of the cigarette retail environment have on youth smoking uptake.

METHODS

YOUTH SMOKING DATA

Cross-sectional data were collected from February 1999 through June 2003 from 109 308 students in schools participating in their second year of the Monitoring the Future (MTF) survey, funded by the National Institute on Drug Abuse. The MTF survey uses a multistage sampling design to obtain nationally representative samples of 8th-, 10th-, and 12th-grade students, with modal ages of 14, 16, and 18 years, respectively.[22] Community boundaries were defined as the area from which each MTF school drew at least 80% of its student population. Community data collection activities, funded by the Robert Wood Johnson Foundation as part of the Bridging the Gap Initiative: Research Informing Practice and Policy for Healthy Youth Behavior, occurred in approximately 200 MTF communities each year (totaling 966 community areas from 1999 through 2003).

The uptake measure, which is described in detail elsewhere,[6] has been validated to show that current smoking status and intentions to smoke are reliable predictors of future smoking. Briefly, this measure includes stages that identify the process by which adolescents begin smoking. Three MTF questions were used to create the uptake measure: (1) ever smoking, (2) smoking in the past 30 days, and (3) intention to smoke in the next 5 years. The uptake measure included the following categories: (1) never smoker, (2) puffer, (3) nonrecent experimenter, (4) former established smoker, (5) recent experimenter, and (6) current established smoker. A *puffer* was defined as someone who has smoked once or twice. A *nonrecent experimenter* was defined as a student who smoked occasionally, but not in the past 30 days. A *former established smoker* was defined as a student who smoked regularly in the past (not the past 30 days). A *recent experimenter* was defined as someone who smoked occasionally, but not regularly, in the past 30 days. A *current established smoker* was defined as someone who smoked regularly at the time of the survey, or smoked regularly in the past and smoked in the past 30 days. Because some of the MTF questions used to create this measure are asked of a subset of students, this study is limited to this subsample of respondents.

CIGARETTE MARKETING DATA

Observational data collection occurred annually in retail stores in the communities around the approximately 200 schools participating in their second year of MTF surveys. Community boundaries were defined as the area from which each school drew most of its student population. Using the census TIGER (Topologically Integrated Geographic Encoding and Referencing system; a Web mapping application, sponsored by the US Census Bureau, for the United States) files, maps of each community were created and a list of potential tobacco retailers located within each community was generated based on retailer-reported standard industry classification codes. Screener calls were conducted by telephone to identify which of these stores sold tobacco products. If the total number of outlets selling tobacco in a community was 30 or fewer, all outlets were observed; this was the case in 82.0% of communities. If more than 30 outlets sold tobacco products, a random sample of 30 stores was selected, along with a random sample of replacement stores (for use if a store on the primary list was closed, was determined to be unsafe, could not be located, or did not sell tobacco or alcohol). If the list of retail stores was fewer than 30 in a given community, field staff were instructed to add any additional stores selling tobacco products that they identified in the field. Field staff also added the store nearest the index school if it was not included in the sample. There were 17 476 stores in the 5-year sample, with a mean of 18.1 (SD, 9.9) stores per community.

Observations were conducted in each retail outlet using trained field staff teams composed of a lead and an assistant observer. The 2-person teams served as a reliability check for each site observation. If there was disagreement on any measure, field staff would return to the store to verify the measure prior to leaving the community. The purpose of the retail observations was to unobtrusively collect information on tobacco product placement, the extent of related advertising and promotions, and tobacco prices. Advertising included parking lot, other exterior (eg, store window), and interior advertising, while promotions included special price offers, on-pack coupons, and retail value-added promotions (eg, buy 1 get 1 free or gift with purchase). Observers collected these data during an approximately 10-minute visit to each selected store. Field staff were instructed to alternate collecting information on posted nominal prices (including excise taxes, but excluding sales tax) and price-based promotional offers for Marlboro (Philip Morris USA, Richmond, Va) and Newport (Lorilland Tobacco Company, Greensboro, NC) cigarettes from store to store to yield approximately equal numbers of stores for each brand. If a store did not sell one of the brands, then the other was substituted. Marlboro and Newport were selected because they are the brands most widely used by teenagers, accounting for approximately 78% of the usual brand smoked.[23] Information was also collected on low-height advertisements (<105 cm from the ground) and functional objects (branded objects that have some use, such as clocks, trash cans, and grocery baskets).

Two of the cigarette marketing variables are defined as the proportion of stores in each community that had a given type of marketing. For example, the promotions variable reflects the proportion of stores in the community that offered some type of promotion for Marlboro or Newport. Similarly, the placement variable reflects the proportion of the stores with clerk assist–only cigarette placement.

For advertising, a scale (Cronbach $\alpha = 0.70$) was constructed, which equals the sum of 5 separate variables representing the proportion of stores in a site having any (1) property, (2) exterior, (3) interior, (4) functional object, or (5) low-height adver-

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Table 1. Descriptive Statistics

Explanatory Variable	Proportion*	Standard Deviation	Range
Cigarette marketing variables			
Advertising scale†	2.56	0.76	0 to 5
No self-service placement	0.83	0.21	0 to 1
Any vs no promotions	0.48	0.26	0 to 1
Premium-price cigarettes, $†	3.62	0.58	2.37 to 6.84
Control variables			
Grade			
8‡	0.34	0.47	0 to 1
10	0.34	0.47	0 to 1
12	0.32	0.47	0 to 1
Male sex	0.47	0.49	0 to 1
Student's weekly income, $†	52.93	55.42	0 to 278.20
Lives with both parents	0.77	0.42	0 to 1
Father's educational level	0.55	0.49	0 to 1
Mother's educational level	0.59	0.49	0 to 1
Race			
African American	0.11	0.32	0 to 1
White‡	0.68	0.46	0 to 1
Hispanic origin	0.11	0.31	0 to 1
Asian	0.03	0.17	0 to 1
Other	0.05	0.22	0 to 1
Year†	2001	1.41	1999 to 2003
Setting			
Urban	0.23	0.42	0 to 1
Suburban	0.42	0.49	0 to 1
Rural‡	0.35	0.48	0 to 1
Smoke-free air index†	13.16	12.11	−22.5 to 51.0
PUP index†	1.78	1.06	0 to 3
Youth access index†	17.22	6.95	3 to 29

Abbreviation: PUP, purchase, use, or possession.

*For proportions, 0.83 indicates 83% of the sample, except where otherwise indicated. For the sample, N = 26 301.

†Data are given as the sample mean (eg, $3.62 is the average price for premium-brand cigarettes across the 5 years of the study).

‡Referent category.

tising. Sensitivity analyses were conducted by testing alternative constructs, including a measure representing the proportion of stores in a site having increasing levels of advertising. Results were consistent across measures. Therefore, we present the most straightforward advertising construct.

The measure of price is the average price of premium-brand cigarettes (Marlboro and Newport) across all stores in a community. To account for changes in the relative price of cigarettes over time, our price measure is deflated by the national Consumer Price Index, published by the Bureau of Labor Statistics (2003). Methods for the youth surveys and the community data collection were reviewed and approved by an appropriate institutional review board.

CONTROL VARIABLES

Key state tobacco control policies were controlled for in the models. These include an index reflecting the comprehensiveness and extent of state restrictions on smoking, adjusted for preemption; an index of state policies banning minors' purchase, use, or possession of tobacco products; and an index of state policies restricting youth access to tobacco products. The smoke-free air index is the sum of restrictions on smoking in 9 different indoor locations, with each taking a value between 0 and 5 depending on the extent of the restriction, with points subtracted if there is statewide preemption of stronger local policies. The purchase, use, or possession index includes 3 dichotomous variables (1 indicates law present; and 0, no law), representing the count of state policies prohibiting minors' possession, use, and purchase, respectively. The youth access index was constructed using the rating system developed by Alciati et al,[24] and includes information on 9 dimensions of youth access–related policies rated from 0 to 5 depending on the stringency of relevant provisions. The state-level tobacco-related policies were obtained from a tobacco database (ImpacTeen; available at: http://www.impacteen.org).

Table 2. Frequency Distribution of Smoking Experience

Behavior	Threshold	No. (%) of the Total
Never smoker	0	14 130 (53.7)
Puffer	1	5456 (20.7)
Nonrecent experimenter	2	1077 (4.1)
Former established smoker	3	815 (3.1)
Recent experimenter	4	1808 (6.9)
Current established smoker	5	3015 (11.5)
Total	6	26 301 (100.0)

In addition, several variables were used to control for youth and community factors likely to affect smoking behavior, including grade (8, 10, and 12), sex, race/ethnicity (black or African American, white or Caucasian, Hispanic, Asian, and other), lives with both parents, student income from a job or other sources, indicators of parental educational level (some college or more), year of data collection, and urbanization of the community. Urbanization level was obtained from the National Center for Education Statistics for each school. Other data are taken from the MTF surveys. Cases with missing data on any variable were eliminated from analyses.

ANALYSIS

Analyses were run using computer software (Stata, version 9.2; StataCorp, College Station, Tex). Generalized ordered logit models were run using gologit[25] procedures in the software (Stata), requesting Wald tests to determine if the coefficients between thresholds were significantly different for the gologit models and using the lincom statement for requested contrasts. We used a generalized ordered logit model to capture the differential effects of cigarette marketing on our varying thresholds of smoking uptake. A standard ordered logit model, also called a proportional odds model, assumes the effect of the independent variables is the same for all categories of the dependent variable. The generalized ordered logit model relaxes the proportional odds assumption and allows the effects of the explanatory variables to have varying effects on different levels of smoking uptake. We defined 6 levels of smoking uptake; thus, there are 5 thresholds to separate these stages. The complex sample design was accounted for by using sampling weights to adjust for differential selection probabilities, and adjusting for clustering by site—defined as school enrollment zone—to compute robust standard errors. All analyses controlled for student grade, sex, race/ethnicity, whether the student lives with both parents, student's income from work and other sources, father's and mother's level of education (college or more), urbanization, state-level tobacco control policies, and year of data collection.

RESULTS

There were 26 301 students in the study, with 34.3%, 33.6%, and 32.1% of 8th, 10th, and 12th graders, respectively (**Table 1**). Stores in observed communities had nearly 3

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Table 3. Results of the Generalized Ordered Logit Model for Smoking Uptake*

Store Variable	Threshold 1: Nonsmoker to Puffer	Threshold 2: Nonrecent Experimenter	Threshold 3: Former Established Smoker	Threshold 4: Recent Experimenter	Threshold 5: Current Established Smoker
Advertising scale	1.08 (1.02-1.14)†	1.05 (0.99-1.12)	1.04 (0.97-1.11)	0.99 (0.92-1.07)	0.99 (0.91-1.07)
Premium price	0.87 (0.74-1.02)	0.76 (0.64-0.89)‡	0.77 (0.65-0.92)†	0.81 (0.67-0.98)†	0.79 (0.63-0.98)†
Presence of promotions	1.08 (0.92-1.27)	1.15 (0.96-1.37)	1.19 (1.00-1.44)†	1.22 (1.01-1.48)†	1.38 (1.11-1.72)†
Self-service placement	0.94 (0.76-1.17)	0.89 (0.71-1.12)	0.92 (0.72-1.16)	0.80 (0.63-1.02)	0.79 (0.57-1.08)

*Data are given as odds ratio (95% confidence interval). The sample N = 26 301. All models include intercepts and control for grade; sex; race/ethnicity; whether the student lives with both parents; student's income; father's and mother's level of education (college or more); urbanization; state-level smoke-free air policies; state-level youth purchase, use, and possession policies; state-level youth access policies; and year of data collection. Complete model results are available from the corresponding author on request.

†$P<.05$.

‡$P<.001$.

(2.56) of 5 types of advertising. In contrast, only 17.0% of stores within each community had some type of self-assist placement, but 48.0%, or nearly half, of all stores had some type of price-based cigarette promotion. The average price for premium-brand cigarettes was $3.62.

Table 2 contains the frequency distributions for smoking experience. Overall, 53.7% of the sample had never smoked. The next most frequent category was puffers (20.7%); also at the high end, 11.5% of the sample were current established smokers. The mean for smoking uptake was 1.23, indicating that the average student was somewhere between a puffer and a nonrecent experimenter.

Table 3 reports the results of the generalized ordered logit model examining movement across the smoking uptake thresholds by retail cigarette marketing strategy. Thresholds 1 through 5 refer to the 6 different levels of smoking uptake reported in Table 2. For example, threshold 1 refers to a movement from "never smoker" to "puffer," and so on. Results for threshold 1 showed that an increase in moving up a level on the advertising scale (the proportion of stores in a community having an additional type of advertising) will increase the odds of an adolescent moving from the nonsmoking to the initiation (puffer) stage of uptake by a factor of 1.08, or a relative increase of 8%. We did test for interaction effects between grade and advertising (results not shown). Results showed a significant interaction effect for 8th graders and advertising. All other results remained unchanged. Beginning at threshold 2, advertising was no longer significant; price had a strong significant negative effect on smoking uptake. In fact, results suggest that for every dollar increase in price, the odds that an adolescent will move on to the next level of smoking decrease by 24%. The magnitude of the effect of higher cigarette prices on smoking uptake varies slightly by threshold; but overall, this finding was consistent across the remaining thresholds (3-5). Beginning at threshold 3, the presence of promotions had a positive significant effect on moving youth along the smoking uptake continuum. Results of thresholds 4 and 5 also showed that the proportion of stores having any promotions significantly increased the odds of youth moving to higher levels of smoking uptake.

The results of the pairwise Wald tests showed significant differences in moving from threshold 1 to 2 for price ($P=.03$), while the effects of price are equal across the remaining stages of uptake. For promotions, we found significant differences in moving from threshold 3 to 5 and from threshold 4 to 5 ($P=.05$ for both).

To better assess the magnitude of the association between cigarette marketing and youth smoking uptake, we conducted a series of simulations to produce estimates of how cigarette marketing influences the different thresholds of smoking uptake for varying levels of availability for advertising and promotions. Specifically, the predicted probabilities were calculated for the model estimated in Table 3 by separately setting the advertising and promotion variables to their minimum and maximum values found in the sample, holding all other independent variables at their mean. Simulations were performed using the prvalue option in the computer software used (Stata, version 9.2) to assess the impact of these various changes in marketing measures on youth smoking uptake.

We used the estimates from our model to predict changes in uptake if stores went from having approximately 2½ different types of advertising to having no advertising or if stores had all 5 types of advertising. If stores had no advertising, there would be a relative 11.25% decline in puffers, while increasing the types of advertising in stores to include the 5 captured in our scale would result in a 10.86% increase in puffers.

For promotions, we examined changes in smoking uptake if they went from being available in just less than half of stores to being available in either all stores (100%) or no stores. If all stores had some type of promotions, current established smokers would experience a relative increase of 16.58%. On the other hand, completely eliminating promotions would result in a 13.39% relative decline in current established smokers.

COMMENT

The results of this study show cigarette marketing strategies have differential effects on the progression from initiation and experimentation with cigarettes to regular smoking. Specifically, our results suggest point-of-sale advertising is associated with encouraging youth to try smoking, whereas cigarette promotions are associated with

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Table 4. The BTG Cigarette Retail Marketing Trends by Year*

Cigarette Marketing Measure	1999	2000	2001	2002	2003
Point-of-sale advertising scale	2.61	2.71	2.73	2.40	2.40
Premium-priced cigarettes	2.94	3.32	3.48	3.75	3.75
Any vs no promotions	0.52	0.39	0.40	0.49	0.59
Multipack discounts	0.27	0.15	0.14	0.23	0.17
Cents off/special advertised price	0.37	0.27	0.30	0.39	0.55
Gift with purchase	0.06	0.08	0.10	0.11	0.04
Clerk-assist placement	0.68	0.78	0.83	0.91	0.90

Abbreviation: BTG, Bridging the Gap Initiative.

*The promotion measure differs slightly between 1999 and subsequent years. In 1999, the presence of a variety of promotions for any brand was collected; from 2000 on, the presence of promotions for Marlboro (Philip Morris USA, Richmond, Va) or Newport (Lorillard Tobacco Company, Greensboro, NC) cigarettes only was collected. This is most likely the cause of the decrease in the presence of promotions from 1999 to 2000.

influencing those youth already experimenting with cigarettes to progress to regular smoking, with established smokers being most influenced by promotional offers.

The advertising measure used in our study represents the level or amount of point-of-sale advertising that is present in communities. This pervasiveness of advertising may influence youth initiation of smoking by creating the belief that smoking is a normative behavior.[3] As previously mentioned, we also tested for interactions between grade and advertising, which did not substantively alter our results or the implications of this study. Results did show that 8th graders are more influenced by advertising than 10th and 12th graders. This reinforces our overall finding that advertising impacts the early stages of smoking, which is where we would expect to find the younger students.

Our findings are consistent with previous literature,[10,14,26-28] which has shown a link between advertising and promotions and encouraging adolescents to initiate smoking. There is also evidence that point-of-sale advertising influences youths' intentions to smoke in the future.[29] Some studies[12,14,15] have also found a relationship between receptivity to tobacco "advertising" and progressing to established smoking. We did not find any evidence of point-of-sale advertising influencing current established smokers. However, these studies[12,14,15] used measures that captured youths' receptivity to cigarette advertisements and tobacco promotional items (ie, a T-shirt or a hat). This study disentangled these marketing strategies to look at point-of-sale advertising and promotions separately. Thus, although our results show advertising has no influence on established smokers, our findings are consistent with previous studies given that our results show promotions are important in the later stages of uptake.

Furthermore, these findings support previous research[30,31] that shows price-based promotional offers are particularly appealing to young price-sensitive smokers. Thus, the beneficial effects of higher cigarette prices are undermined when youth are able to take advantage of cigarette promotions. In addition, our results suggest higher cigarette prices are associated with discouraging youth from progressing to established smoking at most levels of smoking uptake. Price was only insignificant at threshold 1, possibly because youth who first initiate tobacco use are more likely to obtain cigarettes from a source other than a store.[32] This finding is particularly significant because the latest Federal Trade Commission Cigarette Report[21] shows a substantial increase in price discounts (71.4% or $10.78 billion), such as buy downs, paid to retailers in 2003 to reduce the price of cigarettes to consumers. Beginning in 2002, there was a definite shift away from retail value-added promotions toward price discounts,[21] which would be reflected in the recorded cigarette price rather than through the presence of a promotional offer. This shift toward price discounts is reflected in the data used for this study, which can be seen in **Table 4**. After steady increases, there was no change in price between 2002 and 2003, and the largest increase in the presence of promotions occurred in the category of cents off/special advertised price.

There are some limitations in our marketing data: (1) the lack of information on the content of the point-of-sale advertising, (2) the promotions variable does not capture the full extent of promotions that may have been available in the stores during data collection, and (3) our price measure is an average of prices collected across stores in the community and is unweighted because we have no information regarding each store's share of cigarette sales. Yet, these measures are still more local and, for promotions and price, more specific to the brands youth smoke than anything that has been used in previous studies.

Since the implementation of the MSA, the cigarette industry has shifted its marketing efforts away from more traditional media, such as print advertising, toward retail marketing efforts.[20] Our findings provide evidence that the retail environment is associated with youth smoking uptake. Therefore, although the MSA restricted the cigarette industry's advertising and promotional activities, and the industry itself has restricted its advertising in magazines, the increase in cigarette retail marketing is, at least partly, offsetting any benefits of other MSA-related marketing reductions.

These results are of particular significance because, to our knowledge, no previous study has examined the differential impact of objectively collected measures of cigarette marketing strategies on smoking uptake. Overall, our results provide evidence that restricting point-of-sale advertising will discourage youth from trying smoking, and policies that increase cigarette prices and/or restrict price-

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based promotions will have a long-term positive impact by preventing youth from moving farther along the smoking uptake continuum toward regular smoking.

Accepted for Publication: November 20, 2006.
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Financial Disclosure: None reported.
Funding/Support: This study was supported by the Robert Wood Johnson Foundation and the Centers for Disease Control and Prevention. The MTF survey is supported by the National Institute on Drug Abuse.
Role of the Sponsor: The funding bodies had no role in data extraction and analyses, in the writing of the manuscript, or in the decision to submit the manuscript for publication.
Disclaimer: The views expressed herein are those of the authors and do not necessarily reflect the views of the Robert Wood Johnson Foundation, the Centers for Disease Control and Prevention, the University of Illinois at Chicago, or the University of Michigan, Ann Arbor.
Additional Information: The material contained in this article is based on Dr Slater's thesis, in partial fulfillment of the requirements for the doctoral degree at the Graduate College of the University of Illinois at Chicago.
Acknowledgment: We thank Bridging the Gap colleagues for their input into instrument design; Jaana Myllyluoma, PhD, and colleagues at Battelle Centers for Public Health Research and Evaluation for data collection; and Deborah Kloska for assistance with data analysis.

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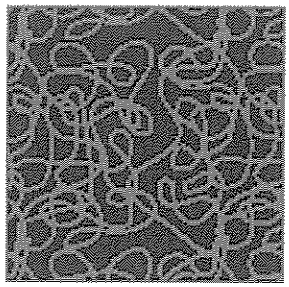
SMOKING AND TOBACCO CONTROL

MONOGRAPH



Population Based Smoking Cessation

Proceedings of a Conference on What Works to Influence Cessation in the General Population

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Public Health Service
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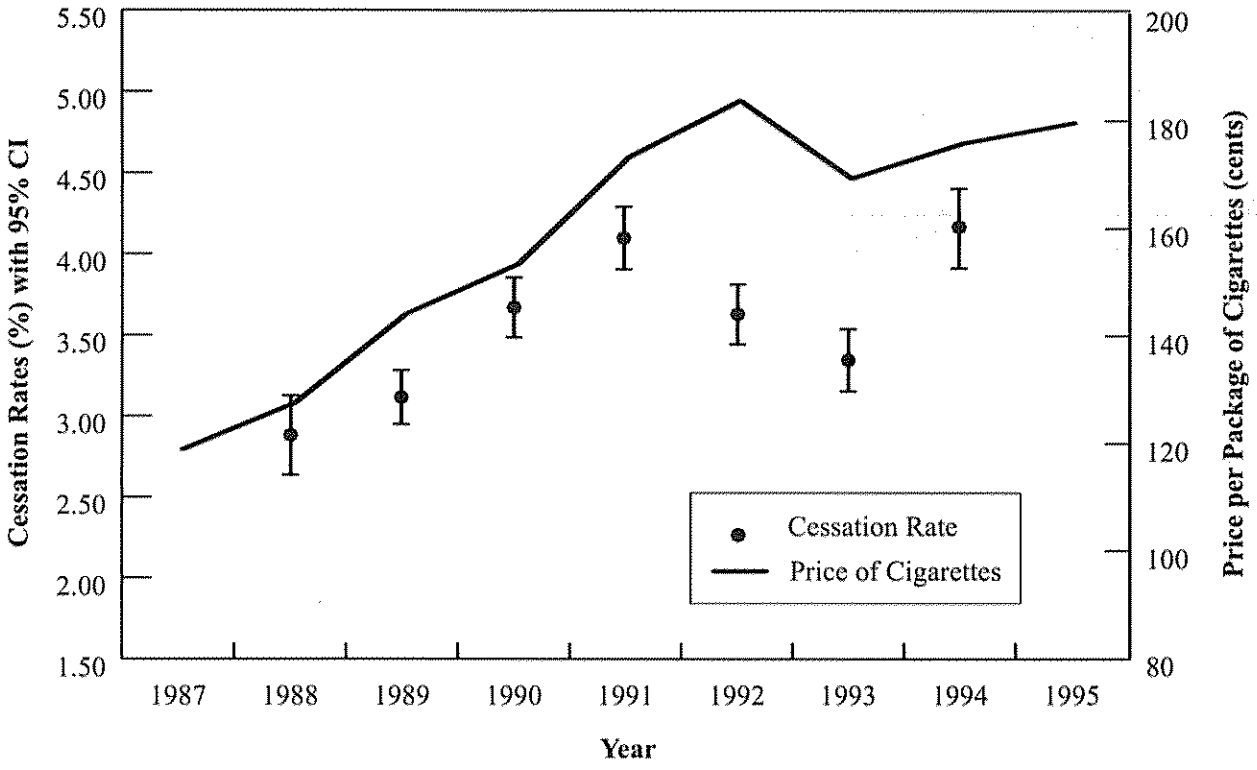
National Cancer Institute

13

Figure 6-4
Long-Term Cessation Rates* versus Price of Cigarettes: United States



** The at-risk population for each calendar year includes those CPS subjects who reported smoking during that year and who responded to the CPS no less than 2 calendar years and no more than 4 calendar years from the year for which the rate was calculated. Long-term quits are those that are at least 1 year long.*

smoker quit limits the utility of calendar year quit rate estimates to those within 4 years of the survey. But by combining the 1992/93 and 1995/96 CPS it is possible to get calendar-year, long-term successful cessation rates for the period of 1988-1995.

Figure 6-4 presents these calendar-year, long-term successful cessation rates in conjunction with the average sales-weighted cost (Tobacco Institute, 1998) of a pack of cigarettes for the same years. There is a remarkable concordance between the cost and cessation data, particularly for the fall in cost and fall in cessation that occurred between 1992 and 1993 as part of a price competition triggered by the discounting of the prices of Marlboro and other premium cigarettes. This pattern suggests that at a macro level there is a concordance between cost of cigarettes and cessation rates.

MEASURES OF CESSATION

There is a marked disparity in the cost of cigarettes among different U.S. states. This disparity is produced by differences in the state excise taxes on cigarettes and by differences in the market share of different brands of cigarettes, particularly of generic brands that sell at a steep discount to full-price premium brands such as Marlboro. Differences across states in cost of cigarettes can be compared to differences in state-specific

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Working Paper 8331
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1050 Massachusetts Avenue
Cambridge, MA 02138
June 2001

Support for this research has been provided by the Robert Wood Johnson Foundation Scholars in Health Policy Research Program and the National Institute on Drug Abuse. The Monitoring the Future data were collected under research grant number R01-DA01411 from the National Institute on Drug Abuse. We would like to thank Philip DeCicca for excellent research assistance. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

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Effects of Price and Access Laws on Teenage Smoking Initiation:
A National Longitudinal Analysis
John A. Tauras, Patrick M. O'Malley and Lloyd D. Johnston
NBER Working Paper No. 8331
June 2001
JEL No. I1

ABSTRACT

Over the past three decades a significant amount of economic research has established that increasing cigarette prices reduces cigarette smoking among both adults and adolescents. The consensus estimates for the price elasticity of adult demand from these studies fall in a narrow range of –0.3 to –0.5, suggesting that a 10% increase in the price of cigarettes would decrease adult consumption by 3%-5%. A smaller literature on youth responsiveness to cigarette prices has also emerged. A majority of these studies concluded that youth are up to three times as responsive to price as are adults. Only four econometric studies have attempted to model youth and young adult smoking initiation decisions. All four studies concluded that cigarette prices (or cigarette excise taxes) are insignificant determinants of smoking initiation.

This study addresses the limitations of the previous studies on smoking initiation and examines the impact of cigarette prices and youth access laws on adolescent smoking initiation. Nationally representative longitudinal surveys of 8th and 10th graders as part of the Monitoring the Future project are employed in the analysis. State-specific prices and several measures of youth access restrictions are added to the survey data. Discrete-time hazard methods are used to model the probability of initiation. Contradicting the results of the four previous studies on smoking initiation, the results of this study clearly indicate that increases in the price of cigarettes would significantly reduce the number of adolescents who start smoking. The results are mixed with respect to youth access restrictions.

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I. Introduction

The prevalence of cigarette smoking among American teenagers was rising for a good part of the 1990s. According to the Monitoring the Future Surveys (MTFS), the proportion of 8th and 10th graders categorized as current cigarette smokers increased dramatically between the years 1991 and 1996. Similarly, the proportion of current smokers in the 12th grade significantly increased between the years 1992 and 1997 (Johnston, O'Malley, and Bachman, 2000).

This upward trend in adolescent smoking coupled with the addictive nature of cigarettes has caused a great deal of concern among public health advocates. Since many adolescent smokers continue to use tobacco products as adults, the sharp rise in youth smoking in the 1990's is likely to translate into future increases in adult smoking. Given the incontrovertible health effects of smoking, efforts to prevent youths from starting may be the most effective means to reduce the future burden of tobacco related disease.

Understanding why many youth initiate cigarette smoking and what impact public policy plays in deterring smoking onset is of utmost importance to reduce the harm associated with smoking. This paper is the first econometric study to examine the determinants of smoking initiation among adolescents during the rapid rise in smoking in the 1990's. In particular, this study examines the impact cigarette prices (which can be manipulated by excise taxation), youth access laws, and other socio-demographic factors have on youths' decisions to start smoking.

II. Previous Research

Economic research in the last three decades has shown that cigarette prices are inversely related to cigarette demand. A National Cancer Institute sponsored gathering of

economists and other experts concluded that the overall price elasticity of adult cigarette demand falls in a narrow range of –0.3 to –0.5, suggesting that a 10% increase in the price of cigarettes would decrease overall adult consumption of cigarettes by approximately 4% (NCI, 1993). A smaller literature on youth and young adult responsiveness to cigarette prices has also emerged. The consensus from these studies is that youth and young adults are at least as responsive to price as adults are, if not significantly more price responsive (USDHHS, 1994).

Using data taken from Cycle III of the Health Examination survey (1966-1970), Lewit and colleagues (1981) were the first to examine the determinants of adolescent (12-17 years old) cigarette smoking. They examine the impact of price on smoking prevalence and then examine the impact of price on the number of cigarettes smoked by adolescent smokers. The total price elasticity of demand was estimated to be –1.44. In addition, the study found price to have a larger impact on adolescents' decisions to smoke rather than on average amount smoked by smoker.

Using a similar methodology to Lewit et al. (1981), Chaloupka and Grossman (1996) confirmed the finding that youth and young adults are more responsive to price changes than are adults. They employed 1992-1994 Monitoring the Future Surveys of 8th, 10th, and 12th graders in their investigation. They estimated a total price elasticity of demand for individuals mostly aged 12 –18 centered on –1.31.

More recently, Tauras and Chaloupka (1999) employed the longitudinal component of the Monitoring the Future Surveys to estimate the impact of price on young adult smoking. Using an individual-level fixed effects model, they conclude that the total price elasticity of demand for young adults is centered on –0.79. Moreover, Harris and

Chan (1999) used the 1992-1993 Tobacco Use Supplement of the Current Population Survey to estimate the impact of price on smoking by various age groups. Their estimated price elasticities ranged from –0.996 for individual's aged 15-17 to –0.329 for individual's aged 27-29. In addition, using multiple data sets, Gruber (2000) concludes that older teens (approximately 17-18 years of age) are quite sensitive to price changes with an estimated price elasticity of demand of –0.67. However, he finds price to have an insignificant impact on younger teens (approximately 13-16 years of age) smoking. Finally, Evans and Huang(1998) estimate a prevalence elasticity of –0.20 for high school seniors using annual state-level measures of smoking prevalence for high school seniors employing the 1977-1992 Monitoring the Future Surveys. However, when only the second half of the data was employed (1985-1992), the prevalence elasticity was estimated to be –0.50, suggesting that young adults are becoming more price responsive over time.

A limitation of the previous studies on the determinants of youth and young adult smoking is that they are cross-sectional in nature and are unable to model the dynamics of smoking transitions such as smoking initiation. Only two published and two unpublished studies have attempted to address the issue of youth smoking initiation. All four studies concluded that economic factors such as cigarette prices and excise taxes were insignificant determinants of youth smoking initiation.

Douglas and Hariharan (1994) were the first to model smoking initiation. They employed data from the 1978 and 1979 National Health Interview Survey: Smoking Supplement and used a split population duration model to estimate the probability that an individual would start smoking. They concluded that increases in cigarette excise taxes

(which increase the price of cigarettes) had no influence on individuals' decisions to start smoking.

Expanding on the original study, Douglas (1998) used the 1987 National Health Interview Survey: Cancer Risk Factor Supplement to investigate individuals' decisions to start and quit smoking in the context of an economic model of addictive behavior. He employed several alternative parametric duration models in his study and concluded that past, current, and future prices of cigarettes had no impact on individuals' decisions to start smoking. Likewise, he concluded that past and current cigarette prices had no influence on individuals' decisions to quit smoking. However, Douglas concluded that increases in the future price of cigarettes would increase the likelihood that individuals quit smoking.

In a more recent unpublished study, Forster and Jones (1999) employed data taken from the British Health and Lifestyle Survey and used both semi-parametric and fully parametric duration modeling to investigate individuals' decisions to start and quit smoking. They found cigarette excise taxes to be insignificant determinants of smoking initiation. However, they concluded that increases in excise taxes would shorten the amount of time an individual smoked and thereby increase the likelihood of smoking cessation.

Finally, DeCicca, Kenkel, and Mathios (1999) used panel data taken from the National Education Longitudinal Survey of 1988 to model youth smoking initiation decisions. They employed both a smoking onset function as well as a discrete time duration model in their investigation. They concluded that both cigarette prices and excise taxes are insignificant determinants of smoking onset between 8th and 12th grade.

They further concluded that after including state fixed effects in their discrete time duration model, both cigarette prices and excise taxes had no influence on adolescent smoking initiation.

While all four previous studies made significant contributions to the economic literature on the determinants of teenage smoking by modeling smoking initiation and not simply smoking participation, the findings that cigarette prices and excise taxes are insignificant determinants of smoking behavior is at odds with a majority of the research that has been conducted throughout the past 30 years. One possible explanation why Douglas and Hariharan (1994), Douglas (1998), and Forster and Jones (1999) found insignificant price/tax effects is due to their use of cross-sectional data with retrospective information on smoking initiation. The use of retrospective information could significantly influence the estimates by introducing imperfect recall by respondents. In fact, Forster and Jones tested for recall bias in their analysis and conclude that there is strong evidence of 5 and 10 year recall bias.

A second possible explanation why Douglas and Hariharan (1994), Douglas (1998), and Forster and Jones (1999) found insignificant price/tax effects stems from a likely price-matching problem. All three studies based all previous prices/taxes that an individual would have paid for cigarettes on that individual's current location of residence (either state or country level). If an individual lived in a different location any time in the past, that individual would have been matched with an incorrect price/tax.

While DeCicca, Kenkel, and Mathios (1999) concluded that both cigarette prices and taxes are insignificant determinants of smoking initiation when state fixed effects were included, they warned that these results should be viewed with caution because

prices and taxes were only measured at three different periods of time and when state fixed effects were excluded, both prices and taxes had significant and negative impacts on smoking initiation. The use of state level fixed effects restricts the variation of prices/taxes to nominal changes in prices/taxes within a state over time. If there is no significant variation within a state over time, the effect of price on initiation would likely be washed out. Furthermore, Dee and Evans (1998) reevaluated the NELS data that DeCicca et al. used, making adjustments to the way in which the sample was constructed and variables were defined, and concluded that price had a strong negative impact on the smoking onset functions contradicting the DeCicca et al. conclusions.

Finally, very few studies have examined the impact youth access restrictions have on youth smoking behavior. DeCicca et al. (1999) concluded that youth access laws have no influence on smoking initiation. Chaloupka and Grossman (1996) and Rigotti et al. (1997) found youth access laws to have little or no influence on cigarette demand of youth and young adults. However, Chaloupka and Pacula (1998) found that teenagers who live in states that aggressively enforce retail youth access compliance are less likely to smoke and smoke less on average than teens who live in states that do not have comprehensive enforcement. Finally, Jason et al. (1991) found that active enforcement of youth access laws in Woodridge, IL caused a significant decrease in regular smoking among adolescents.

To summarize, the economic literature on adolescent cigarette demand is conflicting. Cross-sectional analyses of cigarette demand have found that cigarette prices (or cigarette excise taxes) and the probability of youth smoking are inversely related. However, studies that have modeled the determinants of youth smoking initiation have

concluded that price is an insignificant determinant of smoking onset. Finally, the findings regarding youth access laws and adolescent cigarette demand are mixed. This paper proposes to address these issues and examine the impact cigarette prices and youth access restrictions have on adolescent's decisions to initiate cigarette smoking using longitudinal data derived from large national samples.

III. Data and Methods

The data are taken from the nationally representative longitudinal surveys of 8th and 10th graders conducted by the Institute for Social Research at the University of Michigan as part of the Monitoring the Future project (Bachman, Johnston, and O'Malley, 1996; and Johnston, O'Malley, and Bachman, 2000). These surveys focus on the use of cigarettes, alcohol, and illicit drugs. This is an extremely relevant and important time in an individual's life span to start tracking smoking behavior. According to the 1994 Surgeon General's report, very few individuals start smoking daily before the 8th grade and nearly all first use of cigarettes occurs before high school graduation.

The data used for these analyses were collected on three cohorts of students enrolled in 8th and 10th grade in 1991, 1992, and 1993. In each of these years, approximately 15,000 10th graders and between 18,000 and 19,000 8th graders were surveyed. From each cohort, 2,000 8th graders and 2,000 10th graders were selected to be followed-up via mail surveys. Students who were deemed to be at high risk for dropping out of school were over-sampled. Weights are used in the analyses to adjust for the differential sampling. Follow-up surveys were conducted at two-year intervals for up to

3 follow-ups on 8th grade cohorts and up to 2 follow-ups on the 10th grade cohorts.[1] The questionnaires used in the follow-up surveys are very similar to those used in the baseline years. Most of the questions asked at baseline were also asked in subsequent follow-ups so that changes in behaviors and experiences can be measured.

Cigarette consumption, socioeconomic, and demographic variables were constructed from the survey data for all respondents. Of particular importance to this paper was the information collected on each individual's smoking behavior. In the baseline year and all subsequent follow-ups, each individual was asked the following question: "How frequently have you smoked cigarettes during the past 30 days?" The possible responses to this question were: not at all; <1 cigarette per day; 1-5 cigarettes per day; about ½ pack per day; about 1 pack per day; about 1 ½ packs per day; and 2 packs or more per day. The responses to this question were used to create three alternative dichotomous smoking variables. The first is equal to one if the respondent indicated consuming any cigarettes in the past thirty days, and equal to zero otherwise. The second is equal to one if the individual indicated consuming at least 1-5 cigarettes per day, and equals zero otherwise. The third is equal to one if the individual consumed at least ½ pack of cigarettes each day, and is equal to zero otherwise. Tracked over time, the dichotomous smoking variables allow us to examine whether or not an individual has initiated cigarette smoking between waves of data using three alternative measures of initiation. Only individuals who have never smoked in all previous waves of data are allowed to enter the risk pool and subsequently initiate smoking based on one or more of

[1] In 1997, MTF discontinued tracking 10th graders in their follow-up surveys. Therefore, the data set consist of 3 follow-ups on 8th graders and 2 follow-ups on 10th graders, corresponding to having up to 4 observations on each 8th grader and up to 3 observations on each 10th grader.

the alternative measure. Once an individual has initiated, they are no longer at risk of initiating and are dropped from the risk pool.

In addition to the cigarette consumption variables, several independent variables were selected to control for factors that are thought likely to influence smoking initiation. These include: the age of the respondent, in years; the age of the respondent squared; average real weekly income from employment (deflated by the national consumer price index (CPI) 1982-1984=100); number of years of formal schooling completed; average number of hours worked weekly; number of children; race/ethnicity (African American, Mexican, Cuban, Puerto Rican, Other Latin, Asian American, Other Race, White – omitted); gender (male, female – omitted); indicators of family structure (live with parents, live alone); separate indicators of father's education and mother's education (some high school, high school graduate, some college, college graduate, completed graduate school, education unknown, completed grade school or less – omitted); indicators of mother's work status (mother works part-time, mother works full-time, mother does not work – omitted); indicators of frequency of participation in religious services (infrequent participation, moderate participation, frequent participation, no participation – omitted); and indicators of marital status (engaged, separated/divorced, single, married-omitted). Moreover, since attrition may be associated with smoking initiation, a variable reflecting the number of observations that each individual contributes to the full sample was created.

In addition, indicators of region according to the Bureau of Labor Statistics (New England, New Jersey/New York, East, Southeast, Midwest, Plains, Northwest, West, and

South –omitted) as well as two time variables (year and year squared) were constructed to control for region and time trends.

Based on state level identifiers, cigarette prices were added to the survey data. The price data were obtained from Tobacco Institute's Tax Burden on Tobacco. Each year prior to 1999, the Tobacco Institute published the average price of a pack of twenty cigarettes as of November 1 for each state. These prices are inclusive of state level sales taxes applied to cigarettes, but are exclusive of local cigarette taxes. Since the price published is as of November 1, and the survey is conducted between mid February and early June and the dependent variables are based on past month smoking, a weighted average price for the first six months of each year is computed. The average price for the first six months of every year is calculated by subtracting state and federal excise taxes from the current year's price and the previous year's price and weighting the pre-tax prices accordingly (7/12 previous year and 5/12 current year). Then the average federal tax and average state tax for the first six months of the year are added to the first six month's average pretax price. To account for changes in the relative price of cigarettes over time, all cigarette prices are deflated by the national Consumer Price Index published by the Bureau of Labor Statistics (1982-1984=100).

Based on state identifiers, a set of variables reflecting the presence and magnitude of youth access laws was added to the data. These data were obtained from the American Lung Association's annual State Legislated Actions on Tobacco Issues. Each year, the American Lung Association publishes data on states' activities to restrict availability of tobacco products by minors. These data were used to construct a variable that captures the minimum age required to purchase cigarettes in each state. In addition, these data

were used to construct indicators for states that restrict distribution of free tobacco samples to minors, restrict placement of cigarette vending machines, require minimum purchase age signs on vending machines, require minimum purchase age signs at point of sale, and require vendors to pay monetary fines and face possible license revocation for selling to minors. These indicators are interacted with a variable that reflects whether or not an individual is a minor, so that only minors in the analyses will be affected by youth access laws. A minor is defined as any individual whose age is less than the minimum legal cigarette purchase age. In addition, a dichotomous variable is constructed that is equal to one if a state has a law that restricts students from smoking in public schools and is equal to zero otherwise. Finally, a youth access index variable was created in an attempt to capture the magnitude of each states laws with respect to youth smoking. The index variable takes on the value of 1 if the respondent is a minor and resides in a state that has exactly 1 of the following laws: minimum purchase age, free samples restriction to minors, vending machine sign posting restriction, vending machine placement restriction, minimum age sign posting restriction, vendor penalty, and school restrictions[2]. Similarly, the index variable takes on a value of 0, 2, 3, 4, 5, 6 and 7 if the state has exactly 0, 2, 3, 4, 5, 6 or 7 of the above mentioned youth access laws.

A discrete-time hazard model is used to assess the impact exogenous covariates have on adolescent's probability of starting smoking. The dependent variable is known as the starting hazard. The starting hazard can be defined as the probability that an individual starts smoking in a given time period conditional on not having smoked in any previous wave of data. This probability is modeled using weighted dichotomous probit equation in all model specifications. The weights are used to account for the over-

[2] It is not required that a respondent be a minor for the school restriction to take a value of one in the index.

sampling of high-risk individuals in the sample.[3] In addition, to account for the correlation among multiple observations on an individual subject a Huber/White robust method of calculating the variance-covariance matrix is used. The robust estimator relaxes the assumption of independence of observations by allowing the observations to be independent across individuals, but not independent within an individual.[4] Only individuals at risk of initiating cigarette smoking are allowed to enter the model. Therefore, only individuals who had not started to smoke as of the previous wave are allowed to enter the risk pool and subsequently enter into the model estimation. Since adequate information on prior smoking by the 10th grade cohorts is not known, and since many youth start smoking between 8th and 10th grade, all baseline observations for the 10th grade cohorts are eliminated from the risk pool. However, since very few 6th graders are classified as current smokers, it is assumed that all baseline observations for the 8th grade cohorts are at risk of smoking initiation and therefore are allowed to enter the risk pool. This is equivalent to estimating the probability of smoking initiation between some earlier period and 8th grade for the 8th grade baseline observations. A total of 15,548 observations in the data representing 8,447 adolescents are at risk of making a transition from the non-smoking state to the smoking state. Of these 8,447 individuals, 35.23%, 18.65%, and 9.49% initiate smoking during the time they are under observation based on initiation defined as smoking any cigarettes in the past thirty days, smoking at least 1-5 cigarettes per day on average in the past month, and smoking at least a half a pack per day on average in the past month respectively.

[3] Non weighted probit equations and weighted probit equations to account for attrition were also performed. In the latter, the number of observations that each individual contributes to the full sample is not employed as a covariate. The results are very similar to those presented in the paper and are available upon request.

IV. Results

Table 2 contains estimates from the smoking initiation equations when initiation is defined as smoking any cigarettes in the previous 30 days, with the corresponding estimates for initiation defined as smoking at least 1 to 5 cigarettes per day on average presented in Table 3, and estimates for initiation defined as smoking at least ½ pack per day on average presented in Table 4. Each Table contains ten alternative models. Model 1 of each table contains estimates from a specification that includes the real average price of cigarettes, gender, age, race/ethnicity, living arrangement, parental education, mother's work status, religious participation, marital status, number of children, hours worked, education, income, number of observations per individual in the full sample, year, and region. Model 2 of each table is identical to model 1 except model 2 includes a youth access index variable. The models estimated in columns 3 through 9 are identical to model 1, except models 3 through 9 include at most one tobacco control policy. These models are specifically designed to decrease the collinearity associated with including highly correlated state level variables. Finally, model 10 is identical to model 1 except model 10 includes all seven tobacco control policies. In addition, with the exception of price, time trend, region, age, and indicators of family structure, indicators for respondents with missing data for all of the above variables are included in the models. These missing value indicators were created to prevent the loss of a large number of observations. In the case of discrete covariates with missing data, the missing value dummy variables take the value of one, while the covariates take on a value of zero. In

[4] Additional models in which clustering was based on zip code were also estimated. The results are very similar to those included in the paper. These estimates are available upon request.

the case of continuous covariates with missing data, the missing value indicators take the value of one and the covariates take the value that has been imputed at the mean of the individual's other observations. The missing value indicators take a value of zero for all respondents whose covariates are known.

The real price of cigarettes is found to have a negative and significant impact at the 1% significance level on smoking initiation in all the models that were estimated when initiation is based on smoking at least 1 to 5 cigarettes per day on average and at least ½ pack per day on average. In addition, the real price of cigarettes is found to have a negative impact on smoking initiation defined as smoking any cigarettes in the past 30 days, however, this relationship is significant at the 10% level in only models 7 and 9. The estimated price elasticities of initiation[5] are presented in Table 5. The average price elasticity of initiation based on any smoking, at least 1-5 cigarettes per day on average, and at least ½ pack per day on average are –0.271, -0.811, and –0.955 respectively. These estimates clearly indicate that increases in the real price of cigarettes (which can be achieved through excise taxation) will decrease the number of adolescents who start smoking. The results above indicate that a 10% increase in the price of cigarettes will decrease the probability of smoking initiation between approximately 3% and 10% depending on how initiation is defined. In addition, these results suggest that individuals who are classified as having initiated smoking based on greater cigarettes smoked are more price responsive than are individuals classified as having initiated smoking based on fewer cigarettes smoked. This is not surprising given that many adolescents who

[5] The price elasticity of initiation is defined as $\varepsilon_{ip} = \left(\frac{\partial initiation}{\partial price}\right)\left(\frac{\overline{price}}{\overline{initiation}}\right)$

experiment with cigarettes or smoke in small quantities never purchase their own cigarettes, but rather "borrow" from a friend.

To control for the possibility that unobserved state level sentiment toward smoking is causing both the excise taxes to increase as well as decrease adolescent smoking initiation, alternative models are run that replaced the region fixed effects with state fixed effects. To conserve space, the estimates are not presented here, but are available upon request. Price has a negative and significant impact on all three measure of smoking initiation except in model 10 when initiation is defined as any cigarettes consumed in the previous 30 days. The estimated price elasticities of initiation from these models are presented in Table 6. The average price elasticity of initiation based on smoking any cigarettes, smoking at least 1 to 5 cigarettes per day on average and smoking at least ½ pack per day on average are –0.111, –1.23 and –1.43 respectively. These results imply that when unobserved state level sentiment is controlled for, cigarette price increases have a larger impact on deterring adolescents from initiating into daily smoking than when state sentiment is not controlled for.

The results are mixed with respect to youth access restrictions. The youth access index variable, designed to capture the magnitude of each states youth smoking restrictions, has an insignificant impact on all three measures of smoking initiation. Minimum purchase age laws are found to have a negative and significant impact at at least the 10% significance level on smoking initiation in all the models except when initiation is defined as smoking at least 1 to 5 cigarettes per day on average and all the tobacco control policies are included in the model. Restrictions on smoking in public schools seem to have little or no impact on the two stricter measures of smoking

initiation, however, restrictions on smoking in public schools seem to have a negative and significant impact at at least the 10% level on smoking initiation defined as smoking any cigarettes in the past month. Restrictions on the distribution of free samples to minors decrease the probability of smoking initiation based on initiation defined as smoking at least 1 to 5 cigarettes per day on average in the past month, however, these restrictions fail to meet statistical significance at conventional levels when smoking initiation is defined as smoking any cigarettes and smoking at least ½ pack per day on average. Point of sale minimum age sign requirements (including both store and vending machine sign postings), vending machine placement, and penalties to vendors who sell to minors seem to have little or no impact on curtailing adolescent smoking initiation.

Briefly reviewing the results from the other independent variables, controlling for all other variables: Males are more likely to start smoking than are females when initiation is based on smoking at least ½ packs per day on average. Young adolescents are much more likely to initiate cigarette smoking than are older adolescents. With respect to race/ethnicity, African Americans, Mexicans, Asian Americans, and Other Latin races are significantly less likely to start smoking than are Whites. Adolescents who live with at least one or more of their parents are significantly less likely to initiate cigarette smoking than those that do not live with a parent.

Paternal education does not seem to be a strong predictor of smoking initiation, although, based on a one-tail test, individuals whose fathers have a college degree or have an advanced professional degree are less likely to start smoking than those whose fathers have less than a high school education when initiation is defined as smoking at least ½ pack per day on average. Individuals whose mothers work part-time are significantly less

likely to initiate smoking than individuals whose mothers do not work based on initiation defined as smoking at least 1 to 5 cigarettes per day on average and smoking at least ½ pack per day on average.

Adolescents with a strong attachment to religion, as measured by the frequency of religious service attendance, are much less likely to start smoking than are adolescents with little or no attachment to religion. Based on a one-tail test at at least the 10% significance level, individuals who are engaged, single, or are either separated or divorced are significantly more likely to start smoking than are individuals who are married.

Adolescents with more children are significantly less likely to initiate smoking than adolescents with fewer children based on initiation defined as smoking any cigarettes during the past 30 days. Adolescents who work more hours per week are more likely to initiate cigarette smoking than individuals who work fewer hours per week based on a one-tail test at at least the 10% significance level. Individuals with more formal years of schooling are significantly less likely to initiate cigarette smoking than are individuals who have less education. Finally, adolescents with higher incomes from employment are significantly more likely to initiate cigarette smoking based on initiation defined as smoking at least 1 to 5 cigarettes per day and smoking at least ½ pack per day on average.

V. Discussion

For the better part of the 1990's, cigarette smoking among American teenagers has been on the rise. Many proposals have been drafted by policy makers in an attempt to combat this upward trend. At the heart of almost every proposal is a tax increase that

would substantially increase the price of cigarettes. Decreasing smoking initiation among America's young people was one of President Clinton's top domestic priorities during his second term in office. On February 7, 2000, President Clinton unveiled his proposed budget for fiscal year 2001which contained several important tobacco-related initiatives including a 25-cent excise tax increase on cigarettes.[6]

While the use of economic incentives (such as tax increases) to decrease youth smoking initiation have found their way into almost all anti-smoking proposals, prior research has suggested that price and tax increases would have little or no influence on youth smoking initiation. The research presented here, however, contradicts those previous studies. The average estimates provided above suggest that had a 10% increase in the federal excise tax been enacted during the time of this study, and had that tax been fully passed on to consumers, the probability of daily smoking initiation among youth would have declined by approximately 10%.

With respect to other youth tobacco control policies, the estimates above suggest that minimum purchase age laws, restrictions on smoking in public schools, and restrictions on distribution of free tobacco samples could possibly be effective tools in decreasing smoking initiation. Other youth access laws such as minimum purchase age sign postings at point of sale and on vending machines, vending machine placement requirements, and penalties for vendor sale violations seem to have little impact on youth smoking initiation. However, the state-level youth tobacco control policies used in this analysis may underestimate the true impact smoking restrictions have on youth smoking

[6] Other tobacco initiatives included: increasing the prices of smokeless tobacco and cigars; moving the already legislated 5 cent per pack excise tax increase slated for January 1, 2002 to October 1, 2000; imposing assessments on tobacco companies for underage smoking; ensuring Medicaid patients have access to medication that aids in smoking cessation; providing $39 million to the Food and Drug

initiation because they do not account for local level policies, they do not take account of the level of enforcement that takes place within states, and there may not be enough variation in the existence of these policies during the period under study here.

Administration to help enforce youth access laws; providing funds to pay for legal costs associated with the Department of Justice's litigation to recover federal expenditures on smoking; and various others.

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Table 1

Variables	Definition, Baseyear Mean (μ_B), Baseyear Standard Deviation (σ_B), At Risk Mean(μ_R), At Risk Standard Deviation (σ_R)
Real Cigarette Price	Average price of a pack of twenty cigarettes for the first two quarters of the year, deflated by the national Consumer Price Index, 1982-1984=100. μ_B=1.26 σ_B=0.127 μ_R=1.22 σ_R=0.145
Youth Access Index	Index variable that takes on the value of 1 if the respondent is a minor and resides in a state that has exactly 1 of the following laws: minimum purchase age, free samples restriction to minors, vending machine sign posting restriction, vending machine placement restriction, minimum age sign posting restriction, vendor penalty, and school restrictions[7]. Similarly, the index variable takes on a value of 0, 2, 3, 4, 5, 6 and 7 if the state has exactly 0, 2, 3, 4, 5, 6 or 7 of the above mentioned youth access laws. μ_B=3.88 σ_B=1.29 μ_R=3.61 σ_R=1.61
Minimum Purchase Age	Age required to purchase cigarettes. μ_B=17.82 σ_B=2.06 μ_R=18.002 σ_R=1.52
School Restriction	Dichotomous indicator equal to one if respondent resides in a state that restricts cigarette smoking in public schools and zero otherwise. μ_B=0.859 σ_B=0.348 μ_R=0.88 σ_R=0.325
Distribution of Free Samples	Dichotomous indicator equal to one if respondent is a minor and resides in a state that restricts the distribution of free tobacco products to minors, and zero otherwise. μ_B=0.481 σ_B=0.499 μ_R=0.433 σ_R=0.496
Vending Machine Sign	Dichotomous indicator equal to one if respondent is a minor and resides in a state that requires minimum purchase age signs to be posted on vending machines, and zero otherwise. μ_B=0.403 σ_B=0.491 μ_R=0.327 σ_R=0.469
Vending Machine Placement	Dichotomous indicator equal to one if respondent is a minor and resides in a state that restricts the placement of vending machines to areas not accessible by minors, and zero otherwise. μ_B=0.361 σ_B=0.480 μ_R=0.334 σ_R=0.472
Minimum Age Sign	Dichotomous indicator equal to one if respondent is a minor and resides in a state that requires minimum purchase age signs to be posted at point of sale, and zero otherwise. μ_B=0.761 σ_B=0.426 μ_R=0.561 σ_R=0.496
Vendor Penalty	Dichotomous indicator equal to one if respondent is a minor and resides in a state that penalizes vendors with monetary fines and possible revocation of license to vendors who sell tobacco to minors, and zero otherwise. μ_B=0.03 σ_B=0.167 μ_R=0.08 σ_R=0.271
Male	Dichotomous indicator equal to one if respondent is a male, and zero otherwise. μ_B=0.510 σ_B=0.499 μ_R=0.476 σ_R=0.499
Age	Age of respondent, in years. μ_B=15.3 σ_B=1.68 μ_R=16.94 σ_R=2.56
Age Squared	Age of respondent squared. μ_B=236.86 σ_B=51.21 μ_R=293.61 σ_R=86.71
African American	Dichotomous indicator equal to one if respondent is African American, and zero otherwise. μ_B=0.155 σ_B=0.362 μ_R=0.163 σ_R=0.369

[7] It is not required that a respondent be a minor for the school restriction to take a value of one in the index.

Mexican	Dichotomous indicator equal to one if respondent is Mexican, and zero otherwise. μ_B=0.092 σ_B=0.288 μ_R=0.087 σ_R=0.028
Cuban	Dichotomous indicator equal to one if respondent is Cuban, and zero otherwise. μ_B=0.008 σ_B=0.086 μ_R=0.006 σ_R=0.078
Puerto Rican	Dichotomous indicator equal to one if respondent is Puerto Rican, and zero otherwise. μ_B=0.012 σ_B=0.111 μ_R=0.010 σ_R=0.098
Other Latin	Dichotomous indicator equal to one if respondent is of other Latin American descent, and zero otherwise. μ_B=0.016 σ_B=0.126 μ_R=0.015 σ_R=0.121
Asian American	Dichotomous indicator equal to one if respondent is Asian American, and zero otherwise. μ_B=0.019 σ_B=0.136 μ_R=0.021 σ_R=0.144
Other Race	Dichotomous indicator equal to one if respondent is from another race not mentioned above, and zero otherwise. μ_B=0.097 σ_B=0.296 μ_R=0.104 σ_R=0.306
Live Parents	Dichotomous indicator equal to one for individuals who live with one or more of their parents, and zero otherwise. μ_B=0.93 σ_B=0.255 μ_R=0.866 σ_R=0.340
Live Alone	Dichotomous indicator equal to one for individuals who live alone, and zero otherwise. μ_B=0.004 σ_B=0.067 μ_R=0.010 σ_R=0.098
Father Some High School	Dichotomous indicator equal to one if father attended high school, but did not graduate, and zero otherwise. μ_B=0.135 σ_B=0.342 μ_R=0.120 σ_R=0.325
Father High School Graduate	Dichotomous indicator equal to one if father graduated from high school, but did not attend college, and zero otherwise. μ_B=0.271 σ_B=0.445 μ_R=0.267 σ_R=0.442
Father Some College	Dichotomous indicator equal to one if father attended college, but did not graduate, and zero otherwise. μ_B=0.125 σ_B=0.330 μ_R=0.121 σ_R=0.327
Father College Graduate	Dichotomous indicator equal to one if father graduated from college, but pursued no further education, and zero otherwise. μ_B=0.185 σ_B=0.388 μ_R=0.200 σ_R=0.400
Father Professional	Dichotomous indicator equal to one if father earned a graduate degree in a professional occupation, and zero otherwise. μ_B=0.099 σ_B=0.299 μ_R=0.111 σ_R=0.314
Father Education Unknown	Dichotomous indicator equal to one if father's education is unknown, and zero otherwise. μ_B=0.121 σ_B=0.326 μ_R=0.120 σ_R=0.328
Mother Some High School	Dichotomous indicator equal to one if mother attended high school, but did not graduate, and zero otherwise. μ_B=0.152 σ_B=0.359 μ_R=0.133 σ_R=0.340
Mother High School Graduate	Dichotomous indicator equal to one if mother graduated from high school, but did not attend college, and zero otherwise. μ_B=0.309 σ_B=0.462 μ_R=0.301 σ_R=0.459
Mother Some College	Dichotomous indicator equal to one if mother attended college, but did not graduate, and zero otherwise. μ_B=0.151 σ_B=0.358 μ_R=0.157 σ_R=0.364
Mother College Graduate	Dichotomous indicator equal to one if mother graduated from college, but pursued no further education, and zero otherwise. μ_B=0.178 σ_B=0.382 μ_R=0.189 σ_R=0.391
Mother Professional	Dichotomous indicator equal to one if mother earned a graduate degree

	in a professional occupation, and zero otherwise. μ_B=0.088 σ_B=0.283 μ_R=0.098 σ_R=0.297
Mother Education Unknown	Dichotomous indicator equal to one if mother's education is unknown, and zero otherwise. μ_B=0.070 σ_B=0.255 μ_R=0.074 σ_R=0.261
Mother Works Part-Time	Dichotomous indicator equal to one if mother works part-time, and zero otherwise. μ_B=0.176 σ_B=0.381 μ_R=0.177 σ_R=0.381
Mother Works Full-Time	Dichotomous indicator equal to one if mother works full-time, and zero otherwise. μ_B=0.567 σ_B=0.495 μ_R=0.566 σ_R=0.496
Infrequent Religion	Dichotomous indicator equal to one for individuals who attend religious services infrequently and zero otherwise. μ_B=0.323 σ_B=0.468 μ_R=0.341 σ_R=0.474
Moderate Religion	Dichotomous indicator equal to one for individuals who attend religious services once or twice a month and zero otherwise. μ_B=0.163 σ_B=0.369 μ_R=0.166 σ_R=0.372
Frequent Religion	Dichotomous indicator equal to one for individuals who attend religious services at least once a week and zero otherwise. μ_B=0.357 σ_B=0.479 μ_R=0.343 σ_R=0.475
Engaged	Dichotomous indicator equal to one for individuals who are engaged, and zero otherwise. μ_B=not asked σ_B= not asked μ_R=0.043 σ_R=0.202
Separated / Divorced	Dichotomous indicator equal to one for individuals who are separated or divorced, and zero otherwise. μ_B= not asked σ_B= not asked μ_R=0.006 σ_R=0.079
Single	Dichotomous indicator equal to one for individuals who are single, and zero otherwise. μ_B= not asked σ_B= not asked μ_R=0.578 σ_R=0.494
Number of Children	Number of children the respondent has. μ_B= not asked σ_B= not asked μ_R=0.06 σ_R=0.288
Hours Worked	Number of hours worked per week in the past thirty days. μ_B=4.63 σ_B=8.24 μ_R=10.81 σ_R=14.39
Formal School Years	Number of formal school years completed. μ_B=8.018 σ_B=0.999 μ_R=9.34 σ_R=2.07
Real Income	Average real weekly income from employment sources only (in dollars), deflated by the national Consumer Price Index, 1982-1984=100. μ_B=0.160 σ_B=0.271 μ_R=0.441 σ_R=0.709
Number of Observations	Number of observations that each individual contributes to the full sample. μ_B=NA σ_B=NA μ_R=NA σ_R=NA
New England	Dichotomous indicator equal to one if individual resides in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, or Vermont and zero otherwise. μ_B=0.045 σ_B=0.206 μ_R=0.044 σ_R=0.203
New York/ New Jersey	Dichotomous indicator equal to one if individual resides in New Jersey or New York and zero otherwise. μ_B=0.097 σ_B=0.295 μ_R=0.099 σ_R=0.299
East	Dichotomous indicator equal to one if individual resides in Pennsylvania, Delaware, District of Columbia, Maryland, Virginia, or West Virginia and zero otherwise. μ_B=0.088 σ_B=0.283 μ_R=0.097 σ_R=0.296
South East	Dichotomous indicator equal to one if individual resides in Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, or Tennessee and zero otherwise.

	μ_B=0.184 σ_B=0.388 μ_R=0.185 σ_R=0.388
Midwest	Dichotomous indicator equal to one if individual resides in Illinois, Indiana, Michigan, Minnesota, Ohio, or Wisconsin and zero otherwise. μ_B=0.181 σ_B=0.385 μ_R=0.180 σ_R=0.384
South	Dichotomous indicator equal to one if individual resides in Arkansas, Louisiana, New Mexico, Oklahoma, or Texas and zero otherwise. μ_B=0.121 σ_B=0.326 μ_R=0.114 σ_R=0.318
Plains	Dichotomous indicator equal to one if individual resides in Nebraska, Iowa, Kansas, or Missouri and zero otherwise. μ_B=0.067 σ_B=0.251 μ_R=0.072 σ_R=0.258
Mountain	Dichotomous indicator equal to one if individual resides in Colorado, Montana, North Dakota, South Dakota, Utah, or Wyoming and zero otherwise. μ_B=0.052 σ_B=0.222 μ_R=0.044 σ_R=0.206
West	Dichotomous indicator equal to one if individual resides in Arizona, California, Hawaii, or Nevada, and zero otherwise. μ_B=0.141 σ_B=0.348 μ_R=0.141 σ_R=0.348
Northwest	Dichotomous indicator equal to one if individual resides in Washington, Oregon, Idaho, or Alaska and zero otherwise. μ_B=0.025 σ_B=0.155 μ_R=0.025 σ_R=0.156

Table 2
Smoking Initiation Equations – Any Cigarettes Smoked in the Previous 30 days

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Real Cigarette Price	-0.177 (-1.27)	-0.171 (-1.21)	-0.133 (-0.95)	-0.118 (-0.82)	-0.169 (-1.20)	-0.173 (-1.23)	-0.181 (-1.29)	-0.175 (-1.25)	-0.205 (-1.45)	-0.115 (-0.79)
Youth Access Index		-0.006 (-0.48)								
Minimum Purchase Age			-0.024 (-2.85)							-0.019 (-2.11)
School Restriction				-0.119 (-2.02)						-0.088 (-1.38)
Distribution of Free Samples					-0.021 (-0.64)					-0.025 (-0.63)
Vending Machine Sign						0.010 (0.28)				0.015 (0.39)
Vending Machine Placement							0.014 (0.39)			0.013 (0.31)
Minimum Age Sign								-0.027 (-0.68)		-0.009 (-0.20)
Vendor Penalty									0.103 (1.79)	0.112 (1.84)
Male	-0.045 (-1.52)	-0.045 (-1.52)	-0.045 (-1.52)	-0.045 (-1.53)	-0.045 (-1.51)	-0.045 (-1.51)	-0.045 (-1.52)	-0.045 (-1.51)	-0.044 (-1.49)	-0.044 (-1.49)
Age	0.255 (3.08)	0.262 (3.11)	0.254 (3.07)	0.253 (3.06)	0.261 (3.12)	0.252 (3.04)	0.251 (3.03)	0.264 (3.13)	0.240 (2.91)	0.239 (2.85)
Age Squared	-0.007 (-2.73)	-0.007 (-2.76)	-0.007 (-2.72)	-0.007 (-2.71)	-0.007 (-2.78)	-0.007 (-2.68)	-0.007 (-2.67)	-0.007 (-2.79)	-0.007 (-2.54)	-0.006 (-2.47)
African American	-0.644 (-13.32)	-0.644 (-13.33)	-0.648 (-13.37)	-0.655 (-13.44)	-0.644 (-13.32)	-0.645 (-13.30)	-0.644 (-13.31)	-0.643 (-13.29)	-0.641 (-13.25)	-0.653 (-13.34)
Mexican	-0.263 (-4.07)	-0.263 (-4.07)	-0.266 (-4.12)	-0.263 (-4.07)	-0.264 (-4.09)	-0.263 (-4.07)	-0.262 (-4.06)	-0.260 (-4.03)	-0.261 (-4.04)	-0.265 (-4.09)
Cuban	0.167 (0.88)	0.170 (0.89)	0.165 (0.86)	0.204 (1.06)	0.168 (0.88)	0.168 (0.88)	0.167 (0.88)	0.172 (0.90)	0.167 (0.88)	0.194 (1.01)
Puerto Rican	0.008 (0.05)	0.008 (0.05)	0.010 (0.06)	0.011 (0.07)	0.009 (0.06)	0.009 (0.06)	0.007 (0.05)	0.008 (0.05)	0.012 (0.08)	0.017 (0.11)

Other Latin	-0.203 (-1.55)	-0.203 (-1.55)	-0.209 (-1.59)	-0.195 (-1.48)	-0.204 (-1.56)	-0.203 (-1.55)	-0.204 (-1.55)	-0.203 (-1.55)	-0.205 (-1.56)	-0.205 (-1.55)
Asian American	-0.397 (-3.60)	-0.397 (-3.59)	-0.402 (-3.65)	-0.396 (-3.58)	-0.397 (-3.60)	-0.398 (-3.60)	-0.397 (-3.60)	-0.397 (-3.59)	-0.398 (-3.61)	-0.402 (-3.64)
Other Race	-0.019 (-0.42)	-0.019 (-0.42)	-0.018 (-0.39)	-0.020 (-0.44)	-0.019 (-0.41)	-0.018 (-0.41)	-0.019 (-0.42)	-0.019 (-0.42)	-0.019 (-0.43)	-0.019 (-0.41)
Live With Parents	-0.190 (-3.72)	-0.191 (-3.73)	-0.193 (-3.77)	-0.191 (-3.74)	-0.191 (-3.73)	-0.190 (-3.73)	-0.190 (-3.71)	-0.190 (-3.73)	-0.188 (-3.68)	-0.191 (-3.74)
Live Alone	-0.060 (-0.38)	-0.059 (-0.37)	-0.061 (-0.38)	-0.058 (-0.37)	-0.058 (-0.37)	-0.060 (-0.38)	-0.060 (-0.37)	-0.059 (-0.37)	-0.062 (-0.39)	-0.059 (-0.37)
Father Some High School	0.005 (0.06)	0.005 (0.05)	0.010 (0.11)	0.001 (0.01)	0.006 (0.06)	0.005 (0.06)	0.005 (0.06)	0.005 (0.05)	0.004 (0.05)	0.006 (0.07)
Father High School Graduate	-0.024 (-0.27)	-0.024 (-0.27)	-0.021 (-0.24)	-0.026 (-0.30)	-0.023 (-0.26)	-0.024 (-0.27)	-0.024 (-0.27)	-0.025 (-0.28)	-0.026 (-0.29)	-0.024 (-0.27)
Father Some College	0.016 (0.17)	0.016 (0.17)	0.020 (0.20)	0.014 (0.15)	0.016 (0.17)	0.017 (0.17)	0.016 (0.17)	0.016 (0.17)	0.015 (0.16)	0.017 (0.18)
Father College Graduate	-0.059 (-0.64)	-0.059 (-0.64)	-0.053 (-0.58)	-0.062 (-0.67)	-0.059 (-0.64)	-0.059 (-0.64)	-0.059 (-0.64)	-0.059 (-0.64)	-0.062 (-0.67)	-0.059 (-0.64)
Father Professional	-0.048 (-0.48)	-0.048 (-0.48)	-0.043 (-0.43)	-0.051 (-0.51)	-0.047 (-0.48)	-0.047 (-0.48)	-0.048 (-0.48)	-0.048 (-0.48)	-0.049 (-0.49)	-0.047 (-0.47)
Father Education Unknown	0.026 (0.27)	0.025 (0.26)	0.028 (0.29)	0.022 (0.23)	0.026 (0.27)	0.026 (0.27)	0.026 (0.27)	0.025 (0.26)	0.024 (0.25)	0.025 (0.26)
Mother Some High School	0.131 (1.32)	0.130 (1.31)	0.132 (1.33)	0.132 (1.33)	0.129 (1.30)	0.131 (1.32)	0.132 (1.33)	0.130 (1.31)	0.131 (1.32)	0.132 (1.33)
Mother High School Graduate	0.074 (0.75)	0.074 (0.75)	0.074 (0.75)	0.075 (0.76)	0.074 (0.75)	0.074 (0.75)	0.075 (0.76)	0.074 (0.75)	0.074 (0.75)	0.074 (0.75)
Mother Some College	0.028 (0.27)	0.027 (0.27)	0.031 (0.31)	0.029 (0.28)	0.027 (0.26)	0.028 (0.27)	0.029 (0.28)	0.027 (0.27)	0.028 (0.28)	0.031 (0.30)
Mother College Graduate	0.021 (0.21)	0.021 (0.20)	0.021 (0.20)	0.022 (0.22)	0.020 (0.19)	0.021 (0.20)	0.022 (0.21)	0.021 (0.20)	0.021 (0.21)	0.021 (0.21)
Mother Professional	0.098 (0.89)	0.097 (0.89)	0.097 (0.88)	0.101 (0.92)	0.097 (0.89)	0.098 (0.89)	0.098 (0.89)	0.097 (0.89)	0.097 (0.89)	0.099 (0.90)
Mother Education Unknown	-0.046 (-0.41)	-0.046 (-0.41)	-0.046 (-0.42)	-0.043 (-0.39)	-0.046 (-0.42)	-0.046 (-0.41)	-0.045 (-0.41)	-0.045 (-0.41)	-0.046 (-0.42)	-0.045 (-0.41)
Mother Occasionally Worked	-0.030 (-0.65)	-0.030 (-0.66)	-0.030 (-0.67)	-0.030 (-0.66)	-0.030 (-0.67)	-0.030 (-0.65)	-0.029 (-0.65)	-0.030 (-0.66)	-0.030 (-0.65)	-0.031 (-0.69)

Mother Usually Worked	0.045	0.045	0.044	0.046	0.044	0.045	0.045	0.045	0.044	0.043
	(1.25)	(1.25)	(1.22)	(1.27)	(1.23)	(1.25)	(1.25)	(1.25)	(1.24)	(1.19)
Infrequent Religious Attendance	-0.115	-0.115	-0.115	-0.115	-0.115	-0.115	-0.115	-0.115	-0.116	-0.115
	(-2.69)	(-2.68)	(-2.68)	(-2.69)	(-2.68)	(-2.69)	(-2.69)	(-2.69)	(-2.70)	(-2.69)
Moderate Religious Attendance	-0.150	-0.150	-0.151	-0.152	-0.150	-0.150	-0.150	-0.150	-0.150	-0.151
	(-3.02)	(-3.02)	(-3.03)	(-3.04)	(-3.00)	(-3.01)	(-3.02)	(-3.02)	(-3.02)	(-3.03)
Frequent Religious Attendance	-0.460	-0.460	-0.461	-0.462	-0.459	-0.459	-0.459	-0.460	-0.460	-0.462
	(-10.28)	(-10.28)	(-10.31)	(-10.33)	(-10.27)	(-10.27)	(-10.28)	(-10.28)	(-10.28)	(-10.33)
Engaged	0.266	0.266	0.268	0.266	0.267	0.267	0.267	0.266	0.268	0.271
	(1.85)	(1.85)	(1.86)	(1.85)	(1.85)	(1.86)	(1.85)	(1.85)	(1.86)	(1.88)
Separated/Divorced	0.416	0.414	0.417	0.418	0.417	0.418	0.417	0.413	0.422	0.427
	(1.80)	(1.79)	(1.80)	(1.80)	(1.81)	(1.81)	(1.81)	(1.79)	(1.83)	(1.84)
Single	0.271	0.270	0.274	0.269	0.270	0.272	0.272	0.270	0.272	0.274
	(2.17)	(2.16)	(2.19)	(2.15)	(2.16)	(2.18)	(2.18)	(2.16)	(2.18)	(2.19)
Number of Children	-0.185	-0.185	-0.184	-0.187	-0.185	-0.185	-0.185	-0.185	-0.186	-0.189
	(-2.07)	(-2.07)	(-2.07)	(-2.10)	(-2.07)	(-2.07)	(-2.07)	(-2.07)	(-2.09)	(-2.12)
Hours Worked	0.006	0.006	0.006	0.007	0.006	0.006	0.006	0.006	0.006	0.007
	(3.16)	(3.16)	(3.17)	(3.20)	(3.16)	(3.16)	(3.16)	(3.16)	(3.16)	(3.18)
Formal School Years	-0.257	-0.256	-0.258	-0.256	-0.256	-0.257	-0.258	-0.256	-0.259	-0.259
	(-10.84)	(-10.78)	(-10.87)	(-10.81)	(-10.82)	(-10.84)	(-10.83)	(-10.76)	(-10.91)	(-10.86)
Real Income	-0.022	-0.022	-0.022	-0.023	-0.022	-0.022	-0.022	-0.022	-0.022	-0.023
	(-0.51)	(-0.51)	(-0.51)	(-0.55)	(-0.52)	(-0.52)	(-0.51)	(-0.51)	(-0.52)	(-0.55)
Year	-2.700	-2.560	-2.334	-2.536	-2.562	-2.738	-2.782	-2.568	-2.838	-2.364
	(-2.94)	(-2.67)	(-2.51)	(-2.75)	(-2.73)	(-2.95)	(-2.95)	(-2.74)	(-3.09)	(-2.44)
Year Squared	0.015	0.014	0.013	0.014	0.014	0.015	0.015	0.014	0.015	0.013
	(3.02)	(2.74)	(2.59)	(2.83)	(2.81)	(3.03)	(3.02)	(2.81)	(3.16)	(2.52)
nobs	-0.117	-0.117	-0.117	-0.118	-0.117	-0.117	-0.116	-0.117	-0.116	-0.117
	(-6.58)	(-6.59)	(-6.58)	(-6.65)	(-6.58)	(-6.58)	(-6.57)	(-6.59)	(-6.52)	(-6.57)
New England	-0.046	-0.045	-0.053	-0.049	-0.045	-0.045	-0.050	-0.047	-0.051	-0.061
	(-0.57)	(-0.56)	(-0.65)	(-0.61)	(-0.56)	(-0.56)	(-0.62)	(-0.58)	(-0.64)	(-0.75)
New Jersey/New York	-0.124	-0.121	-0.132	-0.129	-0.118	-0.119	-0.129	-0.124	-0.162	-0.166
	(-1.81)	(-1.76)	(-1.93)	(-1.89)	(-1.70)	(-1.68)	(-1.85)	(-1.81)	(-2.25)	(-2.21)
East	-0.027	-0.033	-0.001	-0.017	-0.022	-0.022	-0.026	-0.046	-0.026	0.009
	(-0.40)	(-0.48)	(-0.02)	(-0.25)	(-0.33)	(-0.32)	(-0.39)	(-0.64)	(-0.39)	(0.12)
Southeast	-0.122	-0.127	-0.115	-0.176	-0.117	-0.115	-0.126	-0.128	-0.132	-0.154
	(-2.04)	(-2.09)	(-1.91)	(-2.68)	(-1.93)	(-1.76)	(-2.07)	(-2.11)	(-2.19)	(-2.06)

Midwest	-0.071	-0.068	-0.071	-0.065	-0.064	-0.067	-0.078	-0.073	-0.070	-0.058
	(-1.25)	(-1.20)	(-1.24)	(-1.15)	(-1.10)	(-1.15)	(-1.30)	(-1.28)	(-1.24)	(-0.93)
Mountain	-0.157	-0.155	-0.153	-0.173	-0.156	-0.156	-0.166	-0.160	-0.156	-0.172
	(-1.88)	(-1.85)	(-1.83)	(-2.05)	(-1.87)	(-1.87)	(-1.91)	(-1.91)	(-1.88)	(-1.93)
Plains	-0.107	-0.107	-0.151	-0.108	-0.095	-0.102	-0.109	-0.115	-0.121	-0.144
	(-1.48)	(-1.48)	(-2.05)	(-1.50)	(-1.28)	(-1.39)	(-1.50)	(-1.57)	(-1.67)	(-1.77)
Northwest	-0.116	-0.117	-0.126	-0.124	-0.109	-0.108	-0.123	-0.121	-0.119	-0.120
	(-1.11)	(-1.12)	(-1.20)	(-1.17)	(-1.03)	(-0.99)	(-1.16)	(-1.15)	(-1.14)	(-1.07)
West	-0.171	-0.175	-0.175	-0.173	-0.162	-0.162	-0.171	-0.177	-0.165	-0.149
	(-2.83)	(-2.88)	(-2.89)	(-2.87)	(-2.63)	(-2.43)	(-2.84)	(-2.90)	(-2.73)	(-2.11)

All equations also include an intercept, year, year squared, eight dichotomous region indicators, number of observations per individual in the full sample, and missing value indicators for gender, race/ethnicity, type of community, father's education, mother's education, mothers work status, religious participation, marital status, children, hours worked, school years, and income. Asymptotic t-ratios are in parentheses. The critical values for the t-ratios are 2.58 (2.33), 1.96 (1.64), 1.64 (1.28) at the 1, 5, and 10% significance levels, respectively, based on a two-tailed (one-tailed) test.

Table 3
Smoking Initiation Equations – At Least 1 to 5 Cigarettes Smoked in the Previous 30 Days

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Real Cigarette Price	-0.456 (-2.73)	-0.444 (-2.66)	-0.426 (-2.54)	-0.412 (-2.43)	-0.432 (-2.58)	-0.462 (-2.74)	-0.460 (-2.75)	-0.455 (-2.73)	-0.489 (-2.90)	-0.412 (-2.38)
Youth Access Index		-0.010 (-0.72)								
Minimum Purchase Age			-0.016 (-1.70)							-0.009 (-0.92)
School Restriction				-0.087 (-1.25)						-0.083 (-1.11)
Distribution of Free Samples					-0.059 (-1.53)					-0.077 (-1.68)
Vending Machine Sign						-0.017 (-0.38)				-0.004 (-0.09)
Vending Machine Placement							0.017 (0.39)			0.026 (0.52)
Minimum Age Sign								-0.025 (-0.52)		0.012 (0.22)
Vendor Penalty									0.116 (1.70)	0.138 (1.90)
Male	-0.016 (-0.46)	-0.016 (-0.46)	-0.017 (-0.47)	-0.017 (-0.47)	-0.016 (-0.45)	-0.017 (-0.47)	-0.017 (-0.47)	-0.016 (-0.46)	-0.015 (-0.43)	-0.015 (-0.43)
Age	0.398 (3.73)	0.412 (3.73)	0.396 (3.71)	0.396 (3.70)	0.415 (3.81)	0.403 (3.72)	0.393 (3.67)	0.407 (3.71)	0.380 (3.58)	0.386 (3.52)
Age Squared	-0.011 (-3.43)	-0.012 (-3.44)	-0.011 (-3.41)	-0.011 (-3.41)	-0.012 (-3.53)	-0.012 (-3.42)	-0.011 (-3.36)	-0.012 (-3.41)	-0.011 (-3.26)	-0.011 (-3.20)
African American	-0.690 (-10.98)	-0.690 (-11.00)	-0.693 (-11.01)	-0.698 (-11.06)	-0.691 (-10.99)	-0.689 (-10.93)	-0.690 (-10.99)	-0.689 (-10.97)	-0.687 (-10.93)	-0.696 (-10.96)
Mexican	-0.377 (-4.67)	-0.378 (-4.67)	-0.380 (-4.69)	-0.377 (-4.66)	-0.383 (-4.73)	-0.377 (-4.66)	-0.376 (-4.66)	-0.375 (-4.64)	-0.375 (-4.64)	-0.383 (-4.70)
Cuban	0.100 (0.46)	0.105 (0.48)	0.098 (0.45)	0.127 (0.58)	0.101 (0.46)	0.099 (0.45)	0.099 (0.45)	0.104 (0.48)	0.099 (0.46)	0.122 (0.55)

Puerto Rican	0.062 (0.36)	0.063 (0.36)	0.063 (0.37)	0.065 (0.38)	0.066 (0.38)	0.061 (0.35)	0.061 (0.36)	0.063 (0.37)	0.068 (0.40)	0.075 (0.43)
Other Latin	-0.325 (-1.89)	-0.324 (-1.89)	-0.329 (-1.91)	-0.318 (-1.85)	-0.327 (-1.90)	-0.325 (-1.89)	-0.325 (-1.89)	-0.324 (-1.89)	-0.325 (-1.89)	-0.325 (-1.89)
Asian American	-0.441 (-2.97)	-0.441 (-2.97)	-0.445 (-3.00)	-0.441 (-2.97)	-0.442 (-2.97)	-0.441 (-2.97)	-0.441 (-2.97)	-0.441 (-2.97)	-0.442 (-2.97)	-0.443 (-2.99)
Other Race	-0.065 (-1.23)	-0.065 (-1.24)	-0.064 (-1.22)	-0.065 (-1.24)	-0.065 (-1.23)	-0.066 (-1.25)	-0.065 (-1.24)	-0.065 (-1.24)	-0.065 (-1.24)	-0.065 (-1.24)
Live With Parents	-0.279 (-4.73)	-0.279 (-4.74)	-0.281 (-4.76)	-0.280 (-4.74)	-0.280 (-4.75)	-0.278 (-4.72)	-0.279 (-4.72)	-0.279 (-4.73)	-0.277 (-4.70)	-0.279 (-4.73)
Live Alone	-0.145 (-0.75)	-0.143 (-0.74)	-0.145 (-0.75)	-0.143 (-0.74)	-0.139 (-0.72)	-0.145 (-0.75)	-0.145 (-0.75)	-0.144 (-0.74)	-0.149 (-0.77)	-0.139 (-0.72)
Father Some High School	-0.020 (-0.19)	-0.020 (-0.19)	-0.016 (-0.15)	-0.023 (-0.21)	-0.016 (-0.16)	-0.020 (-0.19)	-0.020 (-0.19)	-0.020 (-0.19)	-0.020 (-0.19)	-0.017 (-0.16)
Father High School Graduate	-0.049 (-0.47)	-0.049 (-0.47)	-0.046 (-0.44)	-0.050 (-0.48)	-0.046 (-0.44)	-0.049 (-0.48)	-0.049 (-0.47)	-0.049 (-0.47)	-0.051 (-0.49)	-0.047 (-0.45)
Father Some College	-0.028 (-0.25)	-0.028 (-0.25)	-0.024 (-0.22)	-0.029 (-0.26)	-0.026 (-0.23)	-0.029 (-0.26)	-0.028 (-0.25)	-0.028 (-0.25)	-0.029 (-0.26)	-0.027 (-0.24)
Father College Graduate	-0.117 (-1.08)	-0.116 (-1.07)	-0.112 (-1.03)	-0.118 (-1.09)	-0.116 (-1.07)	-0.117 (-1.08)	-0.117 (-1.08)	-0.117 (-1.08)	-0.120 (-1.11)	-0.119 (-1.09)
Father Professional	-0.050 (-0.42)	-0.050 (-0.42)	-0.047 (-0.39)	-0.052 (-0.44)	-0.049 (-0.41)	-0.050 (-0.42)	-0.050 (-0.42)	-0.050 (-0.42)	-0.051 (-0.43)	-0.049 (-0.41)
Father Education Unknown	0.052 (0.47)	0.052 (0.47)	0.055 (0.50)	0.050 (0.45)	0.055 (0.49)	0.052 (0.47)	0.052 (0.47)	0.051 (0.47)	0.050 (0.46)	0.054 (0.49)
Mother Some High School	0.016 (0.14)	0.014 (0.12)	0.018 (0.15)	0.017 (0.15)	0.012 (0.10)	0.016 (0.14)	0.017 (0.15)	0.015 (0.13)	0.017 (0.15)	0.015 (0.13)
Mother High School Graduate	-0.055 (-0.47)	-0.056 (-0.48)	-0.055 (-0.47)	-0.054 (-0.47)	-0.057 (-0.49)	-0.055 (-0.47)	-0.055 (-0.47)	-0.056 (-0.48)	-0.056 (-0.48)	-0.056 (-0.48)
Mother Some College	-0.104 (-0.85)	-0.105 (-0.86)	-0.101 (-0.83)	-0.102 (-0.84)	-0.106 (-0.87)	-0.104 (-0.85)	-0.103 (-0.84)	-0.104 (-0.86)	-0.103 (-0.85)	-0.101 (-0.83)
Mother College Graduate	-0.192 (-1.55)	-0.193 (-1.56)	-0.192 (-1.55)	-0.191 (-1.54)	-0.195 (-1.57)	-0.192 (-1.55)	-0.191 (-1.54)	-0.192 (-1.55)	-0.192 (-1.55)	-0.194 (-1.57)
Mother Professional	-0.146 (-1.09)	-0.146 (-1.09)	-0.146 (-1.09)	-0.143 (-1.07)	-0.147 (-1.10)	-0.146 (-1.09)	-0.145 (-1.09)	-0.146 (-1.09)	-0.146 (-1.09)	-0.145 (-1.08)

Mother Education Unknown	-0.102 (-0.79)	-0.102 (-0.80)	-0.102 (-0.79)	-0.099 (-0.77)	-0.104 (-0.81)	-0.102 (-0.79)	-0.101 (-0.79)	-0.102 (-0.79)	-0.102 (-0.80)	-0.103 (-0.80)
Mother Occasionally Worked	-0.107 (-1.93)	-0.108 (-1.94)	-0.108 (-1.94)	-0.107 (-1.93)	-0.109 (-1.97)	-0.107 (-1.93)	-0.107 (-1.93)	-0.107 (-1.94)	-0.107 (-1.93)	-0.110 (-1.98)
Mother Usually Worked	0.050 (1.18)	0.050 (1.18)	0.049 (1.16)	0.051 (1.19)	0.048 (1.13)	0.050 (1.19)	0.050 (1.18)	0.050 (1.17)	0.049 (1.16)	0.047 (1.10)
Infrequent Religious Attendance	-0.159 (-3.32)	-0.159 (-3.31)	-0.159 (-3.32)	-0.159 (-3.32)	-0.158 (-3.29)	-0.159 (-3.32)	-0.160 (-3.33)	-0.159 (-3.32)	-0.160 (-3.35)	-0.159 (-3.32)
Moderate Religious Attendance	-0.349 (-5.88)	-0.349 (-5.88)	-0.349 (-5.89)	-0.350 (-5.90)	-0.347 (-5.86)	-0.349 (-5.88)	-0.349 (-5.88)	-0.349 (-5.89)	-0.348 (-5.87)	-0.347 (-5.84)
Frequent Religious Attendance	-0.553 (-10.56)	-0.554 (-10.57)	-0.554 (-10.58)	-0.555 (-10.59)	-0.553 (-10.56)	-0.553 (-10.57)	-0.553 (-10.56)	-0.553 (-10.57)	-0.553 (-10.55)	-0.554 (-10.57)
Engaged	0.574 (3.07)	0.574 (3.07)	0.574 (3.07)	0.573 (3.07)	0.577 (3.09)	0.574 (3.07)	0.575 (3.07)	0.574 (3.07)	0.576 (3.08)	0.579 (3.10)
Separated/Divorced	0.811 (3.06)	0.808 (3.05)	0.810 (3.06)	0.811 (3.06)	0.815 (3.08)	0.809 (3.05)	0.812 (3.06)	0.808 (3.05)	0.818 (3.09)	0.827 (3.11)
Single	0.443 (2.59)	0.441 (2.58)	0.445 (2.60)	0.441 (2.58)	0.444 (2.60)	0.443 (2.59)	0.445 (2.60)	0.442 (2.58)	0.445 (2.60)	0.446 (2.61)
Number of Children	-0.112 (-1.05)	-0.111 (-1.05)	-0.112 (-1.05)	-0.114 (-1.07)	-0.112 (-1.05)	-0.112 (-1.05)	-0.112 (-1.06)	-0.111 (-1.05)	-0.114 (-1.07)	-0.117 (-1.11)
Hours Worked	0.004 (1.85)	0.004 (1.86)	0.004 (1.85)	0.004 (1.87)	0.004 (1.84)	0.004 (1.85)	0.004 (1.85)	0.004 (1.85)	0.004 (1.85)	0.004 (1.85)
Formal School Years	-0.243 (-8.86)	-0.242 (-8.79)	-0.244 (-8.87)	-0.242 (-8.82)	-0.241 (-8.80)	-0.243 (-8.85)	-0.244 (-8.86)	-0.242 (-8.80)	-0.246 (-8.93)	-0.244 (-8.88)
Real Income	0.075 (1.61)	0.075 (1.60)	0.075 (1.61)	0.074 (1.59)	0.074 (1.59)	0.075 (1.61)	0.075 (1.62)	0.075 (1.61)	0.075 (1.59)	0.073 (1.55)
Year	-2.615 (-2.38)	-2.375 (-2.10)	-2.354 (-2.12)	-2.488 (-2.26)	-2.237 (-2.01)	-2.556 (-2.31)	-2.707 (-2.41)	-2.500 (-2.25)	-2.753 (-2.51)	-2.199 (-1.93)
Year Squared	0.014 (2.39)	0.013 (2.11)	0.013 (2.14)	0.013 (2.27)	0.012 (2.02)	0.014 (2.32)	0.014 (2.42)	0.013 (2.26)	0.015 (2.52)	0.012 (1.94)
nobs	-0.115 (-5.45)	-0.115 (-5.46)	-0.115 (-5.45)	-0.116 (-5.49)	-0.115 (-5.45)	-0.115 (-5.45)	-0.114 (-5.44)	-0.115 (-5.46)	-0.113 (-5.39)	-0.114 (-5.40)
New England	-0.026 (-0.27)	-0.024 (-0.25)	-0.031 (-0.32)	-0.028 (-0.29)	-0.023 (-0.24)	-0.028 (-0.30)	-0.031 (0.32)	-0.027 (-0.28)	-0.032 (-0.33)	-0.042 (-0.43)

New Jersey/New York	-0.032 (-0.39)	-0.027 (-0.32)	-0.038 (-0.46)	-0.036 (-0.43)	-0.015 (-0.18)	-0.040 (-0.47)	-0.039 (-0.46)	-0.032 (-0.39)	-0.076 (-0.88)	-0.082 (-0.91)
East	0.078 (0.99)	0.067 (0.84)	0.095 (1.20)	0.086 (1.09)	0.089 (1.14)	0.069 (0.86)	0.079 (1.01)	0.060 (0.70)	0.079 (1.00)	0.120 (1.34)
Southeast	-0.101 (-1.41)	-0.109 (-1.50)	-0.096 (-1.34)	-0.140 (-1.77)	-0.087 (-1.19)	-0.114 (-1.45)	-0.106 (-1.45)	-0.106 (-1.47)	-0.113 (-1.56)	-0.137 (-1.52)
Midwest	-0.027 (-0.39)	-0.022 (-0.32)	-0.026 (-0.38)	-0.022 (-0.32)	-0.007 (-0.10)	-0.034 (-0.48)	-0.036 (-0.50)	-0.028 (-0.42)	-0.027 (-0.39)	-0.011 (-0.14)
Mountain	-0.111 (-1.11)	-0.106 (-1.06)	-0.108 (-1.08)	-0.122 (-1.22)	-0.109 (-1.09)	-0.112 (-1.12)	-0.122 (-1.17)	-0.113 (-1.13)	-0.110 (-1.11)	-0.134 (-1.25)
Plains	-0.128 (-1.50)	-0.128 (-1.50)	-0.159 (-1.81)	-0.128 (-1.50)	-0.096 (-1.09)	-0.135 (-1.54)	-0.130 (-1.52)	-0.136 (-1.56)	-0.145 (-1.69)	-0.128 (-1.32)
Northwest	-0.076 (-0.61)	-0.078 (-0.63)	-0.081 (-0.66)	-0.080 (-0.65)	-0.056 (-0.45)	-0.089 (-0.70)	-0.084 (-0.66)	-0.080 (-0.65)	-0.078 (-0.63)	-0.076 (-0.57)
West	-0.176 (-2.37)	-0.184 (-2.45)	-0.179 (-2.40)	-0.177 (-2.39)	-0.155 (-2.03)	-0.190 (-2.32)	-0.176 (-2.38)	-0.182 (-2.43)	-0.169 (-2.27)	-0.144 (-1.66)

All equations also include an intercept, year, year squared, eight dichotomous region indicators, number of observations per individual in the full sample, and missing value indicators for gender, race/ethnicity, type of community, father's education, mother's education, mothers work status, religious participation, marital status, children, hours worked, school years, and income. Asymptotic t-ratios are in parentheses. The critical values for the t-ratios are 2.58 (2.33), 1.96 (1.64), 1.64 (1.28) at the 1, 5, and 10% significance levels, respectively, based on a two-tailed (one-tailed) test.

Table 4
Smoking Initiation Equations – At Least ½ Pack of Cigarettes Smoked in the Previous 30 Days

Independent Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Real Cigarette Price	-0.595 (-2.81)	-0.609 (-2.87)	-0.562 (-2.64)	-0.571 (-2.65)	-0.598 (-2.81)	-0.577 (-2.69)	-0.599 (-2.83)	-0.600 (-2.82)	-0.610 (-2.86)	-0.546 (-2.46)
Youth Access Index		0.014 (0.78)								
Minimum Purchase Age			-0.019 (-1.62)							-0.018 (-1.42)
School Restriction				-0.049 (-0.57)						-0.043 (-0.46)
Distribution of Free Samples					0.007 (0.15)					-0.014 (-0.25)
Vending Machine Sign						0.053 (0.95)				0.038 (0.63)
Vending Machine Placement							0.022 (0.40)			0.008 (0.12)
Minimum Age Sign								0.069 (1.14)		0.072 (1.06)
Vendor Penalty									0.056 (0.64)	0.052 (0.55)
Male	0.107 (2.33)	0.106 (2.32)	0.106 (2.32)	0.107 (2.34)	0.106 (2.33)	0.107 (2.35)	0.106 (2.33)	0.106 (2.32)	0.107 (2.34)	0.106 (2.32)
Age	0.610 (3.93)	0.589 (3.74)	0.609 (3.93)	0.609 (3.92)	0.607 (3.88)	0.595 (3.83)	0.602 (3.86)	0.583 (3.75)	0.601 (3.86)	0.563 (3.63)
Age Squared	-0.018 (-3.66)	-0.017 (-3.44)	-0.018 (-3.66)	-0.018 (-3.65)	-0.018 (-3.60)	-0.017 (-3.53)	-0.017 (-3.58)	-0.017 (-3.43)	-0.017 (-3.59)	-0.016 (-3.29)
African American	-0.753 (-8.49)	-0.752 (-8.49)	-0.756 (-8.50)	-0.758 (-8.47)	-0.753 (-8.48)	-0.758 (-8.51)	-0.752 (-8.49)	-0.755 (-8.52)	-0.751 (-8.47)	-0.766 (-8.51)
Mexican	-0.451 (-4.12)	-0.450 (-4.12)	-0.454 (-4.14)	-0.451 (-4.12)	-0.450 (-4.11)	-0.453 (-4.14)	-0.450 (-4.11)	-0.457 (-4.19)	-0.450 (-4.11)	-0.461 (-4.20)
Cuban	-0.280 (-0.93)	-0.287 (-0.95)	-0.282 (-0.93)	-0.262 (-0.86)	-0.280 (-0.93)	-0.278 (-0.92)	-0.280 (-0.92)	-0.295 (-0.98)	-0.280 (-0.92)	-0.280 (-0.92)

Puerto Rican	-0.041 (-0.18)	-0.042 (-0.19)	-0.040 (-0.18)	-0.039 (-0.18)	-0.042 (-0.19)	-0.035 (-0.16)	-0.043 (-0.19)	-0.044 (-0.20)	-0.038 (-0.17)	-0.034 (-0.15)
Other Latin	-0.959 (-2.57)	-0.960 (-2.57)	-0.966 (-2.57)	-0.956 (-2.56)	-0.959 (-2.57)	-0.958 (-2.56)	-0.961 (-2.57)	-0.962 (-2.58)	-0.957 (-2.56)	-0.963 (-2.57)
Asian American	-0.365 (-1.87)	-0.366 (-1.87)	-0.371 (-1.89)	-0.365 (-1.87)	-0.365 (-1.87)	-0.368 (-1.87)	-0.365 (-1.87)	-0.367 (-1.88)	-0.365 (-1.86)	-0.373 (-1.91)
Other Race	-0.102 (-1.55)	-0.101 (-1.53)	-0.102 (-1.55)	-0.103 (-1.56)	-0.102 (-1.55)	-0.100 (-1.52)	-0.102 (-1.55)	-0.101 (-1.52)	-0.102 (-1.55)	-0.099 (-1.50)
Live With Parents	-0.156 (-2.09)	-0.156 (-2.09)	-0.159 (-2.12)	-0.157 (-2.10)	-0.156 (-2.09)	-0.159 (-2.13)	-0.156 (-2.08)	-0.156 (-2.09)	-0.155 (-2.08)	-0.160 (-2.14)
Live Alone	0.049 (0.23)	0.046 (0.21)	0.050 (0.23)	0.051 (0.24)	0.048 (0.22)	0.049 (0.23)	0.049 (0.23)	0.046 (0.21)	0.047 (0.22)	0.048 (0.22)
Father Some High School	0.030 (0.24)	0.030 (0.24)	0.033 (0.26)	0.028 (0.22)	0.030 (0.23)	0.032 (0.25)	0.030 (0.24)	0.031 (0.24)	0.030 (0.23)	0.034 (0.27)
Father High School Graduate	-0.149 (-1.16)	-0.149 (-1.17)	-0.147 (-1.15)	-0.150 (-1.17)	-0.149 (-1.17)	-0.147 (-1.15)	-0.148 (-1.16)	-0.147 (-1.15)	-0.150 (-1.17)	-0.146 (-1.14)
Father Some College	-0.114 (-0.81)	-0.113 (-0.81)	-0.111 (-0.79)	-0.115 (-0.82)	-0.114 (-0.81)	-0.110 (-0.79)	-0.114 (-0.81)	-0.114 (-0.81)	-0.114 (-0.82)	-0.110 (-0.79)
Father College Graduate	-0.207 (-1.53)	-0.207 (-1.53)	-0.204 (-1.50)	-0.208 (-1.54)	-0.207 (-1.53)	-0.206 (-1.52)	-0.207 (-1.53)	-0.206 (-1.52)	-0.209 (-1.55)	-0.205 (-1.51)
Father Professional	-0.276 (-1.78)	-0.277 (-1.78)	-0.273 (-1.76)	-0.278 (-1.79)	-0.277 (-1.78)	-0.276 (-1.78)	-0.276 (-1.78)	-0.278 (-1.79)	-0.277 (-1.78)	-0.277 (-1.78)
Father Education Unknown	0.055 (0.40)	0.056 (0.40)	0.057 (0.41)	0.053 (0.39)	0.054 (0.40)	0.056 (0.41)	0.055 (0.40)	0.057 (0.41)	0.054 (0.39)	0.059 (0.43)
Mother Some High School	0.044 (0.29)	0.047 (0.30)	0.046 (0.30)	0.044 (0.29)	0.045 (0.29)	0.044 (0.29)	0.045 (0.30)	0.046 (0.30)	0.044 (0.29)	0.047 (0.31)
Mother High School Graduate	0.071 (0.45)	0.072 (0.46)	0.071 (0.45)	0.071 (0.45)	0.071 (0.45)	0.070 (0.44)	0.072 (0.46)	0.072 (0.45)	0.071 (0.45)	0.071 (0.45)
Mother Some College	-0.037 (-0.23)	-0.036 (-0.22)	-0.034 (-0.21)	-0.037 (-0.22)	-0.037 (-0.22)	-0.038 (-0.23)	-0.036 (-0.22)	-0.037 (-0.22)	-0.037 (-0.23)	-0.034 (-0.20)
Mother College Graduate	-0.042 (-0.25)	-0.040 (-0.24)	-0.043 (-0.25)	-0.042 (-0.25)	-0.041 (-0.24)	-0.043 (-0.25)	-0.040 (-0.24)	-0.042 (-0.25)	-0.042 (-0.25)	-0.044 (-0.26)
Mother Professional	-0.123 (-0.66)	-0.123 (-0.65)	-0.123 (-0.65)	-0.122 (-0.65)	-0.123 (-0.66)	-0.122 (-0.65)	-0.123 (-0.65)	-0.122 (-0.65)	-0.124 (-0.66)	-0.120 (-0.64)
Mother Education Unknown	-0.026 (-0.15)	-0.025 (-0.15)	-0.026 (-0.15)	-0.025 (-0.14)	-0.026 (-0.15)	-0.026 (-0.15)	-0.025 (-0.15)	-0.027 (-0.16)	-0.027 (-0.16)	-0.027 (-0.16)

Mother Occasionally Worked	-0.126 (-1.81)	-0.125 (-1.79)	-0.127 (-1.82)	-0.126 (-1.81)	-0.126 (-1.80)	-0.125 (-1.79)	-0.126 (-1.80)	-0.125 (-1.79)	-0.126 (-1.81)	-0.126 (-1.80)
Mother Usually Worked	-0.004 (-0.08)	-0.004 (-0.08)	-0.005 (-0.09)	-0.004 (-0.07)	-0.004 (-0.08)	-0.005 (-0.10)	-0.005 (-0.08)	-0.003 (-0.06)	-0.005 (-0.09)	-0.005 (-0.09)
Infrequent Religious Attendance	-0.222 (-3.96)	-0.223 (-3.98)	-0.221 (-3.96)	-0.222 (-3.96)	-0.222 (-3.97)	-0.222 (-3.96)	-0.222 (-3.97)	-0.222 (-3.97)	-0.222 (-3.97)	-0.222 (-3.97)
Moderate Religious Attendance	-0.443 (-6.03)	-0.444 (-6.04)	-0.444 (-6.03)	-0.444 (-6.03)	-0.444 (-6.04)	-0.443 (-6.03)	-0.443 (-6.03)	-0.443 (-6.03)	-0.443 (-6.03)	-0.443 (-6.01)
Frequent Religious Attendance	-0.732 (-10.98)	-0.732 (-10.97)	-0.734 (-10.98)	-0.733 (-10.98)	-0.732 (-10.98)	-0.731 (-10.96)	-0.732 (-10.98)	-0.732 (-10.97)	-0.732 (-10.98)	-0.733 (-10.96)
Engaged	0.509 (2.32)	0.509 (2.32)	0.508 (2.32)	0.508 (2.32)	0.508 (2.32)	0.511 (2.33)	0.508 (2.32)	0.510 (2.32)	0.508 (2.32)	0.510 (2.32)
Separated/Divorced	0.715 (2.35)	0.717 (2.35)	0.714 (2.34)	0.715 (2.35)	0.714 (2.35)	0.721 (2.37)	0.716 (2.35)	0.721 (2.36)	0.718 (2.35)	0.729 (2.39)
Single	0.292 (1.44)	0.294 (1.44)	0.292 (1.44)	0.290 (1.43)	0.291 (1.43)	0.294 (1.45)	0.293 (1.44)	0.295 (1.45)	0.291 (1.43)	0.297 (1.46)
Number of Children	0.016 (0.14)	0.015 (0.13)	0.017 (0.15)	0.015 (0.13)	0.016 (0.14)	0.016 (0.13)	0.015 (0.13)	0.015 (0.13)	0.015 (0.13)	0.013 (0.11)
Hours Worked	0.004 (1.32)	0.004 (1.32)	0.004 (1.32)	0.004 (1.33)	0.004 (1.33)	0.004 (1.31)	0.004 (1.32)	0.004 (1.32)	0.004 (1.32)	0.004 (1.32)
Formal School Years	-0.188 (-5.73)	-0.190 (-5.76)	-0.188 (-5.74)	-0.187 (-5.72)	-0.188 (-5.73)	-0.188 (-5.75)	-0.188 (-5.73)	-0.191 (-5.81)	-0.188 (-5.74)	-0.192 (-5.82)
Real Income	0.110 (2.00)	0.111 (2.01)	0.111 (2.00)	0.110 (1.99)	0.111 (2.00)	0.110 (1.99)	0.111 (2.00)	0.111 (2.01)	0.110 (1.98)	0.110 (1.98)
Year	-3.619 (-2.65)	-3.923 (-2.81)	-3.330 (-2.42)	-3.548 (-2.59)	-3.664 (-2.66)	-3.802 (-2.78)	-3.727 (-2.67)	-3.933 (-2.87)	-3.667 (-2.69)	-3.741 (-2.66)
Year Squared	0.019 (2.63)	0.021 (2.79)	0.018 (2.40)	0.019 (2.57)	0.019 (2.64)	0.020 (2.75)	0.020 (2.65)	0.021 (2.85)	0.019 (2.66)	0.020 (2.65)
nobs	-0.132 (-4.99)	-0.132 (-4.98)	-0.132 (-4.98)	-0.133 (-5.01)	-0.132 (-5.00)	-0.133 (-5.02)	-0.132 (-4.98)	-0.132 (-4.99)	-0.131 (-4.97)	-0.132 (-4.98)
New England	0.026 (0.22)	0.023 (0.19)	0.022 (0.18)	0.026 (0.21)	0.026 (0.22)	0.032 (0.27)	0.020 (0.17)	0.027 (0.23)	0.024 (0.20)	0.021 (0.18)
New Jersey/New York	-0.115 (-1.04)	-0.123 (-1.11)	-0.122 (-1.10)	-0.117 (-1.06)	-0.117 (-1.05)	-0.090 (-0.79)	-0.124 (-1.10)	-0.115 (-1.03)	-0.138 (-1.21)	-0.125 (-1.05)
East	0.106 (1.05)	0.121 (1.17)	0.126 (1.23)	0.110 (1.09)	0.105 (1.03)	0.132 (1.27)	0.108 (1.07)	0.155 (1.41)	0.106 (1.05)	0.202 (1.76)

Southeast	-0.025	-0.014	-0.020	-0.047	-0.027	0.013	-0.031	-0.012	-0.030	-0.002
	(-0.27)	(-0.15)	(-0.21)	(-0.46)	(-0.28)	(0.13)	(-0.32)	(-0.13)	(-0.33)	(-0.01)
Midwest	-0.012	-0.018	-0.011	-0.009	-0.014	0.009	-0.023	-0.008	-0.012	0.012
	(-0.13)	(-0.20)	(-0.12)	(-0.10)	(-0.16)	(0.09)	(-0.25)	(-0.09)	(-0.13)	(0.12)
Mountain	-0.249	-0.255	-0.245	-0.256	-0.249	-0.246	-0.264	-0.245	-0.249	-0.250
	(-1.93)	(-1.98)	(-1.90)	(-1.98)	(-1.93)	(-1.91)	(-1.99)	(-1.90)	(-1.93)	(-1.84)
Plains	-0.193	-0.192	-0.229	-0.193	-0.196	-0.173	-0.195	-0.172	-0.200	-0.192
	(-1.71)	(-1.70)	(-1.95)	(-1.71)	(-1.71)	(-1.50)	(-1.72)	(-1.50)	(-1.77)	(-1.50)
Northwest	0.057	0.060	0.051	0.054	0.054	0.100	0.046	0.069	0.055	0.092
	(0.36)	(0.38)	(0.32)	(0.34)	(0.34)	(0.62)	(0.28)	(0.44)	(0.35)	(0.55)
West	-0.183	-0.172	-0.186	-0.184	-0.186	-0.140	-0.184	-0.166	-0.180	-0.129
	(-1.83)	(-1.70)	(-1.85)	(-1.83)	(-1.83)	(-1.28)	(-1.84)	(-1.65)	(-1.79)	(-1.12)

All equations also include an intercept, year, year squared, eight dichotomous region indicators, number of observations per individual in the full sample, and missing value indicators for gender, race/ethnicity, type of community, father's education, mother's education, mothers work status, religious participation, marital status, children, hours worked, school years, and income. Asymptotic t-ratios are in parentheses. The critical values for the t-ratios are 2.58 (2.33), 1.96 (1.64), 1.64 (1.28) at the 1, 5, and 10% significance levels, respectively, based on a two-tailed (one-tailed) test.

Table 5

Estimated Price Elasticities of Initiation (no state fixed effects included)

	Any Smoking	At least 1-5 cigarettes per day on Average	At least ½ pack per day on average
Model 1	-0.294	-0.832 [a]	-0.988 [a]
Model 2	-0.283	-0.809 [a]	-1.010 [a]
Model 3	-0.221	-0.776 [a]	-0.932 [a]
Model 4	-0.225	-0.751 [a]	-0.948 [a]
Model 5	-0.280	-0.788 [a]	-0.992 [a]
Model 6	-0.288	-0.842 [a]	-0.957 [a]
Model 7	-0.300 [b]	-0.839 [a]	-0.995 [a]
Model 8	-0.291	-0.829 [a]	-0.994 [a]
Model 9	-0.340 [b]	-0.890 [a]	-1.013 [a]
Model 10	-0.191	-0.750 [a]	-0.721 [a]
Average	-0.271	-0.811 [a]	-0.955 [a]

[a] Significant at the 1% level
[b] Significant at the 10% level

Table 6

Estimated Price Elasticities of Initiation (state fixed effects included)

	Any Smoking	At least 1-5 cigarettes per day on Average	At least ½ pack per day on average
Model 1	-0.117[b]	-1.29[a]	1.45[a]
Model 2	-0.118 [b]	-1.28[a]	1.45[a]
Model 3	-0.102 [b]	-1.25[a]	1.42[a]
Model 4	-0.118 [b]	-1.30[a]	1.46[a]
Model 5	-0.113 [b]	-1.18[a]	1.41[a]
Model 6	-0.119 [b]	-1.29[a]	1.49[a]
Model 7	-0.113 [b]	-1.28[a]	1.45[a]
Model 8	-0.119 [b]	-1.29[a]	1.45[a]
Model 9	-0.104 [b]	-1.19[a]	1.42[a]
Model 10	-0.083 [b]	-0.995[a]	1.34[a]
Average	-0.111	-1.23 [a]	1.43 [a]

[a] Significant at the 1% level
[b] Significant at the 10% level

5% each of the total cigarette market (Maxwell 2009). It is important to note that market share is influenced primarily by the preferences of adults, not adolescents (given that market share represents cigarette sales, and many youth obtain their cigarettes through social, not commercial, sources). Therefore, these figures indicate that the combined share of Marlboro, Newport, and Camel is not as concentrated in adults (57.4%) as it is for adolescents (80.4%) and young adults (80.3%). However, the consistencies in these data suggest that brand preferences that develop early in the life course will extend into adulthood. This finding extends to smokeless tobacco and cigar use as well. Brand preferences for these products are discussed in Appendix 3.1 (for smokeless tobacco use, see Tables 3.1.44–3.1.45 and 3.1.47; for cigar use, Tables 3.1.50–3.1.52). Like that observed here, brand preference data for smokeless tobacco and cigars among young people are consistent with industry data for market share. Skoal and Grizzly are the most preferred brands of moist snuff (a type of smokeless tobacco that is preferred over chewing tobacco) among young people, while Black & Mild is the most preferred brand of cigars. It should be noted that with the exception of Black & Mild, the top cigar brands preferred by adolescents and young adults alike include various flavorings, such as peach, grape, apple, and chocolate. At present, characterizing flavors are only banned by the FDA for cigarettes, not cigars. Given this loophole, some flavored cigarettes are reemerging as flavored cigars (Associated Press 2009; CSPnet 2010; U.S. House of Representatives Committee on Energy & Commerce 2011).

Evidence Summary

Similar to the 1994 Surgeon General's report on smoking and health, this report finds that cigarette smoking virtually always begins in adolescence or young adulthood, as does the transition to daily smoking. In 2010, among adults aged 30–39 years, 81.5% of those who had ever tried a cigarette did so by the age of 18 years and 98.0% did so by the age of 26 years, based on NSDUH data (Table 3.2; Appendix 3.1, Table 3.1.9). Among those who had ever smoked cigarettes daily, the mean age of initiation was even younger; 88.2% first smoked by the age of 18 years and 99.0% first smoked by 26 years of age. Smoking initiation was most likely to occur in a young person's 15th or 16th year, which was also true in 1994 (USDHHS 2011). Adolescent and young adult initiation rates for cigarette smoking have been stable over the past 5 years (Appendix 3.1, Table 3.1.31). This finding is consistent with the idea that tobacco companies are successfully targeting young people in advertising and promotion efforts to attract new smokers (see Chapter 5).

Almost one-fifth of high school students are current cigarette smokers, and the prevalence rises with age; one-fourth of high school seniors are current cigarette smokers at present (Figure 3.3; Table 3.3a and Appendix 3.1, Table 3.1.2). Young adults have the highest smoking prevalence among all age groups (Figure 3.3). Males remain more likely than females to be current smokers in every age group except those aged 65 years and older (CDC 2011c). Similar to findings for adults (CDC 2011c), the prevalence of cigarette smoking among young people is highest for American Indians/Alaska Natives and Whites. The lowest prevalence of cigarette smoking among young people are among Asian and Blacks; in contrast, prevalence are lowest for Asians and Hispanics among adults (CDC 2011c). Since the late 1990s, smoking prevalence has decreased for both youth and young adults (CDC 2001, 2009b). Around 2003, however, the rate of decrease began to slow, such that any changes in the prevalence of current smoking from one iteration of a survey to the next were often statistically insignificant. These findings have led to concern that progress in decreasing youth smoking may have "stalled," or halted. Findings as to which youth demographic subgroups show a more or less pronounced stall are inconsistent across surveys. Overall, however, the most recent reports from both YRBS and MTF suggest a stall in particular subgroups. In NYTS, the prevalence of current cigarette smoking did not differ significantly between 2006 and 2009, the two most recent survey iterations (CDC 2010a). Only NSDUH has shown a continuing, statistically significant decline since 2002 in current smoking, although this decline may be limited to White youth since 2007 (SAMHSA 2009b).

Smokeless tobacco is currently used by less than 10% of adolescents overall, but this finding masks significant differences in patterns of use among youth subgroups. The prevalence of current use among females is less than 2% except in a few Western states (See section on current use of smokeless tobacco, Appendix 3.1). Further, White male students are far more likely than males in other racial/ethnic subgroups to use smokeless tobacco, with the prevalence of current use among white male high school students at around 20%, based on YRBS data (Table 3.4a). Recent data from YRBS and MTF

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HEALTH EDUCATION RESEARCH
Theory & Practice

Vol.21 no.3 2006
Pages 338–347
Advance Access publication 15 May 2006

An experimental study of effects on schoolchildren of exposure to point-of-sale cigarette advertising and pack displays

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Abstract

By creating a sense of familiarity with tobacco, cigarette advertising and bold packaging displays in stores where children often visit may help to pre-dispose them to smoking. A total of 605 ninth-grade students were randomly allocated to view a photograph of a typical convenience store point-of-sale which had been digitally manipulated to show either cigarette advertising and pack displays, pack displays only or no cigarettes. Students then completed a self-administered questionnaire. Compared with those who viewed the no cigarettes, students either in the display only condition or cigarette advertising condition perceived it would be easier to purchase tobacco from these stores. Those who saw the cigarette advertising perceived it would be less likely they would be asked for proof of age, and tended to think a greater number of stores would sell cigarettes to them, compared with respondents who saw no tobacco products. Respondents in the display only condition tended to recall displayed cigarette brands more often than respondents who saw no cigarettes. Cigarette advertising similarly influenced students, and tended to weaken students' resolve not to smoke in future. Retail tobacco advertising as well as cigarette pack displays may have adverse influences on youth, suggesting that tighter tobacco marketing restrictions are needed.

Introduction

As usual avenues for tobacco advertising have become increasingly unavailable, the visual presence of the cigarette pack and the in-store pack display has become an essential means of communicating brand imagery for tobacco companies [1, 2]. Tobacco industry documents indicate that tobacco companies understood the importance of the cigarette pack display as a means of promoting brand awareness: 'The aim of the exercise is instant recognition: (Horizon) along with Benson & Hedges, that's given us full gold and blue blocks on display and that helps our brands stand out' [3].

It has been demonstrated that widespread in-store tobacco advertising can influence and distort adolescents' perceptions regarding popularity, use and availability of tobacco. Experimental research has shown that adolescents exposed to retail tobacco advertising perceived significantly easier access to cigarettes than a control group [4]. Advertising exposure also influenced perceptions about smoking prevalence, peer approval for smoking and support for tobacco control policies [4]. Another study [5] found that schoolchildren exposed to point-of-sale advertisements were more likely than those exposed to a photograph of a pack of cigarettes to report positive attributes of users of the brand of cigarettes. Further research has shown that adolescents who reported

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doi:10.1093/her/cyl005

at least weekly exposure to retail tobacco marketing were more likely to have experimented with smoking [6] and that in-store branded tobacco advertising and promotion are strongly associated with choice of cigarette brands by adolescents [7].

The presence of tobacco in stores alongside everyday items such as confectionery, soft drinks and magazines helps to create a sense of familiarity with tobacco products. This familiarity may act to de-emphasize the serious health consequences of tobacco consumption and increase youth perceptions of the prevalence of smoking, as well as their perceived access to tobacco products [8]. The presence of tobacco products in neighbourhood retail outlets conveys to young people that tobacco use is desirable, socially acceptable and prevalent in society [9].

In Victoria, Australia, point-of-sale tobacco advertising has been banned since January 2002, and cigarette pack displays are limited to one pack face per brand variant. An observational study conducted following the implementation of this law found that, although compliance was evident, displays emerged that tilted packs towards the floor, providing maximum viewing of the top of all the packs queued in the display and a consequently greater visual and colourful presence for each brand variant [10]. Efforts to enhance the displays to achieve maximum 'standout' for cigarette brands has led researchers to be concerned that cigarette displays at the point-of-sale may be just as influential as traditional advertising, acting as a promotional tool for cigarette brands.

The present study aims to examine the effect of cigarette packaging displays and advertising at the point-of-sale on students' smoking-related perceptions, beliefs and intentions. Given previous research, we hypothesized that exposure to retail tobacco advertising and cigarette pack displays at the point-of-sale would influence students' perceptions about ease of access to cigarettes, normative beliefs about smoking, perceived harms of smoking, perceived popularity of cigarette brands and future intentions to smoke.

Methods

Participants

Data collection took place in late 2003 and early 2004 from a convenience sample of ninth-grade students (aged 14–15 years) from five secondary schools in Victoria, Australia: two Catholic boys schools, a private co-educational school, a public co-educational school and a Catholic girls' school. Three of the schools were located in areas that had above average level of socio-economic advantage for Victoria, while the other two schools were in areas that had below average level of socio-economic advantage [11].

Schools were approached by a research assistant to determine willingness to have their students involved in the study. Schools were informed that the study would be an investigation into product advertising in convenience stores. Specific detail about examining tobacco marketing was not disclosed, to avoid risk of priming student's responses. Information was sent home to students' parents, along with a consent form, to obtain parental permission to be involved in the study. Out of 886 ninth-grade students approached, active parental permission was obtained for 605 students, resulting in an overall response rate of 68%.

Design

The between-subjects experimental study design was adapted from that developed by Henriksen *et al.* [4]. Within each classroom, participants were randomly exposed to one of the three point-of-sale conditions under the guise of pre-testing a news story written for teenagers.

No cigarettes

A convenience store's point-of-sale area with no visible tobacco presence.

Cigarette display

A convenience store's point-of-sale area with a cigarette pack display, but no cigarette advertising (as required by the current law in Victoria).

Cigarette advertising

A point-of-sale area with both cigarette advertising and cigarette pack displays.

A colour photograph of a point-of-sale section of a convenience store was digitally altered to create the three versions of the same retail environment. Adobe Photoshop was used to eliminate cigarette advertising and cigarette pack displays and to replace these with other non-tobacco product advertising or displays. No retailers or customers were visible in the photographs and references to store names were removed.

Procedure

Trained research assistants visited schools to administer the study. Before the experimental manipulation, all students took part in a discussion designed to increase the salience of general brand advertising and display. Following the discussion of brand advertising, students within classrooms were randomly assigned to see photographs of one of the three conditions. A research assistant then read aloud a fictional news story about teen eating habits and visits to convenience stores. Students were told to look carefully at the photograph they were given of the point-of-sale, and asked to imagine walking around the shop noticing what to buy, while they listened to the story.

After the news story had been read out, the research assistant collected all point-of-sale photographs to ensure students did not subsequently refer back to them. Students then completed a brief questionnaire. The entire data collection session was completed during a class period of ~45 min.

Dependent variables

Perceived difficulty of access

Students were asked about their own, and students their age, likelihood of being able to purchase tobacco from the pictured stores, using a Likert scale ranging from '1 = very easy' to '5 = very hard'. These two questions were combined and averaged to create an overall measure of perceived difficulty of purchasing tobacco ($\alpha > 0.70$). Students were also asked about the likelihood they would be asked for proof of age if they tried to purchase cigarettes at the store, using a Likert scale ranging from '1 = very likely' to '5 = very unlikely'. Finally, students were asked to estimate how many stores in their neighbourhood would sell tobacco to them, and to other students their age.

Normative beliefs

Perceived prevalence of smoking was assessed by asking how many out of 100 classmates in their year level, 100 high school students and 100 adults they thought smoked cigarettes at least once a week. Perceived approval of smoking was measured by asking students how much they agreed or disagreed on a Likert scale ranging from '1 = strongly agree' to '5 = strongly disagree' with a range of attributes to describe smokers ('A teenager who smokes cigarettes seems ... cool; successful; smart; healthy; athletic; and popular'). Perceived peer approval was measured by asking students whether most students their age, and most high school students, 'think it's ok to smoke cigarettes once in a while'. These two questions measured on a Likert scale from '1 = strongly agree' to '5 = strongly disagree', were combined and averaged to create an overall 'peer approval of smoking' measure ($\alpha > 0.70$).

Perceived harm

Students were asked whether they agreed or disagreed that 'Smoking can harm your health', and how dangerous they thought it was to smoke <10 cigarettes a day, and one or two cigarettes occasionally, on a Likert scale ranging from '1 = not dangerous' to '3 = very dangerous'.

Perceived brand popularity

We asked students to nominate the brand they would be likely to smoke if they were a smoker, and then nominate what they thought were the most popular brands smoked by students their age and adults. In order to examine whether cigarette displays and advertising influenced which brands students thought were the most popular, the cigarette brands that were clearly advertised in the cigarette advertising condition (Benson & Hedges,

Lucky Strike, Horizon, Marlboro and Winfield) were coded as 'advertised brands'. Similarly, those cigarette brands that were the most prominent in the cigarette display and cigarette advertising conditions were coded as 'prominently displayed brands'. These brands were determined by their visual presentation in the display, based on the criteria of being presented by a block of colour or a block with a distinctive feature of the pack (e.g. the prominent stripe on Alpine and Winfield packs). Prominently displayed brands included Horizon, Dunhill, Winfield, Benson & Hedges and Alpine.

Intention to smoke

To gauge students' future intentions to smoke, students were asked whether they thought they would smoke a cigarette at any time during the next year, with responses being 'definitely not, probably not, probably yes or definitely yes'. Students who had not tried smoking were also asked if they thought they would try a cigarette soon, and also 'If one of your best friends were to offer you a cigarette, would you smoke it?' with responses also being 'definitely not, probably not, probably yes or definitely yes'.

Descriptive variables

Students indicated their sex, whether they had any older brothers or sisters, or a parent or guardian who smoked and how many, if any, of their five best friends smoked. Students were also asked to indicate their frequency of visiting a convenience store, with response options being 'practically every day, a few times a week, about once a week, about once a month or hardly ever'.

Following the method of Pierce *et al.* [12], students were categorized as non-susceptible never smokers, susceptible never smokers or experimenters. Students who reported trying smoking (even just a few puffs) were coded as 'experimenters'. Students who had never smoked and indicated they would definitely not try smoking cigarettes 'soon' and 'in the next year', and would definitely not smoke a cigarette if one of their best friends were to offer them one, were coded as 'non-susceptible never smokers'. Students who did not answer 'definitely no' to each circumstance were considered 'susceptible never smokers'.

Finally, an 'others smoking' variable was created by combining students' responses to whether they had at least one parent who smokes, a sibling who smoked and how many of the respondent's best friends smoked. This was a continuous variable, where a lower value indicated less exposure to cigarettes from family and friends.

Analysis

Chi-square analysis was used to determine whether random assignment produced equivalent groups in relation to tobacco use and other characteristics. To test hypotheses, generalized estimating equations (GEEs) with random effects were used to determine the effects of exposure to the three point-of-sale conditions, controlling for sex, smoking susceptibility and social and familial exposure to smoking. The school attended by respondents was treated as a random effect to account for clustering by school.

Logistic regression analyses were used to examine the relationship between the cigarette brands respondents thought were most popular among students and adults, and those cigarette brands that were advertised or displayed in the pictured stores.

Results

Sample characteristics

The sample of 605 students consisted of 51% females, 41% of students had tried smoking cigarettes and 9% currently smoked. Of those who had not yet tried smoking, 11% said they would probably or definitely try a cigarette soon and 8% reported they would probably or definitely try smoking during the next year. Over one-third (36%) of students had at least one parent or guardian who smoked, 21% said they had at least one older brother or sister who smoked and 45% reported at least one of their best friends smoked.

Table I shows that the characteristics of students were equally distributed by condition in relation

to demographic characteristics and peer and family exposure to smoking.

Regardless of experimental condition, students who were experimenting with smoking visited convenience stores more often ($\bar{X} = 3.1$, on scale of 1 = practically every day to 5 = hardly ever) than those students who were susceptible non-smokers ($\bar{X} = 3.5$) ($P = 0.002$) and those who were non-susceptible non-smokers ($\bar{X} = 3.7$) ($P < 0.01$). There was no significant difference between the latter two conditions.

Perceived access to tobacco

Table II indicates that students who were exposed to either the cigarette display or the cigarette advertising conditions perceived it would be less difficult for either themselves or students their age to purchase tobacco, than those students who saw the no cigarettes condition ($P = 0.000$). In addition, students who saw the cigarette advertising condition were less likely than respondents in the no cigarettes condition to report that they would be asked for proof of age if they tried to buy cigarettes ($P = 0.01$).

On average, students reported that at least one store in their neighbourhood would sell cigarettes to them ($\bar{X} = 1.5$ stores) or students their age ($\bar{X} = 1.8$ stores). Students who saw the no cigarettes condition tended to report a lower number of neighbourhood stores would sell them cigarettes ($\bar{X} = 1.4$ stores), compared with those who saw the cigarette advertising point-of-sale ($\bar{X} = 1.7$ stores)

Table I. *Student characteristics, by exposure condition*

	Condition			*P*
	a. No cigarettes ($n = 210$) %	b. Cigarette display ($n = 203$) %	c. Cigarette advertising ($n = 192$) %	
Percentage of Female	50.5	48.5	53.8	0.58
Yes, at least one parent smokes	34.8	35.5	37.8	0.81
Yes, at least one of best friends smokes	43.1	45.5	46.4	0.79
Yes, has tried smoking	38.5	43.3	41.8	0.60
Yes, currently smokes	9.9	7.4	8.7	0.67
Visits convenience stores at least a few times a week	28.4	26.4	25.1	0.63

Table II. *Perceived access to cigarettes, by exposure condition*

	Condition		
	a. No cigarettes ($n = 210$) $\bar{X}$	b. Cigarette display ($n = 203$) $\bar{X}$	c. Cigarette advertising ($n = 192$) $\bar{X}$
Difficulty of access to tobacco at pictured store[a]	3.2	2.9[b]	2.8[b]
Likelihood of being asked proof of age[c]	2.5	2.7	2.8[d]
No. of stores in neighbourhood that would sell you cigarettes	1.4	1.5	1.7[e]
No. of stores in neighbourhood that would sell cigarettes to students your age	1.8	1.8	1.8

Covariates = sex, 'susceptibility' and 'others smoking', random effects = school id.
[a]Scale: 1 (very easy) to 5 (very hard). [b]Significantly different ($P < 0.01$) to condition a: no cigarettes. [c]Scale: 1 (very likely) to 5 (very unlikely). [d]Significantly different ($P < 0.05$) to condition a: no cigarettes. [e]Trend towards a significant difference ($P < 0.1$) between condition a: no cigarettes.

($P = 0.07$). There was no exposure effect for the number of neighbourhood stores that participants thought would sell to 'students their age'.

Normative beliefs about smoking

On average, students thought ~30% of students their age smoke cigarettes at least once a week, with no significant differences between the experimental conditions (Table III).

However, those in the cigarette advertising condition reported on average that ~52% of high school students smoked at least once a week, compared with those who saw the cigarette display condition, who estimated ~48% of high school students smoke ($P = 0.03$).

Respondents who saw the cigarette advertising condition also thought a higher proportion of adults smoke (63%) than did those who saw the cigarette display condition (59%).

There was little variation between experimental conditions and students' approval of smoking ($P > 0.10$). Students also tended to disagree with statements attributing positive characteristics to teenagers who smoked, with no significant differences between experimental conditions (Table III).

Perceived harm of smoking

Regardless of survey condition, most students agreed that smoking can harm your health ($\bar{X} = 1.3$, SD = 0.81). Over half of students (52%) considered smoking <10 cigarettes a day 'very dangerous'. However, only 15% of students thought smoking one or two cigarettes occasionally was 'very dangerous', with a further 55% considering it 'a little dangerous' and 25% 'not dangerous'. Students who saw the cigarette advertising condition were significantly more likely ($P = 0.02$) to consider smoking one or two cigarettes occasionally as less dangerous ($\bar{X} = 1.9$), than were respondents who saw the cigarette display condition ($\bar{X} = 2.1$) (Table IV).

Future intentions to smoke

Students who saw the cigarette advertising condition tended to be more likely to suggest that they would smoke a cigarette any time during the following year ($\bar{X} = 2.0$, on scale of '1 = definitely not' to '4 = definitely yes'), compared with those

Table III. *Perceived smoking prevalence, by exposure condition*

	Condition		
	a. No cigarettes ($n = 210$)	b. Cigarette display ($n = 203$)	c. Cigarette advertising ($n = 192$)
Perceived prevalence among	%	%	%
Year 9 students	28	30	31
High school students	52[a]	48	52[b]
Adults	62[a]	59	63[b]
Teenagers who smoke seem[c]	$\bar{X}$	$\bar{X}$	$\bar{X}$
Cool	3.9	4.0	3.9
Successful	4.2	4.3	4.2
Smart	4.2	4.2	4.3
Healthy	4.5	4.5	4.6
Athletic	4.2	4.2	4.2
Popular	3.2	3.3	3.1
Peer approval of smoking	2.7	2.8	2.7

Covariates = sex, susceptibility and others smoking, random effects = school id.
[a]Trend towards a significant difference ($P < 0.1$) between condition b: cigarette display. [b]Significantly different ($P < 0.05$) to condition b: cigarette display. [c]Scale: 1 (strongly agree) to 5 (strongly disagree).

Table IV. *Perceived harm of smoking, by exposure condition*

	Condition		
	a. No cigarettes ($n = 210$) $\bar{X}$	b. Cigarette display ($n = 203$) $\bar{X}$	c. Cigarette advertising ($n = 192$) $\bar{X}$
Smoking can harm your health[a]	1.4	1.3	1.3
Smoking <10 cigarettes per day is ...[b]	2.7	2.8	2.8
Smoking one or two cigarettes per day is ...[b]	2.0	2.1	1.9[c]

Covariates = sex, susceptibility and others smoking; random effects = school id.
[a]Scale: 1 (strongly agree) to 5 (strongly disagree). [b]Scale: 1 (not dangerous) to 3 (very dangerous). [c]Significantly different ($P < 0.05$) to condition b: cigarette display.

who saw the cigarette display condition ($\bar{X} = 1.9$) ($P = 0.07$).

Examining only students who had not yet tried smoking ($n = 348$), those who had been exposed to the cigarette advertising condition, were more likely to suggest that they would smoke a cigarette if one of their best friends offered them one, compared with those who saw the cigarette display condition ($P = 0.039$). However, no significant exposure effects existed for never-smokers' intentions to try a cigarette 'soon' or during the following year ($P > 0.1$).

Perceived popularity of cigarette brands and brand preferences

As shown in Table V, when asked to name cigarette brands that were most popular among adult smokers, students exposed to the cigarette advertising condition were more likely to report a cigarette brand that was advertised (Winfield, Horizon, Benson & Hedges, Marlboro or Lucky Strike), compared with those exposed to the no cigarettes condition ($P = 0.049$). There was also a trend for respondents exposed to the cigarette advertising condition to report one of the advertised brands, more than those who saw the cigarette display condition ($P = 0.057$).

Tobacco brands that were prominently visible in the displays of the cigarette display and cigarette advertising conditions (i.e. Winfield, Horizon, Benson & Hedges, Alpine and Dunhill) were also related to which brands students thought were most popular among adults. There was a trend for those respondents who saw the cigarette display condition to report brands that were prominently displayed, more than students who saw the no cigarettes condition ($P = 0.052$).

There were no significant differences between conditions in relation to the brands respondents thought were popular among students their age who smoke. However, when respondents were asked which cigarette brand they would try if they smoked, those exposed to the cigarette advertising condition also tended to report an advertised brand more than those who saw the cigarette display condition ($P = 0.09$).

Discussion

This experimental study aimed to assess whether cigarette pack displays in retail stores influenced students' perceptions about smoking in ways similar to those previously found for retail tobacco advertising [4].

Table V. *Perceived cigarette brand popularity and brand preferences, by exposure condition*

	a. No cigarettes ($n = 210$)		b. Cigarette display ($n = 203$)		c. Cigarette advertising ($n = 192$)	
	%	OR	%	OR (95% CI)	%	OR (95% CI)
Popular cigarette brands smoked by ...						
Students						
Reported advertised brand	46.9	1.0 ref	49.7	1.08 (0.7–1.7)	54.5	1.43 (0.9–2.3)
Reported prominently displayed brand	63.8	1.0 ref	71.5	1.42 (0.9–2.3)	67.1	1.17 (0.7–1.9)
Adults						
Reported advertised brand	40.3	1.0 ref	40.6	1.02 (0.6–1.6)	48.8	1.58[a,b] (1.0–2.5)
Reported prominently displayed brand	53.0	1.0 ref	64.7	1.58[c] (1.0–2.5)	60.1	1.30 (0.8–2.1)
Which brand would you try?						
Reported advertised brand	42.9	1.0 ref	42.1	0.96 (0.6–0.9)	48.3	1.49 (0.9–2.5)[b]
Reported prominently displayed brand	58.3	1.0 ref	55.9	0.81 (0.5–1.3)	58.9	1.07 (0.6–1.8)

[a]Significantly different ($P < 0.05$) to condition a: no cigarettes. [b]Trend towards a significant difference ($P < 0.1$) between condition b: cigarette display. [c]Trend towards a significant difference ($P < 0.1$) between condition a: no cigarettes.

Overall, our results suggest that the presence of cigarettes at the point-of-sale—whether cigarette display only or display plus tobacco advertising—increased students' perceptions about the ease of purchasing cigarettes. In addition, the presence of tobacco advertising decreased students' perceived likelihood of being asked for proof of age and tended to increase perceptions of the number of stores that would sell them cigarettes. This pattern of findings suggests the presence of displays in retail stores serve to create the perception among students that cigarettes are easily available and accessible in their community, while the presence of tobacco advertising further strengthens perceived ease of accessibility of cigarettes.

Our study findings also suggest that, like advertising, the cigarette pack display is an effective vehicle for promoting brand recall, as evidenced by the cigarette brands reported by students to be the most popular among adult smokers. High recall of cigarette brand names that were advertised in the pictured store, as well as cigarette brands that were prominent in the displays, suggests that tobacco companies are effectively using cigarette packaging displays as a communication device for creating and reinforcing brand awareness and recognition [7]. Cigarette brand names that were advertised in the pictured store also tended to affect the brands of cigarettes students reported they might try if they did smoke.

Exposure to point-of-sale advertising, but not displays, tended to weaken student's resolve not to smoke in the following year. Findings also indicate that exposure to advertising, as opposed to a pack display on its own, influenced whether students would accept a cigarette from one of their friends if they offered. In countries such as the United States in which point-of-sale tobacco advertising has continued to proliferate, this is great cause for concern. US Federal Trade Commission figures indicate that in 2002, tobacco companies spent $12.47 billion on tobacco promotion, a considerable amount of which was focused on the point-of-sale [13].

No effects were observed for most variables measuring perceived harm from smoking, except the perceived danger of smoking one or two cigarettes per day, which was significantly higher among those in the cigarette advertising condition than those in the cigarette display condition. Overall, we found no consistent effects of cigarette advertising or display on peer approval for smoking, the likelihood of positive attributes being ascribed to smokers, or overall harm from smoking. Several of the perceived harm variables and all the smoker attribute variables were highly skewed in a desirable direction, suggesting established views about smoking which may not be easy to manipulate by a single experimental exposure.

Results from this study support some of the findings of the experimental study of Henriksen *et al.* [4]. Like Henriksen *et al.*, we found that retail cigarette advertising induced significantly easier perceived access to cigarettes and increased perceived smoking prevalence of high school students and adults. However, unlike Henriksen *et al.*, cigarette advertising did not influence perceived prevalence of smoking among students their own age. We also did not find advertising to induce more positive appraisals of smokers. There were differences between our study and that of Henriksen *et al.* that may have accounted for differences in some findings. These include the fact that students are no longer routinely exposed to retail tobacco advertising in Australia, that Australian students were in Grade 9 (aged 14–15 years) only, rather than Grades 8 and 9 (aged 13–15 years), that Australian students were recruited by active, rather than passive consent, and that Australian students were exposed to only one photograph in each condition, rather than two. However, given these methodological and contextual differences, the fact that we did find experimental effects for most variables used in both studies suggests that the effects are relatively robust.

There were several study limitations, not the least of which was that the stimulus conditions were artificial. Students briefly viewed one of the three manipulated point-of-sale photographs in a classroom setting, rather than visiting a real store environment, so they may have perceived the photographs to be unrealistic, and may not

have responded in the same way to a real life situation. However, the fact we did observe effects of the different point-of-sale photographs on students' perceptions about smoking even with a brief exposure suggests that the influence of cigarette advertising as well as pack displays in the actual store environment is probably considerable.

In addition, we cannot be certain that the responses of students who saw the store with no cigarettes were not influenced by their own memory of what a convenience store 'usually' looks like (i.e. in Victoria, with the presence of tobacco displays). Over one-third (35%, $n = 74$) of students who saw the store with no cigarettes reported that they had seen tobacco products, even though there was none present, and this false recognition was positively related to being a current smoker ($P < 0.05$). It is possible that due to students' misperceptions of what they had seen during the experimental manipulation we may not have achieved a 'clean' measure of student's exposure to a store with no tobacco products, and therefore condition effects may have been diluted. This also suggests that cigarette displays maybe extremely salient to smoking teenagers and can potentially influence their recollections of this type of marketing.

We confirmed the finding of Henriksen *et al.* [6] that frequency of student visits to convenience stores was associated with a higher likelihood of experimenting with cigarettes, one interpretation being that there may be long-term cumulative effects of point-of-sale exposure. Future research might aim to study students' brand recall and perceptions about smoking immediately after exiting real stores that vary in dominance of cigarette displays at the point-of-sale.

A strength of the study was that we were able to randomize students to conditions within classrooms, rather than randomizing whole classrooms, as in the study of Henriksen *et al.* [4]. However, since data collection occurred within classrooms and only five schools were involved, there may still be clustering of respondents, so to be conservative, we analysed the data using GEEs with random effects, where the school attended by respondents was treated as a random effect. We also controlled for sex, smoking susceptibility and social and familial exposures to cigarette smoking. Thus, the effects observed in this study are independent of these other well-known influences on smoking perceptions.

Implications

This study suggests that the presence of cigarette displays at the point-of-sale, even in the absence of cigarette advertising, has adverse effects on students' perceptions about ease of access to cigarettes and brand recall, both factors that increase the risk of taking up smoking [14, 15]. Furthermore, the study suggests that cigarette advertising has similar effects, and may also weaken students' firm intentions not to smoke in future, a measure that also strongly predicts smoking uptake [16]. These findings make a case for eliminating cigarette advertising at the point-of-sale, and also for placing cigarettes out of sight in the retail environment, as has happened in Saskatechewan, Canada [17]. Such a move may help to curb the alarming rate of smoking uptake among adolescents.

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Received on May 20, 2005; accepted on February 20, 2006

doi:10.1111/j.1360-0443.2007.02062.x

The effect of retail cigarette pack displays on impulse purchase

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ABSTRACT

Aims To assess the extent to which point-of purchase (POP) cigarette displays stimulate impulse purchases. **Design** Telephone-administered population survey. **Setting** Victoria, Australia. **Participants** A total of 2996 adults, among whom 526 smoked factory-made cigarettes and 67 were recent quitters (quit in the past 12 months). **Measurements** Reported cigarette purchase behaviour; perceived effect on smoking of removing cigarettes from view in retail outlets; reported urges to buy cigarettes as a result of seeing the cigarette display. **Findings** When shopping for items other than cigarettes, 25.2% of smokers purchased cigarettes at least sometimes on impulse as a result of seeing the cigarette display. Thirty-eight per cent of smokers who had tried to quit in the past 12 months and 33.9% of recent quitters experienced an urge to buy cigarettes as a result of seeing the retail cigarette display. One in five smokers trying to quit and one in eight recent quitters avoided stores where they usually bought cigarettes in case they might be tempted to purchase them. Many smokers (31.4%) thought the removal of cigarette displays from stores would make it easier for them to quit. **Conclusions** POP cigarette displays act as cues to smoke, even among those not explicitly intending to buy cigarettes, and those trying to avoid smoking. Effective POP marketing restrictions should encompass cigarette displays.

Keywords Cues, marketing, point of purchase, retail, smoking.

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Submitted 4 July 2007; initial review completed 6 September 2007; final version accepted 27 September 2007

INTRODUCTION

As avenues for traditional electronic, billboard and print forms of tobacco marketing are restricted, tobacco companies have relied increasingly upon point-of-purchase (POP) marketing to promote their products [1–3]. A comprehensive POP marketing strategy for cigarette brands includes advertising, pricing and promotions (e.g. 'buy one get one free') [4]. While evidence linking POP marketing to youth smoking is of concern [4–9], to date relatively little research has focused upon the extent to which adult smokers might be influenced by POP marketing. POP marketing may influence smokers who are trying to quit or cut back by reminding them of smoking every time they visit a store [10]. In addition, POP marketing may also tempt recent quitters to relapse [10].

Cigarette pack displays are a key component of POP marketing: tobacco companies pay a premium to ensure prime placement within stores and superior positioning of their brands relative to others [11]. Regulations on retail tobacco marketing primarily restrict or eliminate advertising or promotions for cigarette brands. In countries with such restrictions, POP cigarette pack displays have evolved into prominent 'power walls' of carefully coordinated colourful packs [12–14]. According to industry documents, tobacco companies use cigarette pack displays in order to maintain prominence for their brands in the face of restrictions on retail marketing [15–17]. For example, US tobacco companies circumvented self-service display bans by furnishing enclosed acrylic displays to showcase their products [18].

The tobacco industry's increasing reliance on POP marketing means that there is a profusion of smoking cues in most convenience stores, petrol stations and supermarkets, with cigarette pack displays positioned near the cash register for maximum salience [11]. Increasing environmental cues to smoke is one explanation for observations of higher smoking prevalence and

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smoking frequency in neighbourhoods with a higher concentration of stores that sell cigarettes [19,20]. Another explanation for the potential impact of cigarette pack displays on smoking behaviour comes from research on cue reactivity, which demonstrates that drug-dependent individuals react strongly to cues associated with past or current drug use, including nicotine [21]. Cue reactivity studies typically observe strong subjective reports of craving and modest physiological changes in response to smoking cues, such as viewing other people smoking or pictures of smoking paraphernalia (i.e. cigarettes, packs, matches and ashtrays) [22]. Evidence from ecological momentary assessments also indicates the importance of situational cues in eliciting craving [23,24].

Knowing whether cigarette pack displays are as powerful cues to smoke as the cigarette advertisements they either complement or replace is essential to develop effective regulations for retail tobacco marketing. We sought to ask adult smokers about the extent to which they notice POP cigarette pack displays, experience impulses to purchase cigarettes when confronted by a cigarette display and perceive cigarette displays to be a factor preventing smoking cessation. To our knowledge, this is the first study to ask smokers systematically about these issues.

METHOD

Study participants aged 18 years and over in the state of Victoria, Australia, completed a 12–16-minute telephone survey on health issues in November 2006. The sample was selected using a random digit dialling method, yielding 2996 completed interviews, for a response rate of 43%. Respondents who indicated they smoked daily, weekly or less than weekly were defined as smokers [25]. Recent quitters were defined as those who had smoked more than 100 cigarettes in their life-time, but had quit within the past 12 months. Smokers were asked whether they smoked factory-made cigarettes (FMC), roll-your-own cigarettes or some other form of tobacco.

All respondents were asked how often they go to a supermarket, milk bar/convenience store or petrol station, with response options being almost every day, two to three times a week, once a week, about two to three times a month, once a month, less often and never. Respondents who visited at least one of these stores more often than never were then asked: 'When you are in a supermarket, milk bar/convenience store or petrol station, how often do you notice the cigarette pack display near the cash register?', with options being coded as never/rarely; sometimes; often/always.

FMC smokers were asked: 'thinking about you personally, do you agree or disagree that removing cigarette packs from view in stores would make it easier for you to quit smoking?', with respondents being able to answer strongly agree, agree, neither agree nor disagree, disagree, strongly disagree. FMC smokers were also asked: 'when shopping for something other than cigarettes, how often do you decide to buy cigarettes as a result of seeing the cigarette pack display in the store—would that be always, often, sometimes, rarely or never?'.

We further asked FMC smokers who had made a quit attempt in the past 12 months: 'when you tried to quit smoking, did you ever avoid going to places where you used to buy cigarettes in case you might be tempted to buy them?' and 'when you tried to quit smoking, was there ever a time when seeing the cigarette pack display in the store gave you an urge to buy cigarettes?'. Among those who indicated that they had experienced such an urge, we then asked: 'as a result, did you ever buy cigarettes even though you were trying to quit?'.

Recent quitters were asked: 'thinking about where cigarettes are sold, since you quit smoking, was there ever a time that seeing the cigarette pack display near the cash register gave you an urge to buy cigarettes?' and also: 'since you quit smoking, did you ever avoid going to places where you used to buy cigarettes in case you might be tempted to buy them?'.

For all respondents, we collected information on age and sex, and measured socio-economic status (SES) using the Socio-Economic Index for Areas (SEIFA) [26]. This index ranks residential postcodes on a continuum of advantage to disadvantage, taking into consideration factors such as income, education, occupation and housing, which may influence socio-economic conditions of the area. For the purpose of analysis, we grouped these areas into four quartiles, from lowest (quartile 1) to highest (quartile 4) SES.

Daily FMC smokers were asked to indicate the average number of cigarettes smoked per day, and we grouped these into three categories of light (one to 10 cigarettes per day), medium (11–20) and high (over 20 per day). All less than weekly FMC smokers were assigned to the light consumption category. FMC smokers were asked if they had tried to quit in the past 12 months and if so, the maximum length of time quit in the last 12 months. To gauge intentions to quit, FMC smokers were asked if they were seriously considering quitting in the next 6 months.

Statistical analysis

Survey data were weighted by age and sex according to the Victorian population distribution at the 2001 Census [27]. There were two primary outcomes of interest: (i) purchase behaviour, i.e. an indication that smokers buy cigarettes on impulse at least sometimes as a result of seeing the cigarette pack display; and (ii) policy support,



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i.e. agreement that removing cigarettes from view would make it easier for respondents to quit smoking. A secondary outcome was the extent to which those trying to avoid smoking indicate that they experience urges to buy cigarettes when faced with a retail cigarette display. To examine variables associated with outcomes of interest, we used multivariate logistic regression analysis.

RESULTS

Sample characteristics

Of the total sample of 2996 adults, 17.6% ($n = 526$) were smokers of FMC cigarettes. Overall, 53.2% smoked 10 cigarettes or less per day on average, 31.9% smoked 11–20 cigarettes and 14.9% smoked more than 20 cigarettes per day. A total of 40.7% had tried to quit in the past 12 months and 59.0% were considering quitting in the next 6 months. Among smokers, 34.0% indicated that they visited either a supermarket, milk bar/convenience store and/or petrol station almost every day, with medium (38.4%) and heavy smokers (46.1%) more likely to do so than light smokers (28.2%) [medium versus light odds ratio (OR) 1.58, confidence interval (CI) 1.05–2.39, $P < 0.05$; heavy versus light OR 2.21, CI 1.31–3.73, $P < 0.01$], and with females (29.6%) less likely to do so than males (37.9%) (OR 0.69, CI 0.48–1.00, $P < 0.05$). Age was unrelated to daily store visits.

Noticing cigarette displays at the point of purchase

When in a supermarket, milk bar/convenience store or petrol station, 55.3% of FMC smokers indicated that they often or always noticed the cigarette pack display near the cash register, 19.2% said they sometimes noticed it and 25.5% said they rarely or never noticed it. Multivariate analysis indicated that smokers who visit stores daily were significantly more likely to notice cigarette displays at least sometimes (81.6%) compared with those who visit stores less often (70.9%) (OR 1.90, CI 1.14–3.17, $P < 0.05$), and younger smokers were also more likely to notice these displays than older smokers (OR 0.97, CI 0.96–0.99, $P < 0.001$). However, there was no difference by sex, SES, cigarette consumption, recent quit attempts or quitting intentions.

Impulse purchase of cigarettes among smokers

When shopping for something other than cigarettes, a total of 25.2% FMC smokers at least sometimes decided to buy cigarettes as a result of seeing the cigarette pack display in the store (15.2% sometimes, 7.2% often, and 2.9% always). Table 1 shows that, in multivariate analysis, the likelihood of purchasing cigarettes on impulse at least sometimes was significantly greater among those who noticed cigarette displays at least sometimes (compared to rarely/never), among those considering quitting in the next 6 months, and among females. There was also a trend ($P = 0.068$) towards younger smokers being more likely to purchase on impulse.

Urge to buy cigarettes among those trying to avoid smoking

Among the 209 FMC smokers who had tried to quit in the past 12 months, 37.7% said that seeing the cigarette pack display in a store had given them an urge to buy cigarettes. Table 2 indicates that this was significantly more likely among smokers who notice cigarette displays in stores at least sometimes, among those who visit stores daily, and among those who are considering quitting in the next 6 months.

Of all FMC smokers who tried to quit in the past 12 months, 19.4% ($n = 41$) said that they avoided stores where they usually bought cigarettes in case they might be tempted to buy. Among the 79 FMC smokers who had tried to quit in the past 12 months and experienced an urge to buy cigarettes when seeing the cigarette display, 60.9% bought cigarettes, even though they were trying to quit.

Finally, of the 67 people who had quit smoking in the past 12 months, 33.9% said that seeing the cigarette pack display near the cash register gave them an urge to buy cigarettes and 12.2% said they had avoided stores where they usually bought cigarettes.

Perception that removal of pack displays would assist quitting

Among all FMC smokers, 31.4% agreed or strongly agreed that removing cigarette pack displays from view in stores would make it easier for them to quit. In multivariate analysis, this perception was more likely among smokers who said that they noticed cigarette displays at least sometimes, compared to rarely/never (35.4% versus 20.0%, OR = 2.38, CI 1.35–4.17, $P = 0.003$), those considering quitting in the next 6 months (40.0% versus 19.2%, OR = 2.61, CI 1.57–4.34, $P < 0.001$) and females (37.8%) than males (25.6%) (OR = 1.71, CI 1.11–2.64, $P = 0.016$). This view was less likely among those who were medium (23.9%) or heavy (14.5%) smokers compared to light smokers (40.6%) (medium versus light OR = 0.41, CI 0.25–0.68, $P < 0.001$; heavy versus light OR = 0.24, CI 0.11–0.51, $P < 0.001$) and among the highest than the lowest SES group (28.9% versus 35.4%, OR = 0.50, CI 0.26–0.97, $P = 0.04$). There was no association with frequency of store visits, quit attempts or age.

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Table 1 Variables associated with impulse purchase of cigarettes among factory-made cigarette smokers.*

	At least sometimes				
	n†	%	*Adjusted OR*	*95% CI*	*P*
Notice displays					
Rarely/never	121	11.6	1		
At least sometimes	353	30.3	2.49	1.29–4.80	0.006
Store visits‡					
Not daily	313	22.0	1		
Daily	170	31.2	1.39	0.86–2.24	0.178
Cigarette consumption					
Light (10 cigarettes per day or less)	247	23.9	1		
Medium (11–20 cigarettes)	153	26.8	1.39	0.82–2.36	0.229
Heavy (21+ cigarettes)	72	25.0	1.36	0.67–2.73	0.393
Attempted to quit within last 12 months					
No	285	21.1	1		
Yes	194	32.0	1.52	0.91–2.52	0.108
Considering quitting in next 6 months					
No	170	17.6	1		
Yes	286	30.8	1.82	1.06–3.13	0.029
Age (years)§			0.98	0.96–1.00	0.068
18–29	164	29.9			
30+	320	22.8			
Sex					
Males	253	20.9	1		
Females	231	29.9	1.96	1.22–3.14	0.005
SES					
SEIFA 1 (lowest advantage)	78	29.5	1		
SEIFA 2	77	24.7	0.61	0.28–1.35	0.227
SEIFA 3	147	24.5	0.60	0.30–1.19	0.145
SEIFA 4 (highest advantage)	170	24.1	0.61	0.31–1.19	0.149

*Includes only those who purchase cigarettes at a milk bar/convenience store, petrol station, supermarket or tobacconist. †Frequencies, sample sizes and analyses exclude 'don't know/can't say' respondents. ‡'Store visits' include visiting a supermarket, petrol station and/or milk bar/convenience store. §Age was entered as a continuous variable within the multivariate logistic model. OR: odds ratio; CI: confidence interval; SES: socio-economic status; SEIFA: socio-economic index for areas.

DISCUSSION

Far from being a benign source of influence at the point of purchase, cigarette pack displays stimulate impulse purchases among smokers. Those trying to avoid smoking commonly experience urges to purchase cigarettes when confronted with cigarette displays. Some smokers seem aware that they are prone to experiencing cigarette display-stimulated urges to purchase, to the extent that they avoid particular stores when they are trying to quit or have recently quit.

In-store displays increase sales of other consumer products [28–32]. A study of purchase choices made by approximately 4000 shoppers in 14 US cities found that product displays were associated with a greater likelihood of unplanned (rather than planned) purchases [33]. Furthermore, unplanned purchases were more likely when displays were located near the cash register, or at the end of shopping aisles, than in the middle of an aisle.

Research suggests that the overall presence of tobacco marketing in stores, alongside items such as confectionery, milk, soft drinks and magazines, helps to create a sense of familiarity with tobacco products, contributing to pro-smoking social norms [6,9,34]. Our study suggests that cigarette pack displays may also function to undermine quitting intentions and behaviour among established smokers. A study of magazine content is one of the few to test whether tobacco advertising might aim to undermine cessation attempts. Between 1984 and 1989, the number of tobacco advertisements in popular magazines was greater in January and February compared to the rest of the year [35]. A second study of national magazines from 1980 to 1995 also supported the researchers' hypothesis that the advertising placement intends to frustrate New Years' resolutions to quit by cueing smoking.

Our study demonstrated that younger smokers were more likely to notice cigarette displays and tended to be more likely to purchase on impulse. This pattern of find-

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Table 2 Variables associated with urge to purchase cigarettes among smokers who had tried to quit in the past 12 months.*

	Urge to buy				
	n†	%	*Adjusted OR*	*95% CI*	*P*
Notice displays					
Rarely/never	39	15.4	1		
At least sometimes	167	43.7	3.88	1.36–11.03	0.011
Store visits‡					
Not daily	137	32.8	1		
Daily	73	46.6	2.11	1.05–4.25	0.037
Cigarette consumption					
Light (10 cigarettes per day or less)	124	42.7	1		
Medium (11–20 cigarettes)	55	32.7	0.74	0.34–1.64	0.459
Heavy (21+ cigarettes)	27	25.9	0.41	0.14–1.19	0.100
Max. length of time quit in last 12 months					
More than 3 months	50	44.0	1		
3 months or less	158	36.1	0.93	0.43–2.00	0.850
Considering quitting in next 6 months					
No	34	20.6	1		
Yes	165	43.6	3.54	1.28–9.78	0.015
Age (years)§			0.98	0.95–1.01	0.177
18–29	96	43.8			
30+	112	32.1			
Sex					
Males	112	34.8	1		
Females	98	40.8	0.95	0.48–1.88	0.885
SES					
SEIFA 1 (lowest advantage)	29	44.8	1		
SEIFA 2	35	34.3	0.41	0.12–1.37	0.148
SEIFA 3	61	41.0	0.56	0.19–1.65	0.289
SEIFA 4 (highest advantage)	77	33.8	0.43	0.15–1.22	0.111

*Includes only those who purchase cigarettes at a milk bar/convenience store, petrol station, supermarket or tobacconist and had tried to quit in the last 12 months. †Frequencies, sample sizes and analyses exclude 'don't know/can't say' respondents. ‡'Store visits' include visiting a supermarket, petrol station and/or milk bar/convenience store. §Age was entered as a continuous variable within the multivariate logistic model. OR: odds ratio; CI: confidence interval; SES: socio-economic status; SEIFA: socio-economic index for areas.

ings is consistent with research showing that young adults are price-sensitive [36–38], more likely than other smokers to take advantage of cigarette promotions [28] and may be particularly vulnerable to tobacco marketing [39,40]. Smoking prevalence has remained stable in young adults aged 18–29 years in Victoria Australia, despite declining in other adult age groups [41]. Similarly, between 1993 and 2003, US smoking rates declined among all age groups except young adults aged 18–25 years [42]. The role of POP cigarette displays in perpetuating tobacco use among this age group is a cause for concern. On the basis of this study and others [9,43], we conclude that effective POP marketing restrictions must address cigarette pack displays.

A limitation of our study included a relatively low response rate, although this is typical for present-day telephone surveys that compete with direct telephone marketing efforts [44]. Our study used a retrospective self-report of impulse purchasing. By definition, unplanned or impulse purchases are not mindful, and may therefore be under-reported using this method. Observational or store exit interview methods close to the time of actual purchase might enable greater insight into the frequency of impulse tobacco purchases and the circumstances under which they occur. It is possible that the reporting of recent quit attempts may have been subject to recall bias, resulting in an underestimation of smokers who said that they had tried to quit in the past 12 months. However, this would have simply reduced the size of this subgroup, rather than changed substantively its composition and the associations with urge to purchase. Finally, generalization of the results to other countries would be important. However, the fact that these results were observed in Australia, where shoppers are exposed only to cigarette pack displays and not to tobacco advertising or promotions in stores, suggest that POP marketing may exert even greater effects in most other countries where it remains largely unrestricted. In conclusion, these find-

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ings strengthen the evidence base for placing tobacco out of the line of sight in retail stores, as has been already implemented in Iceland, Ireland and several jurisdictions in Canada [14].

Acknowledgements

This study was funded by Quit Victoria and the National Heart Foundation of Australia (Victorian Division), both non-government health organizations. Melanie Wakefield is supported by a National Health and Medical Research Council Principal Research Fellowship.

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World Health Organization

WHO Framework Convention on Tobacco Control

Conference of the Parties to the WHO Framework Convention on Tobacco Control
Third session
Durban, South Africa, 17–22 November 2008

Provisional agenda item 4.6

FCTC/COP/3/9
2 September 2008

Elaboration of guidelines for implementation of Article 13 of the Convention

1. At its second session, the Conference of the Parties to the WHO Framework Convention on Tobacco Control decided to establish a working group on Article 13 (decision FCTC/COP2(8)). The mandate of the working group was two-fold: (a) to elaborate comprehensive draft guidelines on the implementation of both the domestic and cross-border elements of Article 13 of the WHO Framework Convention on Tobacco Control; and (b) to present recommendations on key elements of a protocol on cross-border advertising, promotion and sponsorship, which would be complementary to these guidelines, and on any other measures that would contribute to the elimination of cross-border advertising, promotion and sponsorship. The working group was requested to present draft guidelines and recommendations to the Conference of the Parties at its third session. Pursuant to that decision, the first meeting of the Key Facilitators[1] and officers of the expert group was held (Geneva, 17–18 September 2007) in order to discuss a possible outline of the guidelines.

2. The first meeting of the working group on Article 13 (Helsinki, 27–29 November 2007), hosted by the Government of Finland, was attended by representatives of the Key Facilitators and Partners[2] of the working group. The participants also included representatives of civil society, the Convention Secretariat and WHO's Tobacco Free Initiative. At the meeting, the working group agreed on the outline proposed by the Key Facilitators, which would serve as the basis for its further discussions. The document was amended during the meeting. The working group requested the Key Facilitators to continue to work on the draft guidelines and recommendations until its second meeting.

3. At the second meeting of the working group (New Delhi, 31 March – 2 April 2008), hosted by the Government of India, the draft guidelines and recommendations were further discussed and elaborated. The group mandated the Key Facilitators to finalize the draft, based on the discussions of the working group, and asked them to invite – as necessary – other members of the group and experts in this process.

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[1] European Community, Finland and India.

[2] Australia, Brazil, Bulgaria, Burkina Faso, Canada, China, Cook Islands, Djibouti, Fiji, France, Iceland, Israel, Madagascar, Malaysia, Mauritania, Netherlands, New Zealand, Palau, Republic of Korea, Sweden and Thailand.

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4. Accordingly, a drafting meeting with the participation of the Key Facilitators, interested Partners, experts and the Convention Secretariat was held (New Delhi, 3–4 April 2008). During this meeting, the draft guidelines and recommendations were finalized. All members of the working group were given the opportunity to comment subsequently on the latest draft.

5. The draft guidelines and recommendations elaborated in the drafting meeting and endorsed by the working group were made accessible, on a protected web site, to all Parties to the WHO Framework Convention for their comments, in accordance with decision FCTC/COP2(8). Nine Parties submitted comments on this draft, but two of these Parties submitted their comments after the deadline. All comments were made available to the members of the working group through the group's internal web site.

6. Following extensive review of the comments and internal consultations, the Key Facilitators amended the draft guidelines and recommendations before their submission to the Conference of the Parties, according to the timeline and procedure outlined in decision FCTC/COP2(8) and the subsequent decision of the Bureau of the Conference of the Parties.

7. The resulting final drafts of the guidelines and recommendations for consideration by the Conference of the Parties are contained in Annex 1 (Draft guidelines on the implementation of Article 13 of the Convention), Annex 2 (Recommendations on key elements of a protocol on cross-border advertising, promotion and sponsorship) and Annex 3 (Recommendations on any other measures that would contribute to the elimination of cross-border advertising, promotion and sponsorship).

8. The Conference is invited to review and, as appropriate, adopt the guidelines.

ANNEX 1

DRAFT GUIDELINES ON THE IMPLEMENTATION OF ARTICLE 13 OF THE WHO FRAMEWORK CONVENTION ON TOBACCO CONTROL (TOBACCO ADVERTISING, PROMOTION AND SPONSORSHIP)

PURPOSE AND OBJECTIVES

1. The purpose of these guidelines is to assist Parties in meeting their obligations under Article 13 of the WHO Framework Convention on Tobacco Control. They draw on the best available evidence and the experience of Parties that have successfully implemented effective measures against tobacco advertising, promotion and sponsorship. They give Parties guidance for introducing and enforcing a comprehensive ban on tobacco advertising, promotion and sponsorship, or, for those Parties that are not in a position to undertake a comprehensive ban owing to their constitutions or constitutional principles, for applying restrictions on tobacco advertising, promotion and sponsorship that are as comprehensive as possible.

2. These guidelines provide guidance on the best ways to implement Article 13 of the Convention in order to eliminate tobacco advertising, promotion and sponsorship effectively at both domestic and international levels.

Underlying principles

3. The following principles apply:

(1) It is well documented that tobacco advertising, promotion and sponsorship increase tobacco use and that comprehensive bans on tobacco advertising, promotion and sponsorship decrease tobacco use.

(2) An effective ban on tobacco advertising, promotion and sponsorship should, as recognized by Parties to the Convention in Articles 13.1 and 13.2, be *comprehensive* and applicable to *all* tobacco advertising, promotion and sponsorship.

(3) According to the definitions in Article 1 of the WHO Framework Convention, a comprehensive ban on all tobacco advertising, promotion and sponsorship applies to *all* forms of *commercial communication, recommendation or action* and all forms of *contribution* to any event, activity or individual with the *aim, effect, or likely effect* of promoting a tobacco product or tobacco use either *directly or indirectly*.

(4) A comprehensive ban on tobacco advertising, promotion and sponsorship should include *cross-border advertising, promotion and sponsorship*. This includes both out-flowing advertising, promotion and sponsorship (originating from a Party's territory) and in-flowing advertising, promotion and sponsorship (entering a Party's territory).

(5) To be effective, a comprehensive ban should address *all persons or entities* involved in the production, placement and/or dissemination of tobacco advertising, promotion and sponsorship.

(6) Effective *monitoring, enforcement and sanctions* supported and facilitated by strong *public education and community awareness programmes* are essential for implementation of a comprehensive ban on tobacco advertising, promotion and sponsorship.

(7) *Civil society* has a central role in building support for, developing and ensuring compliance with laws addressing tobacco advertising, promotion and sponsorship, and it should be included as an active partner in this process.

(8) Effective *international cooperation* is fundamental to the elimination of both domestic and cross-border tobacco advertising, promotion and sponsorship.

Scope of a comprehensive ban

4. The scope of a comprehensive ban on tobacco advertising, promotion and sponsorship is outlined in general terms in subsection "Overview" (paragraphs 5–11) below, while the following subsections (paragraphs 12–34) address aspects that could pose special challenges for regulators in introducing a comprehensive ban.

Overview

5. A ban on tobacco advertising, promotion and sponsorship is effective only if it has a broad scope. Contemporary marketing communication involves an integrated approach to advertising and promoting the purchase and sale of goods, including direct marketing, public relations, sales promotion, personal selling and online interactive marketing methods. If only certain forms of direct tobacco advertising are prohibited, the tobacco industry inevitably shifts its expenditure to other advertising, promotion and sponsorship strategies, using creative, indirect ways to promote tobacco products and tobacco use, especially among young people.

6. Therefore, the effect of a partial advertising ban on tobacco consumption is limited. This is recognized in Article 13 of the Convention, which lays down the basic obligation to ban tobacco advertising, promotion and sponsorship. According to Article 13.1, "Parties recognize that a comprehensive ban on advertising, promotion and sponsorship would reduce the consumption of tobacco products."

7. To implement the comprehensive ban laid down in Articles 13.1 and 13.2, Parties should ban advertising, promotion and sponsorship as defined in Article 1(c) and (g) of the Convention. Article 1(c) defines "tobacco advertising and promotion" as "any form of commercial communication, recommendation or action with the aim, effect or likely effect of promoting a tobacco product or tobacco use either directly or indirectly". Article 1(g) defines "tobacco sponsorship" as "any form of contribution to any event, activity or individual with the aim, effect or likely effect of promoting a tobacco product or tobacco use either directly or indirectly".

8. It is important to note that both "tobacco advertising and promotion" and "tobacco sponsorship" cover promotion not only of particular tobacco products but also of tobacco use generally; not only acts with a promotional aim but also acts that have a promotional effect or are likely to have a promotional effect; and not only direct promotion but also indirect promotion. "Tobacco advertising and promotion" is not restricted to "communications", but also includes "recommendations" and "actions", which should cover at least the following categories: (a) various sales and/or distribution

arrangements[1] (b) hidden forms of advertising or promotion, such as insertion of tobacco products or tobacco use in various media contents; (c) association of tobacco products with events or with other products in various ways; (d) promotional packaging and product design features; and (e) production and distribution of items such as sweets and toys or other products that resemble cigarettes or other tobacco products.[2] It is also important to note that the definition of "tobacco sponsorship" covers "any form of contribution", financial or otherwise, regardless of how or whether that contribution is acknowledged or publicized.

9. Promotional effects, both direct and indirect, may be brought about by the use of words, designs, images, sounds and colours, including brand names, trademarks, logos, names of tobacco manufacturers or importers, and colours or schemes of colours associated with tobacco products, manufacturers or importers, or by the use of a part or parts of words, designs, images and colours. Promotion of tobacco companies themselves (sometimes referred to as corporate promotion) is a form of promotion of tobacco products or tobacco use, even without the presentation of brand names or trademarks. Advertising, including display, and sponsorship of smoking accessories, such as cigarette papers, filters and equipment for rolling cigarettes, and imitations of tobacco products, may also have the effect of promoting tobacco products or tobacco use.

10. Legislation should avoid providing lists of prohibited activities that are, or could be understood to be, exhaustive. While it is often useful to provide examples of prohibited activities, when legislation does so, it should make clear that they are only examples and do not cover the full range of prohibited activities. This can be made clear by using terms like "including but not limited to" or catch-all phrases such as "or any other form of tobacco advertising, promotion or sponsorship".

11. An indicative (non-exhaustive) list of forms of advertising, promotion and sponsorship that fall under the ban in Article 13 is attached in the Appendix to this Annex.

Recommendation

A comprehensive ban on tobacco advertising, promotion and sponsorship, should cover:

- *all advertising and promotion, as well as sponsorship without exemption;*
- *direct and indirect advertising, promotion and sponsorship;*
- *acts that aim at promotion and acts that have or are likely to have a promotional effect;*
- *promotion of tobacco products and the use of tobacco;*
- *commercial communications and commercial recommendations and actions;*

[1] For instance, incentive schemes for retailers, display at points of sale, lotteries, free gifts, free samples, discounts, competitions (whether the purchase of tobacco products is required or not) and incentive promotions or loyalty schemes, e.g. redeemable coupons provided with purchase of tobacco products.

[2] This text reflects the spirit of Article 16.1, which obliges Parties to "adopt and implement effective legislative, executive, administrative or other measures at the appropriate government level to prohibit sales of tobacco products to persons under the age set by domestic law, national law or eighteen. Article 16.1 specifies that these measures may include ... (c) prohibiting the manufacture and sale of sweets, snacks, toys or any other object in the form of tobacco products which appeal to minors."

- *contribution of any kind to any event, activity or individual;*
- *advertising and promotion of tobacco brand names and all corporate promotion; and*
- *traditional media (print, television and radio) and all media platforms, including Internet, mobile telephones and other new technologies as well as films.*

Retail sale and display

12. Display of tobacco products at points of sale in itself constitutes advertising and promotion. Display of products is a key means of promoting tobacco products and tobacco use, including by stimulating impulse purchases of tobacco products, giving the impression that tobacco use is socially acceptable, and making it harder for tobacco users to quit. Young people are particularly vulnerable to the promotional effects of product display.

13. To ensure that points of sale of tobacco products do not have any promotional elements, Parties should introduce a total ban on any display and on the visibility of tobacco products at points of sale, including fixed retail outlets and street vendors. Only the textual listing of products and their prices, without any promotional elements, would be allowed. As for all aspects of Article 13, the ban should also apply in ferries, airplanes, ports and airports.

14. Vending machines should be banned, because they constitute by their very presence a means of advertising or promotion under the terms of the Convention.[1]

Recommendation

Display and visibility of tobacco products at points of sale constitutes advertising and promotion and should therefore be banned. Vending machines should be banned because they constitute, by their very presence, a means of advertising and promotion.

Packaging and product features[2]

15. Packaging is an important element of advertising and promotion. Tobacco pack or product features are used in various ways to attract consumers, promote products, and cultivate and promote brand identity, for example by using logos, colours, fonts, pictures, shapes and materials on or in packs or on individual cigarettes or other tobacco products.

16. The effect of advertising or promotion on packaging can be eliminated by requiring plain packaging: black and white, or two other contrasting colours, as prescribed by national authorities; nothing other than a brand name, a product name and/or manufacturer's name, contact details and the

[1] Banning vending machines because they amount to advertising or promotion complements the provisions of Article 16 on protecting minors. The measures described in Article 16.1 may include: "ensuring that tobacco vending machines under its jurisdiction are not accessible to minors and do not promote sale of tobacco products to minors", and Article 16.5 stipulates that "a Party may, by means of a binding written declaration, indicate its commitment to prohibit the introduction of tobacco vending machines within its jurisdiction or, as appropriate, to a total ban on tobacco vending machines."

[2] See also the draft guidelines for implementation of Article 11, which address plain packaging with regard to health warnings and misleading information.

quantity of product in the packaging, without any logos or other features apart from health warnings, tax marks and other government-mandated information or markings; prescribed font style and size; and standardized shape, size and materials. There should be no advertising or promotion inside or attached to the package or on individual cigarettes or other tobacco products.

17. If plain packaging is not yet mandated, the prohibition should cover as many as possible of the design features that make tobacco products more attractive to consumers, such as animal or other figures, "fun" phrases, coloured cigarette papers, attractive smells, novelty or seasonal packs.

Recommendation

Packaging and product design are important elements of advertising and promotion. The effect of advertising or promotion on packaging can be eliminated if plain packaging is required. Packaging, individual cigarettes or other tobacco products should carry no advertising or promotion, including design features that make products attractive.

Internet sales

18. Internet sales of tobacco inherently involve advertising and promotion as defined in the Convention. The problem is not only limited to advertising and promotion but also includes sales to minors, tax evasion and illicit trade.

19. The most direct way of avoiding tobacco advertising or promotion on the Internet is to ban tobacco sales on the Internet.[1] The ban should apply not only to entities that sell the products but also to others, including credit card companies, that facilitate payment and postal or delivery services for the products.

20. To the extent that Internet sales are not yet banned, restrictions should be imposed, allowing only textual listing of products with prices, with no pictures or promotion features (e.g. any references to low prices).

21. Given the covert nature of tobacco advertising and promotion in the Internet and the difficulty of identifying and reaching wrongdoers, special domestic resources are needed to make these measures operational. Measures recommended in Annex 3 to eliminate cross-border tobacco advertising, promotion and sponsorship, in particular identifying contact points and dealing with notifications from other Parties, would help to ensure that domestic enforcement efforts are not undermined.

Recommendation

Internet sales of tobacco should be banned as they inherently involve tobacco advertising and promotion.

[1] Options for regulating Internet sales are being discussed by the Intergovernmental Negotiating Body on a Protocol on Illicit Trade in Tobacco Products.

Brand stretching and brand sharing

22. "Brand stretching" occurs when a tobacco brand name, emblem, trademark, logo or trade insignia or any other distinctive feature (including distinctive colour combinations) is connected with a non-tobacco product or service in such a way that the tobacco product and the non-tobacco product or service are likely to be associated.

23. "Brand sharing" occurs when a brand name, emblem, trademark, logo or trade insignia or any other distinctive feature (including distinctive colour combinations) on a non-tobacco product or service is connected with a tobacco product or tobacco company, in such a way that the tobacco product or company and the non-tobacco product or service are likely to be associated.

24. "Brand stretching" and "brand sharing" should be regarded as tobacco advertising and promotion in so far as they have the aim, effect or likely effect of promoting a tobacco product or tobacco use either directly or indirectly.

Recommendation

Parties should ban "brand stretching" and "brand sharing", as they are means of tobacco advertising and promotion.

Corporate social responsibility[1]

25. It is increasingly common for tobacco companies to seek to portray themselves as good corporate citizens by making contributions to deserving causes or otherwise promoting "socially responsible" elements of their business practices.

26. Some tobacco companies make financial or in-kind contributions to organizations, such as community, health, welfare or environmental organizations, either directly or through other entities. Such contributions fall within the definition of tobacco sponsorship in Article 1(g) and should be prohibited as part of a comprehensive ban, because the aim, effect or likely effect of such a contribution is to promote a tobacco product or tobacco use either directly or indirectly.

27. Tobacco companies may also seek to engage in "socially responsible" business practices (such as good employee-employer relations or environmental stewardship), which do not involve contributions to other parties. Promotion to the public of such otherwise commendable activities should be prohibited, as their aim, effect or likely effect is to promote a tobacco product or tobacco use either directly or indirectly. Public dissemination of such information should be prohibited, except for purposes of required corporate reporting (such as annual reports) or necessary business administration (e.g. for recruitment purposes and communications with suppliers).

28. Tobacco industry public education campaigns, such as "youth smoking prevention campaigns", should be prohibited on the basis that they involve "contributions" when implemented by other parties or represent corporate promotion if conducted by the industry itself.

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[1] The draft guidelines on Article 5.3, elaborated by a working group established by the Conference of the Parties, address this subject from the perspective of protecting public health policies with respect to tobacco control from commercial and other vested interests of the tobacco industry.

Recommendation

The Parties should ban contributions from tobacco companies to any other entity for "socially responsible causes", as this is a form of sponsorship. Publicity given to "socially responsible" business practices of the tobacco industry should be banned, as it constitutes advertising and promotion.

Legitimate expression

29. Implementation of a comprehensive ban on tobacco advertising, promotion and sponsorship should not prevent legitimate journalistic, artistic or academic expression or legitimate social or political commentary. Examples include news images with coincidental tobacco-related content in the background, the depiction of historical personalities or presentation of views on regulation or policy. Nevertheless, appropriate warnings or disclaimers may be required.

30. In some cases, journalistic, artistic or academic expression or social or political commentary may contain elements that are not justified for editorial, artistic, academic, social or political reasons and must be regarded as advertising, promotion or sponsorship rather than genuine editorial, artistic or academic content or genuine social or political commentary. This is obviously the case if an insertion is made for commercial, tobacco-related reasons, for example, paid placement of tobacco products or images in the media.

Recommendation

Implementation of a comprehensive ban on tobacco advertising, promotion and sponsorship need not interfere with legitimate types of expression, such as journalistic, artistic or academic expression or legitimate social or political commentary. Parties should, however, take measures to prevent the use of journalistic, artistic or academic expression or social or political commentary for promotion of tobacco use or tobacco products.

Depictions of tobacco in entertainment media

31. The depiction of tobacco in entertainment media products, such as films, theatre and games, can strongly influence tobacco use, particularly among young people. Therefore, Parties should take the following measures:

- Implement a mechanism requiring that when an entertainment media product depicts tobacco products, use or imagery of any type, the responsible executives at each company involved in the production, distribution or presentation of that entertainment media product certify that no money, gifts, free publicity, interest-free loans, tobacco products, public relations assistance or anything else of any value has been given in exchange for the depiction.

- Prohibit the depiction of identifiable tobacco brands or tobacco brand images in association with, or as part of the content of, any entertainment media product.

- Require the display of prescribed anti-tobacco advertisements at the beginning of any entertainment media product that depicts tobacco products, use or images.

- Implement a ratings or classification system that takes into account the depiction of tobacco products, use or images in rating or classifying entertainment media products (for example,

requiring adult ratings which restrict access of minors) and that ensures that entertainment media aimed at children (including cartoons) does not depict tobacco products, use or imagery.

Recommendation

Parties should take particular measures concerning the depiction of tobacco in entertainment media products, including requiring certification that no benefits have been received for any tobacco depictions, prohibiting the use of identifiable tobacco brands or imagery, requiring anti-tobacco advertisements and implementing a ratings or classification system that takes tobacco depictions into account.

Communication within the tobacco trade

32. The objective of banning tobacco advertising, promotion and sponsorship can usually be achieved without banning communications within the tobacco trade.

33. Any exception to a comprehensive ban on tobacco advertising, promotion and sponsorship for the purpose of providing product information to actors within the tobacco trade should be defined and applied strictly. Access to such information should be restricted to those persons who make trading decisions and who consequently need the information.

34. Tobacco manufacturers' newsletters can be exempted from the comprehensive ban on tobacco advertising, promotion and sponsorship, but only if they are destined exclusively for the manufacturer's employees, contractors, suppliers and other business partners and only to the extent that their distribution is limited to those persons or entities.

Recommendation

Any exception to a comprehensive ban on tobacco advertising, promotion and sponsorship to allow communication within the tobacco trade should be defined and applied strictly.

Constitutional principles in relation to a comprehensive ban

35. Any Party whose constitution or constitutional principles impose constraints on undertaking a comprehensive ban should, under Article 13, apply restrictions that are as comprehensive as possible in the light of those constraints. All Parties are obliged to undertake a comprehensive ban unless they are "not in a position" to do so "*due to* [their] constitution or constitutional principles". This obligation is to be interpreted in the context of the "recogni[tion] that a comprehensive ban on advertising, promotion and sponsorship would reduce the consumption of tobacco products", and in the light of the Convention's overall objective "to protect present and future generations from the devastating health, social, environmental and economic consequences of tobacco consumption and exposure to tobacco smoke" (Article 3).

36. It is acknowledged that the question of how constitutional principles are to be accommodated is to be determined by each Party's constitutional system.

Obligations related to Article 13.4 of the Convention

37. Under Articles 13.2 and 13.3 of the Convention, Parties are obliged to undertake a comprehensive ban on tobacco advertising, promotion and sponsorship (or apply restrictions that are as comprehensive as possible in light of their constitution or constitutional principles). Some forms of tobacco advertising, promotion and sponsorship can be expected to persist in Parties that have not yet met their obligations under Articles 13.2 and 13.3 of the Convention. In addition, some very limited forms of relevant commercial communication, recommendation or action might continue to exist after a comprehensive ban has been implemented, and some forms of tobacco advertising, promotion and sponsorship may continue in Parties whose constitutions or constitutional principles prevent a comprehensive ban.

38. Any form of tobacco advertising, promotion or sponsorship that is not prohibited is obliged to meet the requirements of Article 13.4. Notably, these requirements include: to "prohibit all forms of tobacco advertising, promotion and sponsorship that promote a tobacco product by any means that are false, misleading or deceptive or likely to create an erroneous impression about its characteristics, health effects, hazards or emissions" (13.4(a)); to "require that health or other appropriate warnings or messages accompany all tobacco advertising and, as appropriate, promotion and sponsorship" (13.4(b)); and to "require, if it does not have a comprehensive ban, the disclosure to relevant governmental authorities of expenditures by the tobacco industry on advertising, promotion and sponsorship not yet prohibited" (13.4(d)).

39. Parties should prohibit the use of any term, descriptor, trademark, emblem, marketing image, logo, colour and figurative or any other sign[1] that promotes a tobacco product or tobacco use, whether directly or indirectly, by any means that are false, misleading or deceptive or likely to create an erroneous impression about the characteristics, health effects, hazards or emissions of any tobacco product or tobacco products, or about the health effects or hazards of tobacco use. Such a prohibition should cover, inter alia, use of the terms "low tar", "light", "ultra-light", "mild", "extra", "ultra" and other terms in any language that may be misleading or create an erroneous impression.[2]

40. Parties should consider giving health or other warnings and messages accompanying any tobacco advertising, promotion and sponsorship at least equal prominence as the advertising, promotion or sponsorship. The content of the required warnings and messages should be prescribed by the relevant authorities and should effectively communicate the health risks and addictiveness of tobacco use, discourage the use of tobacco products and increase motivation to quit tobacco use. In order to maximize their effectiveness, the warnings or other messages required by Parties under Article 13.4(b) of the Convention should be consistent with the warnings or other messages on packaging that Parties require under Article 11.

41. Parties should require disclosure by the tobacco industry to relevant governmental authorities of any advertising, promotion and sponsorship in which it engages. The disclosures should be made at regular intervals prescribed by law and in response to specific requests. They should include, both in total and by brand, information about:

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[1] These phrases are taken from Article 11.1(a), with the addition of the word "colour", which the working group recognizes can be used to convey a misleading impression about the characteristics, health effects or hazards of tobacco products.

[2] See Article 11.1(a) and the draft guidelines on Article 11.

- the kind of advertising, promotion or sponsorship, including its content, form and type of media;
- the placement and extent or frequency of the advertising, promotion or sponsorship;
- the identity of all entities involved in the advertising, promotion and sponsorship, including advertising and production companies;
- in the case of cross-border advertising, promotion or sponsorship originating from a Party's territory, the territory or territories in which it is intended to be, or may be, received; and
- the amount of financial or other resources used for the advertising, promotion or sponsorship.

42. Parties should make the information readily available to the public (e.g. via the Internet)[1] while ensuring the protection of trade secrets.

43. While the obligations stated in Article 13.4(d) regarding disclosure of expenditures by the tobacco industry on advertising, promotion and sponsorship that is not yet prohibited apply only to Parties that do not have a comprehensive ban, all Parties should implement the recommended measures, in line with Article 13.5, which encourages Parties to implement measures beyond their obligations under Article 13.4. Requiring disclosure by the tobacco industry of expenditures on all advertising, promotion and sponsorship in which it engages may help Parties that consider that they have a comprehensive ban to identify any advertising, promotion or sponsorship not covered by the ban or engaged in by the tobacco industry in contravention of the ban. Disclosure requirements may have the added benefit of discouraging the tobacco industry from engaging in tobacco advertising, promotion or sponsorship in which it might otherwise engage.

Recommendation

Parties should meet the requirements of Article 13.4 regarding any form of tobacco advertising, promotion or sponsorship that is not prohibited. Parties should prohibit all promotion of a tobacco product by any means that are false, misleading, deceptive or likely to create an erroneous impression; mandate health or other appropriate warnings or messages; and require regular disclosure by the tobacco industry to authorities of any advertising, promotion and sponsorship in which it engages. Parties should make the disclosed information readily available to the public.

Consistency

44. Domestic bans and their effective enforcement are the cornerstones of any meaningful comprehensive ban on tobacco advertising, promotion and sponsorship at the global level. Contemporary media platforms such as the Internet, films and direct broadcast satellites easily cross borders, and many forms of advertising, promotion and sponsorship regulated by domestic rules, such as event sponsorship, are broadcast and disseminated widely to other States. Moreover, advertising

[1] This provision supports the obligation under Article 12(c) to promote public access to a wide range of information on the tobacco industry as relevant to the objective of the Convention.

and promotion are often linked to products such as items of clothing and technological devices or appear in publications, and thus move from one State to another when these items move.

45. It is obvious that the effectiveness of domestic bans can be undermined unless there is international cooperation.

Cross-border advertising, promotion and sponsorship originating from a Party's territory (out-flowing material)

46. Article 13.2 of the Convention states that "a comprehensive ban shall include, subject to the legal environment and technical means available to that Party, a comprehensive ban on cross-border advertising, promotion and sponsorship *originating from its territory.*"

47. Implementation of the ban should cover, for example, all publications and products printed or produced within the territory of a Party, whether they are targeted to persons within the Party's territory or to persons in the territories of other States. It is often difficult to differentiate between publications or products targeted to or actually used in the originating State and those targeted at and used in other States.

48. The ban should also apply to placing tobacco advertising, promotion and sponsorship on the Internet or another cross-border communications technology by any person or entity within the territory of a Party whether the material is targeted to persons outside or inside that Party's territory.

49. Moreover, the ban should also apply to any person or entity who broadcasts tobacco advertising, promotion and sponsorship that could be received in another State.

50. A comprehensive ban on advertising, promotion and sponsorship originating from a Party's territory should also ensure that a Party's nationals – natural persons or legal persons – do not engage in advertising, promotion or sponsorship in the territory of another State irrespective of whether it is imported back to their State of origin.

Cross-border advertising, promotion and sponsorship entering a Party's territory

51. Article 13.7 states that "Parties which have a ban on certain forms of tobacco advertising, promotion and sponsorship have the sovereign right to ban those forms of cross-border tobacco advertising, promotion and sponsorship *entering their territory* and to impose equal penalties as those applicable to advertising, promotion and sponsorship originating from their territory in accordance with their national law."

52. Implementation of the ban should cover, for example, publications and products printed or produced in other States entering the territory of a Party or targeted to persons in that territory. Parties should consider carrying out sampling checks for imported consignments of printed publications. If such publications are printed, published or distributed by nationals of a Party or entities established in a Party's territory, they should be held liable and the ban enforced to the fullest extent possible.[1] The ban should also apply to all Internet content that is accessible within a Party's territory, and to any

[1] A Party may also enforce its ban against non-national in some circumstances. How to address nationals of other Parties may be the subject of provisions of a possible protocol on cross-border advertising, promotion and sponsorship.

other audio, visual or audiovisual material broadcast into or otherwise received in a Party's territory, whether or not it is targeted to persons in the territory of that Party.

Recommendation

Parties with a comprehensive ban or restrictions on tobacco advertising, promotion and sponsorship should ensure that any cross-border tobacco advertising, promotion and sponsorship originating from their territory is banned or restricted in the same manner as domestic tobacco advertising, promotion and sponsorship. Parties should make use of their sovereign right to take effective actions to limit or prevent any cross-border tobacco advertising, promotion and sponsorship entering their territory, whether from Parties that have restrictions or from non-Parties, recognizing that in some cases effective actions might have to be addressed in a Protocol.

Responsible entities

53. The responsible entities should be defined widely, covering the entire marketing chain. Primary responsibility should lie with the initiator of advertising, promotion or sponsorship, usually tobacco manufacturers, wholesale distributors, importers, retailers and their agents and associations.

54. Moreover, many other entities are involved in tobacco advertising, promotion and sponsorship and should also be held responsible.

55. Responsibility cannot be attributed in the same manner to all entities, as their involvement in the production, placement and dissemination of tobacco advertising, promotion and sponsorship varies. In the case of tobacco sponsorship, the responsible entities are those that make any relevant form of contribution, those that receive any relevant form of contribution and any intermediaries that facilitate the making or receiving of a relevant form of contribution. When tobacco advertising and promotion involve communication, the way in which entities should be held responsible depends on their role in the production and dissemination of the content of the communication and the possibilities they have to control it. The disseminator should be made responsible in so far as it is aware of, or was in the position to become aware of, the content of the advertising and promotion. This is true whatever media or communications technology is involved, but it applies especially to controlling content on the Internet and direct broadcast satellite.

56. In relation to all forms of media and communications:

- Persons or entities that produce or publish content (e.g. advertising agencies, designers, publishers of newspapers and other printed materials, broadcasters and producers of films, television and radio programmes, games and live performances, and Internet, mobile phone, satellite and game content producers) should be banned from including tobacco advertising, promotion and sponsorship.

- Persons or entities, for example media and event organizers, sportspeople, celebrities, film stars and other artists, should be banned from engaging in tobacco advertising, promotion and sponsorship.

- Particular obligations (such as that to remove or disable access to content) should be applied to other entities involved in analogue or digital media and communication (such as social

networking sites, Internet service providers and telecommunication companies), once they have notice of tobacco advertising, promotion and sponsorship.

In the case of legal entities, the responsibility should normally lie on the company, not an individual employee.

57. A contract, agreement or arrangement concerning tobacco advertising, promotion or sponsorship should be held invalid if it is agreed in violation of a comprehensive ban.

58. In relation to the Internet, for example, there are five principal categories of responsible entity upon which bans or particular obligations should be imposed.

- *Content producers* create the content or cause it to be created. These include tobacco companies, advertising agencies, and producers of television programmes, films and games that are distributed online. Content producers should be *banned* from including tobacco advertising, promotion or sponsorship in the content they produce.

- *Content publishers* include publishers and entities that select content before it is made available to Internet users (e.g. Internet sites of newspapers or broadcasters). Content publishers should be *banned* from including tobacco advertising, promotion or sponsorship in the content they make available.

- *Content hosts* are entities that control Internet-connected computer servers on which content is stored, including entities that aggregate content produced by others without selecting the content before they make it available to Internet users (such as social networking Internet sites). Content hosts should have an *obligation to remove or disable access to* tobacco advertising, promotion and sponsorship *once they have received notice of the content.*

- *Content navigators* are entities that facilitate the location of content by users of communications services, such as Internet search engines. Content navigators should have an *obligation to disable access to* tobacco advertising, promotion and sponsorship *once they have received notice of the content.*

- *Access providers* are entities that provide end-user access to communications services, such as Internet service providers and mobile telephone companies. Access providers should have an *obligation to disable access to* tobacco advertising, promotion and sponsorship *once they have received notice of the content.*

59. Unlike the obligations on content producers, content publishers and content hosts, Parties could limit the obligations on content navigators and access providers to using reasonable efforts to disable access in light of what is technically possible.

Recommendation

The entities responsible for tobacco advertising, promotion and sponsorship should be defined widely, and the way in which they are held responsible should depend on their role.

– *Primary responsibility should lie with the initiator of advertising, promotion or sponsorship, usually tobacco manufacturers, wholesale distributors, importers, retailers and their agents and associations.*

– *Persons or entities that produce or publish media content should be banned from including tobacco advertising, promotion and sponsorship in the content they produce or publish.*

– *Persons or entities (such as event organizers, sports people and celebrities) should be banned from engaging in tobacco advertising, promotion and sponsorship.*

– *Particular obligations (such as that to remove content) should be applied to other entities, involved in analogue or digital media after they have received notice of the tobacco advertising, promotion and sponsorship.*

Domestic enforcement of laws on tobacco advertising, promotion and sponsorship

Sanctions

60. Parties should introduce and apply effective, proportionate and dissuasive penalties (including fines, corrective advertising remedies and license suspension or cancellation). In order that the penalties imposed be effective deterrents, they should be graded and should be commensurate with the nature and seriousness of the offence(s), including a first offence, and should outweigh the potential economic benefits to be derived from the advertising, promotion or sponsorship.

61. Repeat infringements should incur a highly significant penalty for a manufacturer or responsible entity. In the case of frequent or flagrant infringements, more stringent sanctions should be imposed, including possible imprisonment. Sanctions should also include the obligation to remedy the infringement, for example by:

- removal of the advertising, promotion or sponsorship;
- the publication of the court decision in a manner to be determined by the court and at the expense of the party or parties designated by the court; and
- funding of corrective or counter-advertising.

62. Sanctions should be applied to the conduct of entities and not only to individuals (including corporate entities that can be held responsible for the conduct of related corporate entities outside the territory but with an effect within the territory). Sanctions should also be applied to the conduct of managers, directors, officers and/or legal representatives of corporate entities when those individuals bear responsibility for the corporate entity's conduct.

63. Licensing of tobacco manufacturers, wholesale distributors, importers and retailers can be an effective method for controlling advertising, promotion and sponsorship. A licence would be granted or renewed only if the applicant could ensure compliance with the legal requirements. In cases of non-compliance, the license could be withdrawn for a certain time or cancelled. For responsible entities not directly involved in producing or selling tobacco, e.g. broadcasters, when such entities are required to be licensed, compliance with the provisions on tobacco advertising, promotion and sponsorship should be included in the criteria for granting, renewing, suspending or revoking a license.

64. If deterrent sanctions are in place, enforcement authorities might be successful in putting an end to illegal practices without court proceedings (e.g. by contacts, meetings, warnings, administrative decisions and periodic penalty payments).

Monitoring, enforcement and access to justice

65. Parties should designate a competent, independent authority to monitor and enforce the laws and entrust it with the necessary powers and resources. This agency should have the power to investigate complaints, seize unlawful advertising or promotion and pronounce on complaints and/or initiate appropriate legal proceedings.

66. Civil society and citizens should be involved in monitoring and effective enforcement of the ban. Civil society, notably entities such as public health, health care, prevention, youth protection or consumer organisations, can be expected to undertake rigorous monitoring, and legislation should specify that members of the public may initiate complaints.

67. In addition, civil law options should be made available to oppose tobacco advertising, promotion and sponsorship. National law should enable any interested person or nongovernmental organization to initiate legal action against illegal tobacco advertising, promotion and sponsorship.

68. The enforcement programme may include a toll-free telephone complaint hotline, an Internet web site or a similar system to encourage the public to report violations.

Recommendation

Parties should introduce and apply effective, proportionate and dissuasive penalties. Parties should designate a competent, independent authority to monitor and enforce the law and entrust it with the necessary powers and resources. Civil society should be involved in monitoring and enforcement of the law and have access to justice

Public education and community awareness

69. In the spirit of Article 12 of the Convention,[1] Parties should promote and strengthen public awareness of tobacco advertising, promotion and sponsorship in all sectors of society, using all available communication tools. Parties should, inter alia, adopt appropriate measures to promote broad access to effective, comprehensive educational and public awareness programmes that underline the importance of a comprehensive ban, educate the public concerning its necessity, and explain why advertising, promotion and sponsorship by the tobacco industry is unacceptable.

70. Engaging the support of the community to monitor compliance and report violations of laws against tobacco advertising, promotion and sponsorship is an essential element of enforcement. In order for members of the community to perform this role, they must be made aware of the problem and understand the law and the ways in which they can act on breaches.

71. Parties should implement public education and awareness programmes, inform members of the community about existing laws on tobacco advertising, promotion and sponsorship, the steps that can be taken to inform the relevant government agency of any advertising, promotion or sponsorship, and the steps that can be taken against a person who has engaged in tobacco advertising, promotion or sponsorship in breach of the law.

[1] "Education, communication, training and public awareness".

Recommendation

Parties should promote and strengthen, in all sectors of society, public awareness of the need to eliminate tobacco advertising, promotion and sponsorship, the laws against it, and the ways in which members of the public can act on breaches of these laws.

International collaboration

72. The effectiveness of efforts to eliminate tobacco advertising, promotion and sponsorship depends not only on the initiatives undertaken by individual Parties but also on the extent to which Parties cooperate in addressing tobacco advertising, promotion and sponsorship. Effective international cooperation will be essential to the elimination of both domestic and cross-border tobacco advertising, promotion and sponsorship.

73. Parties to the Convention already have undertaken commitments with respect to international cooperation, including under Article 13.6 (Cooperation in the development of technologies and other means necessary to facilitate the elimination of cross-border advertising), Article 19 (Liability); Article 20 (Research, surveillance and exchange of information), particularly Article 20.4 (Exchange of publicly available, scientific, technical, socioeconomic, commercial and legal information, as well as information regarding the practices of the tobacco industry); Article 21 (Reporting and exchange of information), Article 22 (Cooperation in the scientific, technical, and legal fields and provision of related expertise) and Article 26 (Financial resources).

74. In addition to the recommendations in these guidelines, the working group is making further recommendations to the Conference of the Parties on any other measures that would contribute to the elimination of cross-border advertising, promotion and sponsorship (see Annex 3). Recommendations are made with respect to facilitation of the exchange of information and other cooperation between Parties. If the Conference of the Parties decides to establish measures designed to facilitate the exchange of information and other cooperation between Parties with respect to cross-border advertising, promotion and sponsorship, for example as outlined in Annex 3, the working group recommends that consideration also be given to the benefits of applying such measures to domestic tobacco advertising, promotion or sponsorship, recognizing that Parties would benefit from sharing information, experience and expertise in respect of all tobacco advertising, promotion and sponsorship, not only cross-border tobacco advertising, promotion and sponsorship.

APPENDIX

Indicative (non-exhaustive) list of forms of tobacco advertising, promotion and sponsorship within the terms of the Convention

- communication through audio, visual or audiovisual means: print (including newspapers, magazines, pamphlets, leaflets, flyers, letters, billboards, posters, signs), television and radio (including terrestrial and satellite), films, DVDs, videos and CDs, games (computer games, video games or online games), and other digital communication platforms (including the Internet and mobile phones), theatre or other live performance;

- brand-marking, including in entertainment venues and retail outlets, and on vehicles and equipment (e.g. by use of brand colours or schemes of colours, logos or trademarks);

- display of tobacco products at points of sale;

- tobacco product vending machines;

- Internet sales of tobacco products;

- brand stretching and brand sharing (product diversification);

- product placement (i.e. the inclusion of or reference to a tobacco product, service or trademark in the context of communication (see above), in return for payment or other consideration);

- provision of gifts or discounted products with the purchase of tobacco products (e.g. key rings, T-shirts, baseball hats, cigarette lighters);

- supply of free samples of tobacco products, including in conjunction with marketing surveys and taste-testing;

- incentive promotions or loyalty schemes, e.g. redeemable coupons provided with purchase of tobacco products;

- competitions, associated with tobacco products or brand names, whether requiring the purchase of a tobacco product or not;

- direct targeting of individuals with promotional (including informational) material, such as direct mail, telemarketing, "consumer surveys" or "research";

- promotion of discounted products;

- sale or supply of toys or sweets that resemble tobacco products;

- payments or other contributions to retailers to encourage or induce them to sell products, including retailer incentive programmes (e.g. rewards to retailers for achieving certain sales volumes);

- packaging and product design features;

- payment or other consideration in exchange for the exclusive sale of a particular product or particular manufacturer's product in a retail outlet, at a venue or at an event, or prominent display of a product;

- sale, supply, placement and display of products at educational establishments, hospitality, sporting, entertainment, music, dance and social venues or events;

- provision of financial or other support to events, activities, individuals or groups (such as sporting or arts events, individual sports people or teams, individual artists or artistic groups, welfare organizations, politicians, political candidates or political parties), whether or not in exchange for publicity, including corporate social responsibility activities; and

- provision of financial or other support by the tobacco industry to venue operators, such as pubs, clubs or other recreational venues, in exchange for building or renovating premises to promote tobacco products or use or provision of awnings and sunshades.

ANNEX 2

RECOMMENDATIONS ON KEY ELEMENTS OF A PROTOCOL ON CROSS-BORDER ADVERTISING, PROMOTION AND SPONSORSHIP

1. Having taken into account, as requested by the Conference of the Parties, the report of the expert group on cross-border advertising, promotion and sponsorship presented to the Conference of the Parties at its second session, the working group recommends:

2. If the Conference of the Parties decides, either now or at some time in the future, to commence negotiation of a protocol on cross-border advertising, promotion and sponsorship, without prejudice to the right of the Conference of the Parties to decide the scope of those negotiations, that consideration be given to the following areas for possible inclusion in such a protocol:

- notification and response procedures in relation to cross-border tobacco advertising, promotion and sponsorship, including obligations to acknowledge receipt of notification, take measures to investigate and respond to the notifying party;[1]

- cooperation between relevant enforcement agencies in relation to the investigation of possible breaches of the law and the bringing of enforcement proceedings, including with respect to the exchange of information, searches of premises or records and the obtaining of evidence (production of documents and the interviewing of witnesses);[2]

- exercise of jurisdiction over cross-border tobacco advertising, promotion or sponsorship, in order to address the possibility that agencies in multiple Parties bring enforcement proceedings against the same entity with regard to the same conduct or, alternatively, that no agency brings enforcement proceedings in the expectation that an agency in another Party or Parties will do so;[3]

- recognition and enforcement of foreign judgments, acknowledging that a Party may obtain a judgement against a body that is not located in its territory and has no assets in its territory.[4]

[1] See document A/FCTC/COP/2/10, paragraph 21.

[2] See document A/FCTC/COP/2/10, paragraphs 17–21.

[3] See document A/FCTC/COP/2/10, paragraphs 22–26.

[4] See document A/FCTC/COP/2/10, paragraphs 27–28.

ANNEX 3

RECOMMENDATIONS ON ANY OTHER MEASURES THAT WOULD CONTRIBUTE TO THE ELIMINATION OF CROSS-BORDER ADVERTISING, PROMOTION AND SPONSORSHIP

1. In its deliberations, the working group noted that international cooperation is essential to the elimination of both domestic and cross-border tobacco advertising, promotion and sponsorship. The working group was mandated by the Conference of the Parties to provide recommendations on other measures that would contribute to the elimination of cross-border advertising, promotion and sponsorship. These recommendations are provided below.

Recommendations

2. The working group, having taken into account that the effectiveness of efforts to eliminate cross-border tobacco advertising, promotion and sponsorship depends not only on initiatives undertaken by individual Parties but also on the extent to which Parties cooperate in addressing cross-border tobacco advertising, promotion and sponsorship; and that Parties to the Convention have already undertaken commitments with respect to international cooperation, including under Article 13.6 (Cooperation in the development of technologies and other means necessary to facilitate the elimination of cross-border advertising); Article 19 (Liability), Article 20 (Research, surveillance and exchange of information), particularly Article 20.4 (Exchange of publicly available, scientific, technical, socioeconomic, commercial and legal information, as well as information regarding the practices of the tobacco industry); Article 21 (Reporting and exchange of information); Article 22 (Cooperation in the scientific, technical, and legal fields and provision of related expertise); and Article 26 (Financial resources) recommends:

(1) that the questions on Article 13 in the reporting instrument adopted by the Conference of the Parties:[1]

- be revised to reflect the principal provisions of the guidelines on Article 13 to be adopted by the Conference of the Parties at its third session;

- be revised to include the following question: "Are you precluded by your constitution or constitutional principles from undertaking a comprehensive ban on all tobacco advertising, promotion and sponsorship? If yes, please give details"; and

- be moved from the section "Optional questions" to the section "Core questions";

[1] Decision FCTC/COP1(14), contained in document A/FCTC/COP/1/DIV/8.

(2) that a web site be set up and facilitated which could be used as a knowledge hub on matters of cross-border advertising, promotion and sponsorship and as a means for notifying instances of cross-border advertising, promotion and sponsorship; relevant material should be regularly uploaded onto the web site. The web site should have, while ensuring the protection of personal data and trade secrets:

(i) a section accessible only by Parties including:

(a) an up-to-date list of Parties' contact points;

(b) a register of experts who can provide technical assistance and training on relevant matters; and

(c) other information provided by Parties or the Convention Secretariat that is to be shared only with Parties;

(ii) a section accessible by Parties and observers that includes:

(a) a facility for reporting instances of cross-border advertising, promotion and sponsorship; and

(b) information provided by Parties or the Convention Secretariat that is to be shared only with Parties and observers but not with the public;

(iii) a section accessible by the public including:

(a) information provided by Parties or the Secretariat that may be shared with the public;

(b) evidence of the impact of cross-border tobacco advertising, promotion and sponsorship and the effectiveness of bans on tobacco advertising, promotion and sponsorship; and

(c) links to the web sites of other relevant bodies;

(3) that Parties, while ensuring the protection of personal data and trade secrets:

– identify a contact point on matters of tobacco advertising, promotion and sponsorship to the Convention Secretariat and notify the Convention Secretariat of any changes in details;

– when notified by another Party of cross-border tobacco advertising, promotion and sponsorship that appears to originate, or have originated, from its territory, acknowledge the notification and inform the notifying party within a reasonable time of any investigation or other action taken in response to the notification;

– use the web site to share relevant information with other Parties and, as appropriate, observers and the public, particularly in relation to:

- persons or entities responsible for the production, placement and/or dissemination of cross-border tobacco advertising, promotion and sponsorship;
- new and emerging methods and forms of cross-border tobacco advertising promotion and sponsorship;
- developments in technology;
- lessons learnt in dealing with cross-border tobacco advertising promotion and sponsorship;
- research needs and opportunities;
- legislation or regulations, including links to such legislation or regulations;
- breaches, or suspected breaches, of legislation or regulations and the origin of notifications or complaints made;
- where appropriate, pending investigations or enforcement action;
- where appropriate, the outcomes of any relevant investigations or enforcement action;
- jurisprudence, including links to such jurisprudence;
- education, training or public awareness programmes planned or implemented;

– notify the Secretariat about experts, whether governmental or nongovernmental, who can provide technical assistance and training to Parties on relevant matters;

(4) that the following tasks be carried out at the international level in a manner to be decided by the Conference of the Parties:

– transmission of a notification, from a Party or observers, of an instance of cross-border tobacco advertising, promotion or sponsorship to the relevant contact point in the Party on whose territory the cross-border tobacco advertising, promotion or sponsorship appears to be originating or to have originated;

– identification of experts, whether governmental or nongovernmental, who can provide technical assistance and training to Parties on relevant matters;

– updating Parties on relevant developments, including new and emerging methods and forms of cross-border advertising, promotion and sponsorship and relevant developments in technology, and communicating such developments to Parties and, as appropriate, observers and the public;

– facilitation of the provision of technical assistance to Parties in respect of cross-border tobacco advertising, promotion and sponsorship;

- assessment of research needs in relation to cross-border tobacco advertising, promotion and sponsorship, and communication of these needs to Parties, research funding bodies and interested researchers;

- liaison with pertinent bodies, including relevant international and regional intergovernmental organizations and relevant nongovernmental organizations, in respect of implementation of Article 13;

- coordination of efforts by Parties to find new technologies to assist in eliminating cross-border tobacco advertising, promotion and sponsorship;

- promotion of public awareness on matters relating to cross-border tobacco advertising, promotion and sponsorship;

- provision of regular reports on the progress of Parties in implementing Article 13, which may include recommendations for review or amendment of the guidelines on Article 13; and

- provision of regular reports on the effectiveness of the arrangements established to facilitate international cooperation with respect to cross-border tobacco advertising promotion and sponsorship and on ways in which the effectiveness of these arrangements might be enhanced;

(5) that observers to the Conference of the Parties be invited to provide relevant information to the Convention Secretariat with respect to cross-border tobacco advertising, promotion and sponsorship, including:

- persons or entities responsible for the production, placement and/or dissemination of cross-border tobacco advertising, promotion and sponsorship;

- new and emerging methods and forms of cross-border tobacco advertising, promotion and sponsorship;

- developments in technology;

- research needs and opportunities; and

- education, training or public awareness programmes, planned or implemented;

(6) that the Convention Secretariat examine mechanisms for providing any assistance to give Parties effective access to the arrangements of the kind referred to in subparagraphs (2), (3) and (4), taking into account the particular needs of developing countries and countries with economies in transition, and communicate relevant information to the Parties;

(7) that an expert group on cross-border tobacco advertising, promotion and sponsorship be established and mandated with the following functions:

- keeping the Conference of the Parties up-to-date on relevant developments in technology, in cross-border tobacco advertising, promotion and sponsorship and in best practices in responding to cross-border tobacco advertising, promotion and sponsorship;

– monitoring and reviewing the guidelines on implementation of Article 13 and the arrangements established to facilitate international cooperation between Parties with respect to cross-border tobacco advertising, promotion and sponsorship; and

– reporting to the Conference of the Parties, through the Secretariat, on the performance of its functions.

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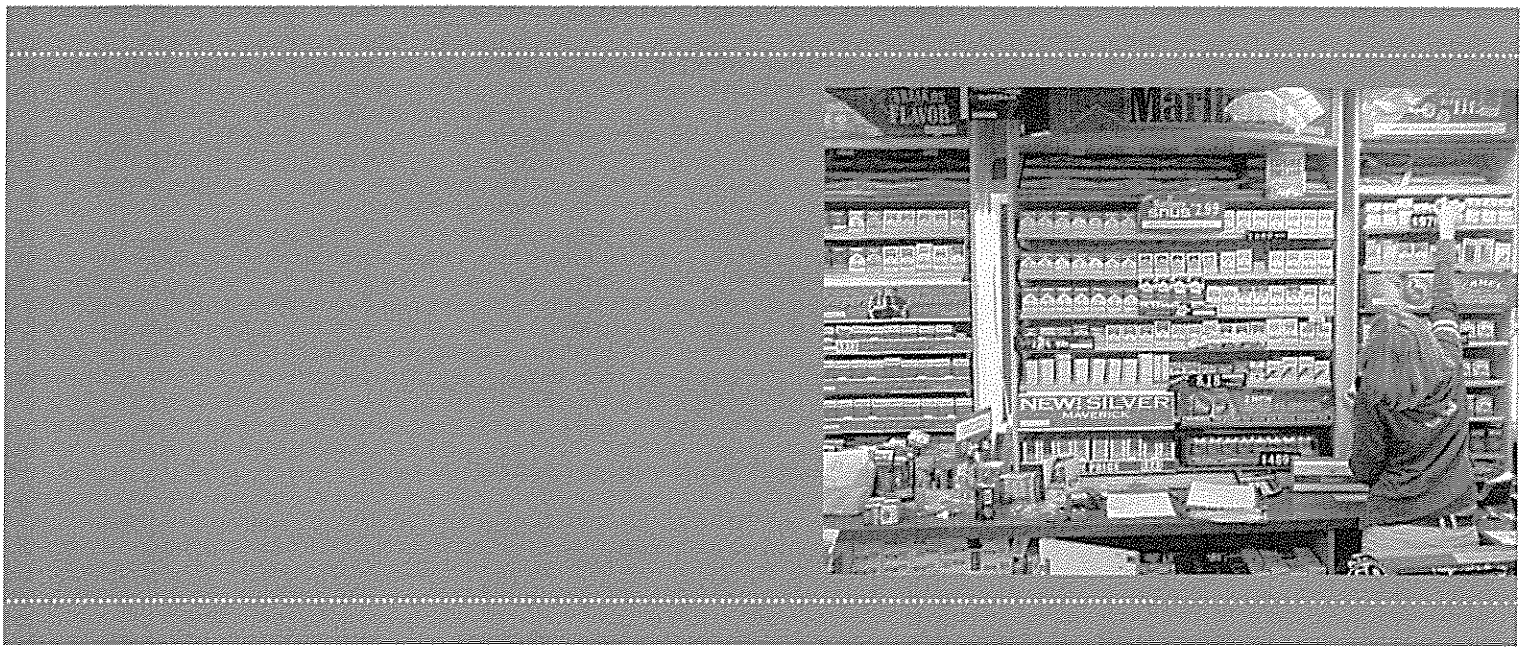

Tobacco Product Display Restrictions

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Funded by a grant from the New York State Department of Health.

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The Center for Public Health and Tobacco Policy is a resource for the New York and Vermont tobacco control communities. It is funded by the New York State and Vermont Departments of Health and works with the New York State and Vermont Tobacco Control Programs and their contractors and partners to develop and support policy initiatives that will reduce tobacco-related morbidity and mortality in New York and Vermont.

Tobacco Product Display Restrictions

Part 1 – Why Focus on Product Displays?

Nearly 90% of regular smokers start smoking by the age of 18 – very few begin after high school.[1] As Surgeon General Joycelyn Elders stated in 1994, "[I]f adolescents can be kept tobacco-free, most will never start using tobacco."[2] While there are several factors that contribute to adolescent smoking, tobacco advertising and promotion at retail stores where tobacco products are sold (also referred to as the "point-of-sale") is undoubtedly one of the most significant. According to a study published in the *American Journal of Public Health*, "After controlling for other variables, weekly or more frequent exposure to retail tobacco marketing was associated with a 50% increase in the odds of ever smoking – nearly as much as the effect of exposure to a parent or household member who smokes."[3]

* * *

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One way in which tobacco companies seek to entice adolescents to use their products is through the use of prominent product displays, sometimes referred to as "power walls." These power walls – typically located behind the cash registers – are highly engineered by tobacco companies to maximize visual intrusiveness and instigate impulse purchases.[4] They function as a subtle kind of advertising, conveying the message that cigarettes are popular and desirable. And they are effective. A recent study concluded that "young people's exposure to tobacco displays at the POS [point-of-sale] is significantly associated with being susceptible to smoking, experimenting with smoking and current smoking."[5]

This report focuses on a powerful legislative response to the tobacco companies' attempts to manipulate youth perceptions and addict a new generation to tobacco use: tobacco

product display restrictions. Display restrictions, which require tobacco products to be kept out of sight, are an appropriate and effective policy intervention that, when combined with other tobacco control efforts, will protect adolescents from predatory tobacco marketing. Tobacco product display restrictions have been successfully implemented around the world, and their use is spreading rapidly.

The Growth of Point-of-Sale Advertising

When the Master Settlement Agreement was signed in 1998, resolving lawsuits brought by 46 states against the tobacco industry, the tobacco companies agreed to stop advertising their products on billboards and to limit other forms of advertising and sponsorship. Rather than reduce their spending on advertising and promotion, however, they shifted much of their spending to the point-of-sale. Annual marketing expenditures by tobacco companies skyrocketed, from $6.9 billion in 1998 to $12.8 billion in 2006. In a given year, the tobacco industry spends close to half a billion dollars in marketing in New York State alone – more than $22 per New Yorker – and close to 90% of that money is spent at the point-of-sale (through a combination of advertising, price buy-downs, and retailer incentives).[6]

> *"The tobacco companies have the displays and they were trying to outbid each other . . . . They are trying to get the space right behind the counter where the racks are . . . . They want the customer to see the cigarettes and the price right behind the cashiers."*
>
> – Convenience store manager (Feighery 2007)

The largest portion of the tobacco companies' point-of-sale promotional budget is spent on price discounting, but a significant amount of that money is spent on "promotional allowances" that compensate retailers for prominently displaying tobacco products in specially designed display racks. In return for receiving these allowances, the tobacco retailers are typically required to sign contracts in which they commit to displaying a company's cigarettes and other tobacco products in a particular location and in a particular manner – usually in a power wall right behind the cash register.[7] In 2008, the most recent year for which data is available, tobacco companies paid retailers nearly $488 million in promotional allowances.[8] The vast amount of money spent on tobacco product displays shows that the tobacco companies clearly believe that prominent power walls increase their sales. Moreover, the fact that they need to pay retailers to display their products (approximately $200 per month, according to a 1999 survey[9]) suggests that the size of the display racks is not driven by customer demand:

> The fact that [the retailers] need to be paid strongly suggests that the size and nature of the displays and signage that the tobacco firms seek to install are more substantial than the retailers' natural inclination. . . . It also suggests that the displays and signage are more than the retailers would normally deploy, given the sales volume and profit margins.[10]

Although cigarettes are a uniquely dangerous product, retailers receive far more in display incentives for cigarettes than they do for any other product. A 1999 study of small retail stores found that 62.4% received compensation for tobacco product placement and in-store displays, compared to only

25.7% for snack foods and soda, and 9.1% for beer and wine.[11]

The Impact of Power Walls

When youth are exposed to extensive tobacco product displays every time they enter a store that sells cigarettes, it distorts their perceptions regarding the availability of cigarettes and increases the likelihood that they will start smoking.

In a 2006 study, researchers found that "[t]he presence of cigarette displays at the point-of-sale, even in the absence of cigarette advertising, has adverse effects on students' perceptions about ease of access to cigarettes and brand recall, both factors that increase the risk of taking up smoking."[12] A more recent research study conducted in New Zealand – a jurisdiction that has banned all point-of-sale advertising other than the displays of the tobacco products themselves – concluded that "[t]he association between exposure to point of sale tobacco displays and susceptibility to smoking uptake or experimenting is comparable to the association between these outcomes and parental smoking, smoking in the home and school SES [socio-economic status]."[13]

The prevalence of power walls in convenience stores is especially troublesome since adolescents are likely to be the ones with the greatest exposure to this advertising. Three-fourths of teenagers visit a convenience store at least once a week, and they stay in these stores for an average of 16 minutes – twice the average time of adults.[14] There is also evidence that tobacco companies may be targeting stores that are popular with youth for the largest displays. A study examining the prevalence of certain brands of tobacco advertising in California found that "stores popular among adolescents displayed more than three times as many cigarette marketing materials outside, and contained twice as much shelf space for Marlboro, Camel, and Newport."[15] Marlboro, Camel, and Newport are the three most popular brands among youth smokers.[16]

In addition, tobacco product displays also have negative effects on those who are trying to smoke less or stop smoking cigarettes. Melanie Wakefield, a leading tobacco researcher and director of Australia's Centre for Behavioural Research in Cancer, has written: "[C]igarette displays stimulate impulse purchases among smokers. Those trying to avoid smoking commonly experience urges to purchase cigarettes when confronted with cigarette displays."[17] Likely for this reason, current smokers have expressed strong support for tobacco product display restrictions when surveyed.[18]

In sum, there is considerable evidence that the ubiquitous presence of large cigarette displays in retail locations increases the likelihood that youth will initiate smoking. Power walls influence the public's perceptions regarding smoking and cause people – especially youth – to overestimate the prevalence of smoking. Once individuals are addicted to cigarettes, these displays trigger urges to purchase cigarettes and increase consumption, which can make quitting more difficult. Furthermore, although anti-smoking advertising and warnings can help reduce youth susceptibility to smoking, they are not sufficient to counteract the effects of point-of-sale advertising.[19] In light of this evidence, the time has come for a restriction on the display of tobacco products in non-adult-only retail stores.

Why Tobacco Product Display Restrictions Are Necessary
Tobacco use is far and away the leading cause of preventable death, killing more than 400,000 Americans and more than 25,000 New Yorkers a year. ***Tobacco is not a normal consumer product – it kills when used as intended.***
Tobacco addiction starts in childhood – nearly 90% of regular smokers started smoking by the age of 18.
Research demonstrates that displays of tobacco products – separate and apart from other tobacco advertising – increase the likelihood that youth will start smoking.
Tobacco product displays create a false impression for youth of the social acceptability (normalcy) and popularity of tobacco use.
Tobacco companies engineer product displays to make them as tempting as possible – and they pay retailers for the right to control and manipulate these displays.
Displays of tobacco products prompt impulse purchases by people trying to quit smoking or people trying to smoke less.
International examples suggest that display restrictions are an effective means of reducing youth smoking.

Part 2 – International Examples

In 2005, the World Health Organization sponsored international negotiations that led to the Framework Convention on Tobacco Control ("FCTC"), a treaty that requires its signatories to initiate a multifaceted approach to tobacco control. The treaty outlines a systematic program designed to reduce the demand for tobacco, including elements such as price increases through taxation, warning labels, public awareness initiatives, promotional restrictions, and cessation programs.[20]

Article 13 of the FCTC requires that "each party shall, in accordance with its constitution or constitutional principles, undertake a comprehensive ban on all tobacco advertising, promotion and sponsorship."[21] The FCTC considers displays of tobacco products to be a form of advertising:

> Display of products is a key means of promoting tobacco products and tobacco use, including by stimulating impulse purchases of tobacco products, giving the impression that tobacco use is socially acceptable and making it harder for tobacco users to quit. Young people are particularly vulnerable to the promotional effects of product display. . . .
>
> Parties should introduce a total ban on any display and on the visibility of tobacco products at points of sale . . . .[22]

This treaty currently has 168 parties, including the United Kingdom, Canada, Australia, Japan, and China.[23] (Although the United States has signed the FCTC, it is not a party to the agreement because the Senate has not ratified the treaty.) The inclusion of a display ban in the FCTC suggests a broad international commitment to limiting the impact of tobacco product displays.

International Adoption

There are five countries that have fully implemented a restriction on the display of tobacco products: Iceland, Canada (where display restrictions were approved in each province, rather than by the national government), Thailand, Ireland, and Norway. In addition, almost all Australian states and territories have passed legislation restricting tobacco product displays, and those laws have already been implemented in New South Wales (Australia's most populous state), the Australian Capital Territory, and Western Australia. England, Wales, Scotland, Northern Ireland, and Finland have passed laws that restrict tobacco product displays, but those laws have not yet been implemented.

The first time a jurisdiction restricted the display of tobacco products was in 2001, when the Republic of Iceland passed the Tobacco Control Act. This act states, "Tobacco and tobacco trademarks shall be so placed at points of sale that they are not visible to the customer."[24] The next jurisdiction to adopt a display restriction was the Canadian province of Saskatchewan, which implemented a tobacco product display restriction in 2002. Its law states, "No retailer shall permit tobacco or tobacco-related products to be displayed in the retailer's business premises so that the tobacco or tobacco-related products are

Canadian Provinces and Territories: Tobacco Product Display Restrictions

Prov./Ter.	Enactment	Implementation
Saskatchewan	2001	2002, suspended due to legal challenge in October 2003, then reinstated in January 2005
Manitoba	2002	2005
Nunavut	2004	2005
Ontario	2005	2008
Prince Edward Island	2005	2006
Quebec	2005	2008
Alberta	2007	2008
British Columbia	2007	2008
New Brunswick	2007	2009
Nova Scotia	2006	2007
Northwest Territories	2006	2007
Yukon	2009	2009
Newfoundland & Labrador	2009	2009

visible to the public if young persons are permitted access to those premises."[25] Rothmans, Benson & Hedges, a Canadian tobacco company, challenged the law in court, and enforcement was temporarily put on hold until the law was upheld by a unanimous ruling of the Supreme Court of Canada in January 2005.[26] Immediately after the Supreme Court ruling, Manitoba and Nunavut began to enforce their own similar laws, and the other Canadian provinces adopted their own display restriction laws between 2005 and 2009.[27]

On September 24, 2005, Thailand implemented a complete ban on point-of-sale tobacco product displays. However, this ban was met with resistance by Seven-Eleven, the largest chain of tobacco retailers in Thailand. Seven-Eleven refused to eliminate the cigarette displays for almost two months after the ban was implemented, but eventually caved in the face of boycotts and protests.[28]

In 2008, the Australian Capital Territory and the Australian state of New South Wales passed laws prohibiting the display of tobacco products. Both of these laws went into effect in 2010. Western Australia followed by passing a display restriction law that took effect in September 2010, and Victoria, South Australia, Tasmania, and the Northern Territory have all adopted display restrictions that will be enforced starting in 2011 or 2012.[29]

Ireland implemented a comprehensive restriction on tobacco advertising in July 2009.[30] Its legislation prohibits all point-of-sale advertising, including point-of-sale product displays. The most recent country to implement a tobacco product display restriction was Norway; its law went into effect on January 1, 2010.[31]

As the recent adoption of display restriction laws (not yet in effect) by England, Wales, Northern Ireland, Scotland, and Finland shows, these laws are quickly spreading around Europe.[32] Based on the positive experiences of countries with display restrictions, other countries such as New Zealand are now exploring the enactment of similar laws.[33] Although each country has a unique legal system, there is a considerable amount to be learned from the countries that have been the trailblazers in this area.

Tobacco Industry Resistance

One frequent feature of other countries' experiences with display restrictions has been unsuccessful legal challenges by tobacco companies and tobacco retailers. Although several legal challenges are still in progress, to date the tobacco industry has never been successful in having a display restriction law overturned.

As mentioned above, in Saskatchewan, the first Canadian province to implement a tobacco product display restriction, Rothmans, Benson & Hedges challenged the law on the grounds that the province's law conflicted with federal law. Although an appellate court temporarily barred enforcement of the law, a unanimous ruling of the Supreme Court of Canada affirmed the law's legality.[34] The Supreme Court held that the fact that the national government had not yet addressed the issue of tobacco product displays did not mean that the provinces were powerless to do so on their own.[35]

Elsewhere, tobacco companies have filed suit to try to block laws from going into effect, but they have dropped their claims when they were unsuccessful. For example, Ireland's restriction on the display of tobacco products was challenged by P.J. Carroll and Company, John Player and Sons Ltd., Gallaher (Dublin) Ltd., and others. However, the courts refused to delay the law from going into effect, and a week before the trial date the case was withdrawn by the tobacco industry plaintiffs.[36]

More recently, Imperial Tobacco, British American Tobacco and Japan Tobacco have joined together to challenge the United Kingdom's display restriction, arguing that it will "encourage the smuggling of tobacco and have a negative impact on small business."[37] Philip Morris also announced that it would challenge Norway's display restriction law, claiming in part that it would be ineffective. Bjoern-Inge Larsen, who heads up the Norwegian Directorate of Health, responded by pointing out that "if Philip Morris really felt the restriction would not reduce the consumption of tobacco they would not worry about this law."[38]

Convenience stores have occasionally been vocal opponents of the display restrictions, claiming that the cost of modifying their stores to comply with the law could put them out of business and that the prohibition on product displays could drive customers away and encourage customers to purchase smuggled, untaxed cigarettes.[39] In some cases, these retailer groups have been exposed as front groups for the tobacco industry. As reported by Lynn Greaves of the Saskatchewan Coalition for Tobacco Reduction:

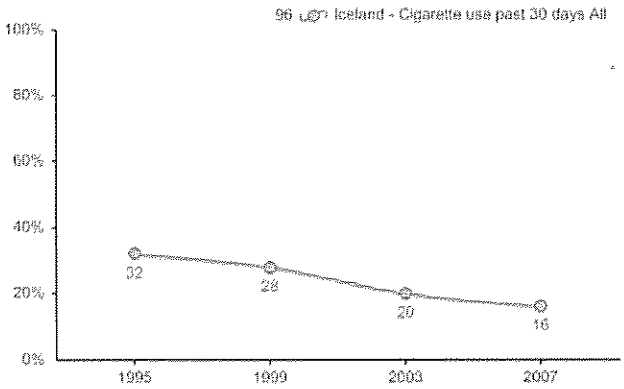
> The *Saskatchewan Committee for Responsible Tobacco Retailing* was formed just prior to the legislation being passed. Although claiming to be "poor" retailers the Committee appeared to be well funded. The Committee mounted a fax campaign to retailers urging them to oppose the legislation by calling their Member of the Legislative Assembly. Retailers were also provided with misinformation predicting dire outcomes if the legislation were passed. Suspicions of links between the retail committee and the tobacco industry were confirmed when a Committee spokesperson admitted it was a sub-committee of the *Canadian Coalition for Responsible Tobacco Retailing*, a tobacco industry coalition with a similar name.[40]

The predicted "dire outcomes," including insurmountable economic hardship and increased crime, did not come to pass.[41] As described in the next section, in jurisdictions that have implemented display restrictions, youth smoking initiation has decreased, and retailers have not experienced the harsh consequences that were foreshadowed by those opposing the laws.[42]

The Impact of the Tobacco Product Display Restrictions

In Iceland, youth smoking rates have declined since the introduction of the display restriction. While it is impossible to disaggregate the effect of the display restriction from other tobacco control measures that were enacted simultaneously, there has been a significant drop in tobacco use among 10th graders since the implementation of the law in 2001. The European School Survey Project on Alcohol and Other Drugs ("ESPAD") surveys 10th grade (16-year-old) students in approximately 35 European Countries. Since the ESPAD has a large sample size (80-90% of 10th grade Iceland students participate), any change larger than a percentage point is statistically significant.[43]

The results of the ESPAD show a striking decrease in smoking prevalence since the implementation of the display restriction in 2001 (from 28% in 1999 to 16% in 2007).[44] This is consistent with the suggestions of academic studies cited above, including the 2004 Henriksen study ("weekly or more frequent exposure to retail tobacco marketing was associated with a 50% increase in the odds of ever smoking"),[45] the 2008 Wakefield study ("[t]he presence of cigarette displays at the point-of-sale, even in the absence of cigarette advertising, has adverse effects on students' perceptions about ease of access to cigarettes and brand recall, both factors that increase the risk of taking up smoking"),[46] and the 2009 Paynter study (finding that the more often a 14-15 year old is exposed to cigarette displays, the more likely he or she is to smoke).[47] Also, it is likely that the display restriction will continue to push down teen smoking rates well into the future, as new generations of children grow up without exposure to power walls and other pro-smoking advertising.



Source: European School Survey Project on Alcohol & Other Drugs, http://www.espad.org/keyresult-generator

Table 8.2: Current smoking prevalence* by province, age 15-19, 1999-2008

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Canada	**27.7**	**25.3**	**22.5**	**22.0**	**18.3**	**18.4**	**18.1**	**14.9**	**15.2**	**14.8**
British Columbia	20.2	18.0	16.8	14.8	13.6	12.8	14.4	12.4	9.0	15.2
Alberta	26.4	24.4	24.1	19.0	18.1	15.7	18.9	15.2	20.1	16.0
Saskatchewan	31.4	24.1	27.1	29.0	28.2	24.7	24.9	20.8	22.0	20.0
Manitoba	29.5	25.4	28.2	23.3	20.3	21.0	20.0	19.7	20.1	17.0
Ontario	24.8	25.1	18.8	19.2	14.5	16.8	16.0	12.5	13.5	12.8
Quebec	35.7	29.6	28.6	32.0	25.5	24.1	22.8	18.3	17.4	16.6
New Brunswick	27.4	29.9	24.6	17.6	21.6	17.7	17.9	15.7	16.8	14.2
Nova Scotia	30.1	25.1	26.8	20.2	18.4	20.3	12.9	14.8	13.4	14.4
PEI	28.3	21.5	20.4	19.3	19.5	16.6	12.9	14.1	13.1	13.7
Nfld. & Labrador	29.9	28.4	22.0	22.2	22.0	21.1	19.0	16.2	16.8	14.7

*Includes daily and non-daily smokers
Data Source: CTUMS, 1999-2008

Source: Canadian Tobacco Use Monitoring Survey
http://www.tobaccoreport.ca/ytu_cs_sp_byprov.html

Canada's experience with the success of the display restriction laws is consistent with Iceland's. The Canadian Tobacco Use Monitoring Survey is conducted yearly and measures the smoking rates of all age groups and provinces in Canada. The trend in the data is apparent – youth smoking rates have gone down in Canada, and the decline is most dramatic in those provinces where the restrictions have been in effect the longest (Saskatchewan and Manitoba).[48] Overall, the smoking rate for 15- to 17-year-olds in Canada has fallen from 13.8% in 2005 to 9.7% in 2008 (a 30% decrease).[49]

Groups opposing the display restrictions predicted that the laws would cause extreme economic hardship to tobacco retailers, especially small convenience stores. This prediction has not been borne out by experience. A recent article in the *Journal of the New Zealand Medical Association* summarized the evidence from Canada:

> In Canada, retailers predicted their profits would be eroded. However, the evidence reveals that any initial financial impacts resulting from tobacco display bans were minor, even for small stores reliant on tobacco sales. Crucially, payments made by tobacco companies to retailers have continued beyond the introduction of display bans....[50]

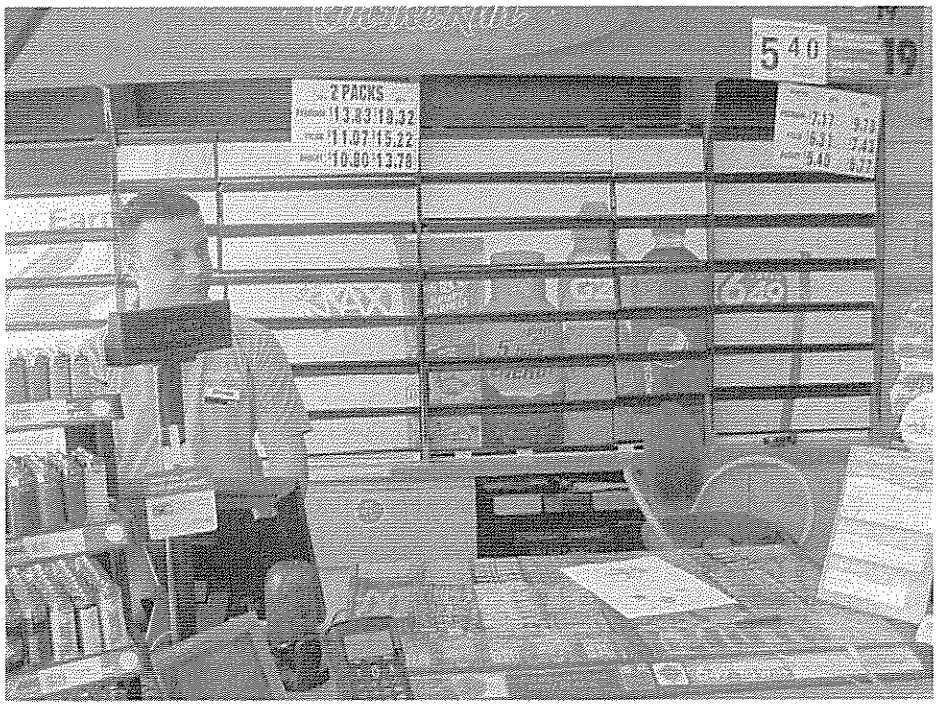
Even representatives of the Canadian convenience store industry have been quoted suggesting that the display restrictions have not harmed their membership.[51] This result is logical, because although display restrictions have helped to reduce youth smoking rates, most current smokers will continue to purchase cigarettes from the retailers that they currently patronize. As the *Journal of the New Zealand Medical Association* article noted, "changes in smoking experimentation, initiation and addiction will only be evident over several years, during which time retailers will have had many opportunities to diversify their product range."[52] In other words, while smoking rates gradually decline, retailers can consider long-term strategies to reduce their dependence on tobacco-related revenue.

Small tobacco retailers have also opposed the display restrictions on the grounds that modifying their stores to comply with the

restriction will be exceedingly expensive. Similarly, experience has shown that this concern is unfounded. In most cases, retailers have made simple modifications to existing shelving in order to comply with the new laws.

For example, the Association of Convenience Stores commissioned a study to survey Ireland stores about how they modified their premises to comply with the display restriction. The study revealed that 78% modified their existing display units to comply with the restriction, while only 22% installed a new storage unit.[53] Many of these retailers were able to accomplish these modifications at very low cost, using curtains and screens.[54]

Some stores have used this new space for advertising other products, covering the display units with attractive advertisements for store brand food products.[55] In Canada, companies which produce display cases have adapted to the new laws by creating innovative solutions for compliance – offering opaque containers and other compliance solutions at reasonable prices to retailers.[56] In addition, some Canadian retailers report that tobacco companies installed complying display units for them, as an incentive to continue selling their products.[57] While some retailers have nonetheless complained about the extra cost being imposed on retailers, these minimal implementation costs are a small tradeoff when considering the benefits of these policies: sparing children from tobacco-related disease and death.[58]



International Tobacco Product Display Restrictions
What Do These Laws Do?

The following are examples of provisions included in display restriction laws in other jurisdictions. These provisions are intended to be illustrative, not models to be copied. The Center for Public Health and Tobacco Policy's model ordinance is contained in Appendix A.

Part One: General Rule – Prohibiting Tobacco Product Displays

Example: "A person who is the occupier of premises on which tobacco products or non-tobacco smoking products are sold must ensure that members of the public cannot see any of those products, or any smoking accessories, from inside or outside the premises." (New South Wales, Australia)

Example: "Tobacco and tobacco trademarks shall be so placed at points of sale that they are not visible to the customer." (Iceland)

Part Two: Defining the Type of Retailers Covered (or Not Covered) by the Law

Example: "No retailer shall permit tobacco or tobacco-related products to be displayed in the retailer's business premises so that the tobacco or tobacco-related products are visible to the public if young persons are permitted access to those premises." (Saskatchewan, Canada) ("Young person" is defined as a person under the age of 18.)

Example: "A person does not commit an offence . . . if the display . . . is in a specialist tobacconist." (Scotland) ("Specialist tobacconist" is defined as a store that derives more than half of its revenue from the sales of "cigars, snuff, pipe tobacco and smoking accessories" and meets other requirements.)

Part Three: Exceptions to the General Rule – Permitted Displays

Example: "No offence is committed . . . if the display is a requested display to an individual aged 18 or over." (England)

Example: "A tobacco advertisement at one point of sale . . . may advertise a product line of a tobacco product . . . by the display of a single immediate package [i.e., a package containing the product] of the product line in the form in which the package is available for sale at that point of sale . . . ." (Victoria, Australia)

Part Four: How Customers Can Learn of the Available Products

Example: "[Retailers may display a] single price ticket at a point of sale for each product line for sale (or usually available for sale) at the point of sale." (Australian Capital Territory) ("Price tickets" are defined as labels no larger than $15cm^2$ that include only the product's name, price, and bar code.)

Example: "[A] person may in any place or premises in which tobacco is sold or offered for sale at retail . . . display a sign that lists the types of tobacco for sale and their prices, if the sign complies with and is displayed in the manner, place, form and size prescribed by regulation . . . ." (New Brunswick, Canada)

Part Five: Enforcement and Penalties

Example: "Local authority boards of health, under the supervision of [the Environmental Agency] shall monitor places where tobacco is sold, and monitor the observation in their district of the provisions of Section II of this Act, regarding labelling [sic], advertising and sale of tobacco." (Iceland)

Example: "A person who contravenes [the section of the law prohibiting tobacco displays] is guilty of an offence and liable (a) for a first offence, to a fine of not more than $10,000, and (b) for a 2nd or subsequent offence, to a fine of not more than $100,000. (Alberta, Canada)

Part 3 – Current Law

New York state law and federal law both regulate tobacco products. Historically, the federal government has regulated tobacco advertising and promotion and excluded state governments from regulating with respect to those subject matters. However, federal law has recently changed due to the enactment of the Family Smoking Prevention and Tobacco Control Act ("FSPTCA"). This recently enacted law allows for concurrent state and federal regulation of tobacco advertising and promotion.

Federal Law

The federal government began regulating the advertising and promotion of cigarettes in 1965, when Congress passed the Federal Cigarette Labeling and Advertising Act ("FCLAA").[59] As originally enacted, the act required warning labels on cigarette packs and preempted (prevented) state and local governments from requiring different or additional warnings on cigarette packs or advertisements.[60] In 1969, Congress amended the FCLAA to require stronger warning labels.[61] At the same time, the preemption language in the Act was changed and broadly expanded.[62] This expanded preemption provision made the regulation of cigarette advertising and promotion an exclusively federal matter and precluded *any* state or local regulation of cigarette advertising or promotion if the regulation was based on health concerns.

Despite this broad preemption – which left only the federal government in a position to regulate tobacco advertising and promotion – the federal government did very little over the next three decades to limit the advertising and promotion of cigarettes, even as tobacco companies aggressively targeted youth with promotional campaigns such as R.J. Reynolds' infamous "Joe Camel" campaign.[63] Due in part to this federal inaction, the states resorted to lawsuits against the tobacco industry in the 1990s, resulting in the 1998 Master Settlement Agreement in which the major tobacco companies agreed to stop advertising on billboards and directing advertisements towards youth.

Until recently, complete federal preemption of state regulation relating to tobacco advertising and promotion remained the law. Congress reversed course in 2009 by passing the Family Smoking Prevention and Tobacco Control Act ("FSPTCA"), which significantly alters federal tobacco regulation of tobacco products.[64] This law grants the Food and Drug Administration (FDA) limited authority to regulate tobacco products,[65] something the Supreme Court had previously determined that the FDA was unable to do without express congressional authorization.[66] The FSPTCA also provides for stronger warning labels[67] and, perhaps most importantly to local tobacco control advocates, alters the scope of federal preemption relating to the advertisement and promotion of tobacco products.

The FSPTCA modified the preemption provision of the FCLAA, which, as amended, now reads:

> No requirement based on smoking and health shall be imposed under State law with respect to the advertising or promotion of any cigarettes the packages of which are labeled in conformity with the provisions of this chapter. . . . Notwithstanding [the preceding], *a State or locality may enact statutes and promulgate regulations, based*

> *on smoking and health . . . imposing specific bans or restrictions on the time, place, and manner, but not content, of the advertising or promotion of any cigarettes.*[68]

This modified preemption provision allows state and local governments to regulate what they were unable to regulate before: where, when and how cigarette companies can advertise their products. Prior to the passage of the FSPTCA, a number of state and local advertising restrictions were invalidated by the courts because they ran afoul of the express preemption provisions of the FCLAA. For example, in 2001 the United States Supreme Court held that a Massachusetts state law that prohibited tobacco advertisements within 1000 feet of "any public playground, playground area in a public park, elementary school or secondary school"[69] was preempted by the FCLAA's express preemption provision.[70] However, now that the FCLAA's preemption scheme has been altered by the FSPTCA, it is unlikely that a similar law would be considered to be preempted. (Yet, as discussed in Part 5 below, a similar law would still be subject to a First Amendment challenge.)

Although state or local display restriction laws would have been preempted under the previous version of the FCLAA, under the revised preemption provision they are not barred. Such laws regulate the "place" and "manner" in which tobacco products can be promoted at the point-of-sale, and as such they are not preempted. (Again, however, they are still subject to First Amendment challenges.)

New York State Law

Even though New York's Public Health Laws contain many provisions regulating the sale of tobacco products, there is only one provision that regulates the *display* of tobacco products. That provision states:

> No person operating a place of business wherein tobacco products or herbal cigarettes are sold or offered for sale shall sell, permit to be sold, offer for sale or display for sale any tobacco product or herbal cigarettes in any manner, unless such products and cigarettes are stored for sale (a) behind a counter in an area accessible only to the personnel of such business, or (b) in a locked container; provided, however, such restriction shall not apply to tobacco businesses [as defined in the Code] and to places to which admission is restricted to persons eighteen years of age or older.[71]

This provision prohibits self-service tobacco displays in retail stores open to minors, but it does not prohibit or limit the visible display of the products themselves. No U.S. jurisdiction has yet passed a tobacco product display restriction law such as those in effect in Iceland, Canada, Thailand, Ireland, Norway, and parts of Australia.

Part 4 – Model Ordinance

The Center for Public Health and Tobacco Policy's model ordinance (contained in Appendix A) is designed for use by local governments around New York. Since no jurisdiction in the U.S. has yet enacted a display restriction ordinance, this model was developed by incorporating some elements of display restriction laws in effect in other countries while also keeping in mind the requirements and limitations of the U.S. and

New York legal systems. It is unknown how U.S. courts will rule on legal challenges to display restriction laws, but this model ordinance has been carefully written to provide jurisdictions with a strong argument that the law does not violate First Amendment protections for commercial speech. This issue is discussed in more detail in the following section.

General Issues

What government entity will be adopting the tobacco product display restriction policy? What government entity will be enforcing the policy?

These are the preliminary questions that must be addressed at the beginning of the drafting process. The model ordinance is written flexibly so that it can be enacted by a county or a municipality (city, town, or village), or it can be incorporated into a county sanitary code by the county health department. If the county government or county health department adopts the policy, then the county health department can assume the enforcement duties. This may be preferable, as county health departments are committed to improving health and are, in most cases, already involved in enforcing the Smoke-Free Air Act and the Adolescent Tobacco Use Prevention Act (ATUPA). If a display restriction ordinance is adopted at the municipal level, then a municipal department (such as the Department of Code Enforcement or the Department of Permit and Inspection Services) will likely be responsible for enforcement, unless the city is able to contract with the county health department for enforcement. Although such municipal departments are experienced at ensuring compliance with local laws, they may not be as committed to the public health purposes underlying the tobacco product display restriction as a health department may be.

Section One: Findings

The first section of the model ordinance contains "findings" that express the reasons for the government's decision to enact such a law. These findings are extremely important, because courts reviewing the law may look to the findings to see if the government had sufficient reasons and justifications for adopting such a measure.[72] The findings should focus on explaining why the display of tobacco products is currently a problem and why the proposed law is needed to address it.

Some courts have expressed a preference for localized findings, including facts about how the proposed law will address the problem at the local level, as opposed to generalized statements about the issue.[73] Some of the figures in the findings have been left blank, so that they can be filled in with local information. It is also advisable to add other findings that are based on local information and may be compelling to the local community. Additional supporting information and exhibits can also be introduced at government hearings where the ordinance is considered. This information can then be referenced in the findings.

Section Two: Definitions

The second section defines the terms that are used in the model ordinance. A few of these terms are worth noting:

- **Age-Verified Customer** and **Legal Age:** Under current New York law, tobacco products cannot be sold to a person under the legal age (eighteen

in most parts of New York, but nineteen in Nassau, Suffolk, and Onondaga Counties), and vendors are required to ask for identification if the person appears to be under the age of twenty-five. The model ordinance uses the same standards for determining when the list of available tobacco products (the "Tobacco Menu") may be provided to a customer. Customers who are of legal age and have had their ID verified if they appear to be under the age of twenty-five are referred to as "Age-Verified Customers."

- **Department:** The "Department" will be the government entity responsible for enforcing the law. This entity should be specified, and discussions with that government agency should occur well before the ordinance is introduced to ensure the enforcing agency's support and cooperation.

- **Tobacco Product:** The ordinance prohibits the display of "Tobacco Products." Tobacco Products are defined to include all types of tobacco products (cigarettes, cigars, smokeless tobacco, etc.) as well as manufactured products containing nicotine. Nicotine products that are approved for use in tobacco cessation by the FDA (Nicorette gum, Nicoderm CQ patches, etc.) are exempted from the definition of "Tobacco Product" and can be displayed. Electronic cigarettes, or e-cigarettes, cannot be displayed unless they are approved as tobacco cessation products by the FDA. The definition of "Tobacco Product" also includes tobacco product packaging. This is done so that retailers cannot thwart the purpose of the display restriction by displaying empty packages.

Section Three: Adult-Only Establishments Exempted

The model ordinance prohibits the display of tobacco products in retail stores, with the exception of adult-only establishments. This is done because the primary purpose of the law is to protect children from tobacco marketing. In addition, limitations on marketing in adult-only settings would be much more vulnerable to a First Amendment challenge. The ordinance, however, does not contain a "tobacco store" exception. Stores that are primarily in the business of selling tobacco can exempt themselves from the provisions of this ordinance by ensuring that their business does not allow people below the legal age for purchasing tobacco (eighteen or nineteen) to enter.

Section Four: Display of Tobacco Products Prohibited

This is the central element of the model ordinance. It prohibits the "display of any Tobacco Product in any matter that permits the customer to view any Tobacco Product prior to purchase." The mechanism for ensuring that tobacco products cannot be viewed is not specified, leaving retailers with flexibility to decide how to comply with the law in a way that best suits their business operation. Retailers may put the tobacco products under the counter, in a back room, in closed, opaque shelving, or in any other location where they cannot be seen by customers.

Sections Five: Use of Tobacco Menu

Because tobacco products cannot be displayed, retailers will be permitted to show customers a "Tobacco Menu" telling them what tobacco products are available and the prices of such products. The Tobacco Menu can only be provided to Age-

Verified Customers at their request, and it must be kept out of sight when not being used. The model ordinance does not limit the type of information that can be put into the Tobacco Menus.

Sections Six and Seven: Enforcement and Penalties

In the model ordinance, penalties for displaying tobacco products range from $500 for a first violation to $2000 for the third and subsequent violations. Violations relating to the use of the Tobacco Menu range from $250 to $1000. Note that under state law, fines allowable under a sanitary code are limited to $500, so if the model ordinance is incorporated into a county sanitary code, the amount of the allowable fines will need to be modified.

The model ordinance also provides for inspections to ensure compliance with the law, and it permits legal actions to be brought by the government or by members of the community (including, but not limited to, other retailers who may be concerned about fair and even enforcement) to ensure compliance with the law. In addition, if a licensing scheme is in place in the locality, violations of the tobacco display ordinance may be grounds for suspending or revoking a license.

Sections Eight and Nine: Severability and Effective Date

The final two sections of the model ordinance are technical provisions included in many laws. The first is a severability provision, which provides that if any piece of the law is struck down in court, the remaining portions of the law remain valid. This is an important provision to include, because without such a provision, a court decision invalidating even one portion of the law could potentially nullify the entire ordinance.

The final section provides that the law will go into effect 180 days (approximately six months) after the ordinance is enacted. This phase-in period allows tobacco retailers plenty of time to ensure that they are able to comply with the requirements of the new law, and it provides the government with sufficient time to plan for inspections and enforcement.

Questions or concerns about the model ordinance can be addressed to the Center for Public Health and Tobacco Policy at tobacco@nesl.edu.



Part 5 – Potential Legal Challenges

Tobacco companies have consistently used legal challenges to resist regulation that is detrimental to their economic interests. Governments that plan to enact a tobacco product display restriction should be aware that tobacco companies could file a legal challenge to the law, asserting that the law is unconstitutional and should be struck down. The primary argument that the plaintiffs will allege is that the law restricts commercial speech in violation of the First Amendment to the United States Constitution. The plaintiffs may also allege that the product display restriction is preempted by the Federal Cigarette Labeling and Advertising Act, although a court is unlikely to accept this argument in light of the narrowed

preemption provisions in the Family Smoking Prevention and Tobacco Control Act (2009).[74]

First Amendment Challenge

The First Amendment to the United States Constitution provides that "Congress shall make no law . . . abridging the freedom of speech . . . ."[75] The same limits that the First Amendment places on Congress also apply to state and local governments.[76] Accordingly, any regulation passed by a state or local government that restricts speech or expression will have to be consistent with the modern jurisprudence interpreting the First Amendment. This jurisprudence has not found all types of speech to be entitled to the same level of protection from regulation. Some speech, representing the "core" of what is protected by the First Amendment (typical examples are religious and political speech), receives a high level of protection.[77] However, other speech receives little or no protection, such as that which incites violence or is obscene.[78] Commercial speech is somewhere between these two poles; it receives First Amendment protection from regulation, but this protection is not absolute.[79]

Commercial speech is the communication of information for economic reasons, including promotions and advertising intended to increase demand for consumer products.[80] Conduct intended to convey a message to consumers can be considered commercial speech.[81] The degree to which such speech is protected by the First Amendment is subject to debate. When deciding whether a certain law violates the First Amendment's commercial speech protections, the most commonly applied test is the four-pronged test developed in a case called *Central Hudson* (the "*Central Hudson* test").[82] The four prongs of the test are as follows:

- First, in order for the speech to be eligible for any protection by the First Amendment, the speech "must concern lawful activity and not be misleading."[83] If the speech promotes unlawful activity or is misleading, the speech receives no First Amendment protection and can be restricted.

- Second, the government "must assert a substantial interest to be achieved by restrictions on commercial speech."[84] Courts are likely to see this as a sliding scale, with the most substantial interests being able to justify greater restrictions on speech: "the regulatory technique must be in proportion to [the government's interest]" and "[t]he protection available for particular commercial expression turns on the nature both of the expression and of the governmental interest served by its regulation."[85]

- The third prong requires that the "regulation directly advances the government interest asserted" and provides that "the regulation may not be sustained if it provides only ineffective or remote support for the government's purpose."[86]

- The last prong requires that the restriction must not be "more extensive than is necessary to serve [the government's interest]."[87] Explaining this prong, the Supreme Court wrote: "The regulatory technique may extend only as far as the interest it serves. The State cannot regulate speech that poses no danger to the asserted state interest, nor can it completely suppress

> information when narrower restrictions on expression would serve its interest as well."[88]

This four-pronged *Central Hudson* test was applied to tobacco control laws in *Lorillard v. Reilly*.[89] In *Lorillard,* tobacco companies challenged a number of advertising restrictions put in place by the Massachusetts Attorney General on the grounds that they were preempted by the FCLAA and also violated the First Amendment (the FCLAA applies only to cigarette promotion, so the First Amendment challenges focused on restrictions on cigar and smokeless tobacco advertising).

Applying the *Central Hudson* test, the United States Supreme Court struck down provisions which prohibited outdoor cigar and smokeless tobacco advertising within 1000 feet of schools or playgrounds because the restrictions failed the final prong of the *Central Hudson* test. According to the Court, the regulations were "more extensive than necessary" to serve the interest of protecting children from tobacco advertising because "[i]n some geographical areas, these regulations would constitute nearly a complete ban on the communication of truthful information about smokeless tobacco and cigars to adult consumers."[90] (For example, the plaintiffs claimed that the regulations would prevent any outdoor tobacco advertising, including window signs, in 87% to 91% of Boston.[91]) The Court concluded that "the uniformly broad sweep of the geographical limitation and the range of communications restricted demonstrate a lack of tailoring."[92]

The Supreme Court also struck down a provision which would have prohibited some point-of-sale advertising. The regulation required that tobacco advertising not be "placed lower than five feet from the floor of any retail establishment which is located within a one thousand foot radius of any" school or playground.[93] The Court concluded that the provision failed both the third and fourth prongs of the *Central Hudson* test, reasoning: "[T]he State's goal is to prevent minors from using tobacco products and to curb demand for that activity by limiting youth exposure to advertising. The 5 foot rule does not seem to advance that goal. Not all children are less than 5 feet tall, and those who are certainly have the ability to look up and take in their surroundings."[94]

As suggested in *Lorillard v. Reilly*, courts will carefully scrutinize regulations restricting tobacco advertising and promotion to see whether they can be upheld under the *Central Hudson* test. In particular, cities and states wishing to impose a display restriction law must be ready to come to court prepared to explain how the law directly advances the government's interest and why a "more limited restriction on commercial speech" could not advance the government's interest.[95]

Application of the Central Hudson Test to Display Restriction Law

Assuming that a court decides that the *Central Hudson* test is the appropriate test to apply to a display restriction law, how might that analysis proceed?[96]

> *Prong One: Is the speech that is being restricted eligible for protection under the First Amendment?*

It is well established that not all speech is protected under the First Amendment. For example, speech which incites violence or is defamatory is not protected. In the commercial context, the Supreme Court has

declined to offer First Amendment protection to speech that is false or misleading.[97] Previous cases have assumed that tobacco product promotion is not inherently misleading and does not promote an illegal activity (despite that fact that tobacco sales to minors are illegal).[98] In his concurring opinion in *Lorillard v. Reilly*, Justice Thomas wrote that although tobacco advertising may contain misleading imagery, "[t]obacco advertising would be no more misleading for suggesting pervasive use of tobacco products than are any other advertisements that attempt to expand a market for a product."[99] With regard to the fact that tobacco use may be illegal for minors, he added that "it is difficult to see any stopping point to a rule that would allow a State to prohibit all speech in favor of an activity in which it is illegal for minors to engage."[100]

Despite Justice Thomas's cautionary words, some legal scholars have suggested that states and local governments should not so easily concede that tobacco promotion is not misleading.[101] Indeed, a huge volume of evidence unearthed in tobacco litigation details how tobacco companies used advertising and promotion to mislead the public about the risks of their products and entice youth to begin smoking.[102] As discussed in Part 1, tobacco product displays are used, at least in part, to convey misleading impressions about the pervasiveness and popularity of tobacco products. As such, this type of promotion could be classified as misleading and beyond First Amendment protection. Nonetheless, it is more likely that a judge who upholds a tobacco product display restriction will do so after applying the entire *Central Hudson* test.

Prong Two: Is there a substantial government interest which can justify the restriction on speech?

The second prong of the *Central Hudson* test requires the government to have a substantial interest which is to be advanced by the restriction on commercial speech. State and local governments have a long-recognized and substantial interest in protecting the health and safety of their residents, and therefore this prong of the test is easily met when the interest at stake is reducing tobacco use. In *Lorillard*, "none of the petitioners contest[ed] the importance of the State's interest in preventing the use of tobacco products by minors."[103] Similarly, in a case involving a tobacco product display restriction, the state or local government's substantial interest in reducing youth tobacco use would likely be uncontested.

Prong Three: Does the regulation directly advance the government interest asserted?

In order to satisfy the third prong of the *Central Hudson* test, the regulation must "directly advance the government's asserted interest," and the support provided for the regulation must be more than "tenuous" or "speculative."[104] "The burden is not satisfied by mere speculation or conjecture; rather, a governmental body seeking to sustain a restriction on commercial speech must demonstrate that the harms it recites are real and that its restriction will in fact alleviate them to a material degree."[105] Courts have considered studies, reports, anecdotes (local and non-local), historical evidence, and even "common sense" when evaluating this part of the test.[106]

The government's burden of proof can be satisfied by pointing to evidence that shows that the tobacco product display restriction

will be effective in reducing the prevalence of underage tobacco use (such as the studies discussed in Part 1). This will require those defending the law to present strong evidence, and efforts should be made to ensure that the evidence is from impartial sources, such as respected peer-reviewed medical journals and judicial findings in cases like *U.S. v. Philip Morris*.[107] Ample evidence suggests that:

- Tobacco use – the leading cause of preventable death in the U.S. – is a serious public health problem;
- Youth are particularly vulnerable to tobacco product promotion;
- As shown in tobacco company documents, tobacco companies exploit this vulnerability to target youth; and
- Tobacco product displays encourage underage youth to try to buy tobacco products, increase youth tobacco experimentation and initiation, promote impulse purchases, and normalize tobacco use.

Prong Four: Is the regulation no more extensive than necessary to serve the interest asserted?

The final prong of the *Central Hudson* test requires that the restriction on speech is "not more extensive than is necessary" to further the substantial government interest.[108] As seen in the Supreme Court's decision to invalidate the outdoor advertising restrictions at issue in *Lorillard*, laws that are found by the court to restrict more speech than necessary will be struck down, regardless of whether they satisfy the other elements of the *Central Hudson* test.

The burden is on the government to show that there is a "reasonable fit" between government's interest and the means employed to advance that interest, and that the regulations do not sweep too broadly and restrict more speech than necessary.[109] There are several aspects of the product display restriction which can help demonstrate that the law is narrowly tailored. First, there is an exception which allows adult-only stores to display tobacco products. Second, there is no blanket restriction on tobacco advertisements; only one type of promotion that has been shown to have a significant influence on youth – displays of the tobacco products themselves – is prohibited. Third, the restriction on communication between legal adult consumers and tobacco companies is very limited. Not only can tobacco companies communicate with their customers through advertisements, but adult customers can also receive truthful information about tobacco products in the tobacco menu.

The government must also show that a more limited restriction on commercial speech could not achieve the government's objective. Therefore, it is important to emphasize that despite the numerous tobacco control efforts that have been attempted in the past, additional efforts are needed to advance the government's substantial interest in reducing the prevalence of youth smoking.[110] Since tobacco promotion undermines and increases the cost of other tobacco control measures, regulating tobacco promotion is an important complement to other tobacco control activities. Moreover, research suggests that anti-tobacco informational campaigns (which would not implicate First Amendment concerns) are not sufficient on their own to counteract the harmful effects

that exposure to pro-tobacco messages has on youth.[111]

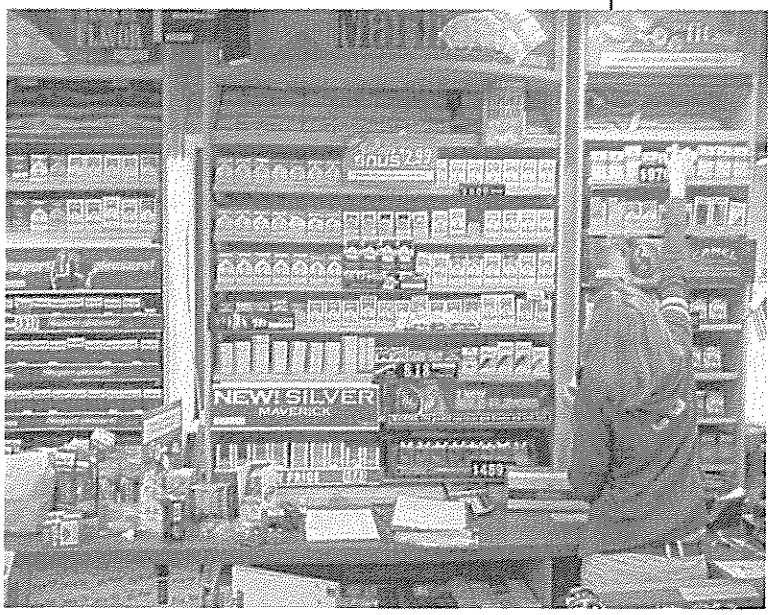
Advocates should utilize legislative hearings and the "findings" section of the law to address both of the challenges raised by this fourth prong of the *Central Hudson* test. They should highlight that (a) display restriction laws do not restrict the ability of tobacco companies to advertise their products in retail stores or elsewhere (beyond prohibiting the displays themselves), and (b) such laws are important and needed complements to other tobacco control measures.

Preemption by the FCLAA

Based on the power granted to it by the Supremacy Clause of the Constitution, Congress can reserve to itself the power to regulate a specific subject and preempt state and local governments from regulating in that area.[112] When the subject that Congress is regulating is one that the states have traditionally regulated (such as public health), the courts will "start with the assumption that the historic police powers of the States were not to be superseded by the Federal Act unless that was the clear and manifest purpose of Congress," but a clear statement by Congress will be sufficient to establish preemption[113]

As discussed above, the Federal Cigarette Labeling and Advertising Act ("FCLAA") contains an express preemption provision, but that provision was recently amended by the FSPTCA to allow individual states to regulate where, when, and how cigarette companies may advertise and promote their products. (By its terms, the FCLAA only preempts local regulation of cigarettes, not other tobacco products.) In previous cases like *Lorillard v. Reilly,* the courts have struck down state and local laws which regulated the advertising or promotion of cigarettes, finding such regulations to be preempted by the FCLAA. However, *Lorillard* was decided prior to the passage of the FSPTCA, and therefore its preemption analysis is no longer controlling.

While the interpretation of the modified preemption provisions of the FCLAA has not yet been addressed by a court, a legislative desire to allow state and local government greater authority to restrict certain aspects of tobacco advertising and promotion is evident. State and local governments are now able to regulate the time, place, and manner of cigarette promotions. Since a tobacco product display restriction does not regulate the content of cigarette advertisements and merely regulates the place and manner of tobacco advertisements, it is unlikely that a court will find that federal law preempts a tobacco product display restriction enacted by a state or local government.



Part 6 – Implementation and Enforcement

Tobacco control policies often bring tensions between competing interests to a head, and for this reason it is essential that local governments that plan to enact tobacco control laws have a well-defined strategy to implement and enforce these local laws. Throughout the enactment and enforcement process, tobacco control advocates and local government representatives must be receptive to the legitimate concerns of retailers, yet the focus must remain on achieving the public health objectives of the display restriction – reduced tobacco related disease and death.

Enactment of a Tobacco Product Display Restriction

In New York, tobacco product display restriction laws could be enacted at the county level or by a city, village, or town.[114] In addition, local boards of health have the authority to pass regulations "necessary and proper for the preservation of public health."[115] The process for approving a display law will depend on the type of government enacting the measure and the specifics of local government's procedures.

Regardless of the level of government involved, a public hearing must occur before the law is approved. This provides the public with an opportunity to comment on the proposed law. This is also an opportunity for tobacco control advocates to provide research and data (including local data) demonstrating the importance of a display restriction law. While the concerns of retailers should not be dismissed, advocates should try to keep the focus on health and on the law's objective of protecting children from the pervasive marketing of an addictive and deadly product.

Once the public hearings have taken place and the measure has been approved, there should be a period of time (specified in the law) between enactment and enforcement of the law. The Center for Public Health and Tobacco Policy's model ordinance suggests 180 days (approximately six months) between enactment of the law and the beginning of enforcement. This timeframe allows enough time for retailers to be educated about the new law and to modify their displays accordingly, yet the timeframe is short enough to limit opposition by the tobacco industry and attempts to repeal the law before it goes into effect.

Retailer Education and Compliance

If the law is enacted at the county level, the county health department should be in charge of enforcing the display restriction. If the law is enacted by a different local government, the local health agency or other agency which conducts inspections should be responsible for the enforcement of the new law. This agency should begin working on retailer education immediately after the law is enacted. A list of the retailers who will be affected by the display restriction can be compiled from licensing records. A pamphlet describing what is permissible under the new law and what is not permissible should be sent to all the retailers. This pamphlet should also discuss the reasons behind the display restriction in order to put the restriction in the proper health context. Retailers should be invited to contact the enforcement agency for more information on compliance with the law, and the enforcement agency should be prepared to answer questions and to assist retailers with compliance.

Examples of information sent to retailers by governments in other countries can be found at the following websites:

- New South Wales (Australia): http://www.health.nsw.gov.au/resources/publichealth/healthpromotion/tobacco/pdf/display_factsheet_5_final.pdf

- British Columbia (Canada): http://www.hls.gov.bc.ca/tobacco/pdf/RETAIL_Brochure_final_1.04.pdf

- Ontario (Canada): http://www.mhp.gov.on.ca/en/smoke-free/display-ban/DisplayBan-FAQs.pdf *and* http://www.mhp.gov.on.ca/en/smoke-free/display-ban/CheatSheet-EN.pdf

- Ireland: http://www.dohc.ie/publications/tobacco_guidance

Some of these materials are reproduced in Appendix B.

Enforcement

As the enforcement date approaches, the enforcement agency should start planning for the first round of inspections, beginning within two weeks following the enforcement date.

Within two months, all stores within the jurisdiction of the enacting government should be inspected. During inspections, the enforcement officer should fill out an inspection sheet with several points of inspection (such as "are tobacco products visible?," "is the tobacco menu kept behind the counter?"), indicating either "compliant" or "non-compliant" for each point. One copy of this inspection sheet should be provided to the retailer after inspection and one copy should be retained for department records.

The enforcement officer should issue a fine if the retailer receives a "non-compliant" mark in any category. However, the enforcement officer should have the discretion to issue a warning if the retailer clearly made an effort to comply but simply misunderstood the requirements. If a non-compliant mark is issued in any category, the enforcement officer should discuss the requirements imposed by the new law with the retailer and ensure that adequate steps are taken to remedy the non-compliant situation. The enforcement officer should also discuss the penalties for non-compliance, including fines and potentially the loss of the ability to sell tobacco products. A retailer that receives a "non-compliant" mark in any category should be inspected again in two weeks.

Once an initial round of inspections has occurred, the enforcement agency should continue to inspect the locations periodically to ensure continued compliance. To conserve resources and reduce additional costs, these inspections could be combined with ATUPA compliance inspections. As with other tobacco control measures, display restriction laws are likely to become largely "self-enforcing," so long as there is an initial effort made to ensure that all retailers come into compliance with the law.[116]

Conclusion

As tobacco companies place more reliance on power walls and other point-of-sale promotions to recruit new smokers, tobacco control advocates and public officials must respond with a similar focus on the point-of-sale. Fortunately, the 2009 Family Smoking Prevention and Tobacco Control Act gives local governments new legal authority to

regulate tobacco advertising and promotion in retail outlets. Tobacco product display restrictions are one promising way in which local governments can utilize this new authority to protect youth from tobacco addiction. As this report demonstrates, tobacco product display restrictions have been successfully implemented in jurisdictions around the world, and there is a growing evidence base suggesting that such policies can successfully reduce youth tobacco use and help address our nation's leading cause of preventable death.

CITATIONS

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[3] Lisa Henriksen et al., *Association of Retail Tobacco Marketing with Adolescent Smoking*, 94 AM. J. PUB. HEALTH 2081, 2082 (2004).

[4] Richard W. Pollay, *More Than Meets the Eye: On the Importance of Retail Cigarette Advertising*, 16 TOBACCO CONTROL 270, 271 (2007) (detailing how these "power walls" are carefully designed for maximum impact, using high tech devices such as eye gaze cameras to plan out the displays).

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[9] Ellen C. Feighery et al., *Retail Trade Incentives: How Tobacco Industry Practices Compare with Those of Other Industries*, 89 AM. J. PUB. HEALTH 1564, 1566 (1999) (hereinafter *Retail Trade Incentives*).

[10] Pollay, *supra* note 4, at 273.

[11] Feighery, *Retail Trade Incentives*, *supra* note 9, at 1566.

[12] Melanie Wakefield et al., *An Experimental Study of Effects on Schoolchildren of Exposure to Point-of-Sale Cigarette Advertising and Pack Displays*, 21 HEALTH EDUC. RES. 338, 346 (2006).

[13] Paynter, *supra* note 5, at 272. Parental smoking, smoking in the home, and SES are all factors know to be significantly correlated with adolescent smoking.

[14] Lisa Henriksen et al., *Association of Retail Tobacco Marketing with Adolescent Smoking*, 94 AM. J. PUB. HEALTH 2081, 2081 (2004) (*citing* POINT OF PURCHASE ADVERTISING INSTITUTE, THE POINT-OF-PURCHASE ADVERTISING INDUSTRY FACT BOOK (1992)); D. Chanil, *Profile of a Convenience Store Customer*, CONVENIENCE STORE NEWS, Feb. 11, 2002, at 54; E.C. Feighery et al., *Cigarette Advertising and Promotional Strategies in Retail Outlets: Results of a Statewide Survey in California*, 10 TOBACCO CONTROL 84 (2001).

[15] Lisa Henriksen et al., *Reaching Youth at the Point of Sale: Cigarette Marketing is More Prevalent at Stores Where Adolescents Shop Frequently*, 12 TOBACCO CONTROL 315, 317 (2004).

[16] University of Michigan News and Information Services, *Cigarette Brands Smoked by American Teens: One Brand Predominates, Three Account for Nearly All Teen Smoking* (Press Release), Apr. 13, 1999, *available at*

http://www.monitoringthefuture.org/pressreleases/pr99apr14.pdf. In a 2008 study, researchers found that students were more likely to smoke when their schools were located near retailers with a high density of tobacco advertising. Lisa Henriksen et al., *Is Adolescent Smoking Related to the Density and Proximity of Tobacco Outlets and Retail Cigarette Advertising Near Schools?*, 47 PREVENTATIVE MEDICINE 210, 212 (2008).

[17] Melanie Wakefield et al., *The Effect of Retail Cigarette Pack Displays on Impulse Purchase*, 103 ADDICTION 322, 325 (2007).

[18] O.B.J. Carter, et al., *The Effect of Retail Cigarette Pack Displays on Unplanned Purchases: Results from Immediate Post-Purchase Interviews*, 18 TOBACCO CONTROL 218, 219 (2009) (finding that 49% of smokers surveyed in Australia were supportive of a display ban, versus only 12% opposed).

[19] Jie Wu Weiss et al., *Longitudinal Effects of Pro-Tobacco and Anti-Tobacco Messages on Adolescent Smoking Susceptibility*, 8 NICOTINE & TOBACCO RES. 455, 462 (2006).

[20] WORLD HEALTH ORGANIZATION, FRAMEWORK CONVENTION ON TOBACCO CONTROL, at v (2005), *available at* http://whqlibdoc.who.int/publications/2003/9241591013.pdf.

[21] Id. at 11.

[22] WORLD HEALTH ORGANIZATION, GUIDELINES FOR IMPLEMENTATION: ARTICLE 5.3; ARTICLE 8; ARTICLE 11; ARTICLE 13, at 54 (2009), *available at* http://whqlibdoc.who.int/publications/2009/9789241598224_eng.pdf.

[23] World Health Organization, *Parties to the WHO Framework Convention on Tobacco Control*, http://www.who.int/fctc/signatories_parties/en/index.html (last visited Jun. 23, 2010).

[24] Tobacco Control Act (No. 6/2002) (Ice.), *available at* http://eng.heilbrigdisraduneyti.is/media/Reglugerdirenska/Tobacco_Control_Act_revised_2003.pdf.

[25] The Tobacco Control Act, S.S., c. T-14.1, s. 6(3) (2001), *available at* http://www.qp.gov.sk.ca/documents/english/Statutes/Statutes/t14-1.pdf.

[26] Rothmans, Benson & Hedges Inc. v. Saskatchewan, [2005] 1 S.C.R. 188 (Can.). Notably, even when enforcement of the law was suspended, approximately 40% of tobacco retailers chose to continue keeping their tobacco products out of view. ASH Scotland, *Point of Sale Tobacco Display Bans – Myths and Realities*, Sept. 2008, *available at* http://www.ashscotland.org.uk/ash/files/ASH%20Scotland%20Briefing%20Paper%20on%20the%20Myths%20and%20Realities%20of%20Tobacco%20Point%20of%20Sale%20Display%20Bans.pdf.

[27] Cancer Society of New Zealand, *Out of Sight – Out of Mind: Canadian Provinces*, *available at* http://protectourchildren.org.nz/index.php?id=378.

[28] *See* Thailand Health Promotion Institute, *Advocacy for Policy of Nil-Display at Tobacco Point of Sales* (2005), *available at* http://www.thpinhf.org/POP.pdf.

[29] The one Australian state that has not enacted a display ban law in Queensland. Legislation has been introduced there to prohibit the display of tobacco products. Queensland Government Ministry, *Ban on Tobacco Displays in Queensland by Mid-2011*, April 29, 2010, *available at* http://www.cabinet.qld.gov.au/mms/StatementDisplaySingle.aspx?id=69544.

[30] Public Health (Tobacco) Act, 2002 (Act No. 6/2002) (Ir.) and Public Health (Tobacco) (Amendment) Act, 2004 (Act No. 6/2004) (Ir.).

[31] Act No. 14 of 9 March 1973 relating to Prevention of the Harmful Effects of Tobacco (Norway), *available at* http://www.regjeringen.no/en/dep/hod/Subjects/Folkehelse/Norways-National-Strategy-for-Tobacco-Co.html?id=451948&epslanguage=EN-GB.

[32] *Finland Bans Tobacco Display in Europe's Toughest Tobacco Control Law*, MEDICAL NEWS TODAY, Aug. 22, 2010, *available at* http://www.medicalnewstoday.com/articles/198494.php.

[33] New Zealand Ministry of Health, *Proposal to Ban Tobacco Retail Displays in New Zealand* (consultation letter requesting comments by May 2010), *available at* http://www.moh.govt.nz/moh.nsf/indexmh/proposal-to-ban-tobacco-retail-displays-in-nz.

[34] David Simpson, *Canada: Point of Sale Win—Again*, 14 TOBACCO CONTROL 78, 78-79 (2005).

[35] Rothman, Benson & Hedges Inc. v. Saskatchewan, [2005] S.C.R. 188 ("There is no inconsistency between s.6 of [Saskatchewan] *The Tobacco Control Act* and s. 30 of the [federal] *Tobacco Act* that would render the former inoperative pursuant to the doctrine of federal legislative paramountcy.").

[36] Ireland Office of Tobacco Control, *Office of Tobacco Control Welcomes Discontinuation of Legal Challenge Against Tobacco Legislation* (Press Release), Jan. 31, 2007, *available at* http://www.otc.ie/article.asp?article=353.

[37] Dominic Walsh, *Cigarette Makers Seek Review of Display Ban*, THE TIMES (U.K.), Apr. 27, 2010, *available at* http://business.timesonline.co.uk/tol/business/industry_sectors/ consumer_goods/ article7108934.ece.

[38] *Marlboro Man Philip Morris Sues Norway Over Cigarette Ban*, TELEGRAPH.CO.UK, Mar. 19, 2010, *available at* http://www.telegraph.co.uk/news/worldnews/europe/norway/ 7405522/Marlboro-man-Philip-Morris-sues-Norway-over-cigarette-ban.html.

[39] THE CENTRE FOR TOBACCO CONTROL RESEARCH, UNIVERSITY OF STERLING, POINT OF SALE DISPLAY OF TOBACCO PRODUCTS 31-36 (Aug 2008).

[40] Letter from Saskatchewan Coalition for Tobacco Reduction to Scottish Government, Apr. 6, 2009, *available at* http://www.scottish.parliament.uk/s3/committees/hs/inquiries/TGPBill/documents/TGP25SaskatchewanCoalitionforTobaccoReduction.pdf. More recently, it was discovered that Philip Morris had been secretly funding an Australian group calling itself the Alliance of Australian Retailers, which had been formed to oppose a proposed rule that would require plain packaging of tobacco products. Anne Davies, *Big Tobacco Hired Public Relations Firm to Lobby Government*, SYDNEY MORNING HERALD, Sept. 11, 2010.

[41] Action on Smoking and Health (ASH) Scotland, *Point of Sale Tobacco Display Bans: Myths and Realities*, at 2 (2008), *available at* http://www.ashscotland.org.uk/ash/6545.1359.html (follow "Briefing on myths and realities of tobacco point of sale display bans" hyperlink).

[42] See *infra* notes 43-58 and accompanying text.

[43] Letter from Stefan Hrafn Jonsson, Research and Development Division Director, Public Health Institute of Iceland, to Katherine Graham, Tobacco Retailers Alliance, *available at* http://www.scottish.parliament.uk/s3/committees/hs/inquiries/TGPBill/documents/2009.06.02ASHScotland.pdf (found in appendix D).

[44] Tobacco control advocates should also be aware of the Public Health Institute of Iceland's ("PHII") survey regarding smoking rates in Iceland, as this data is frequently cited by those opposing the display ban and seems to support the position that the ban has little or no effect (the rate of youth smoking appears to rise and fall, without any downward trend). However, there are some fatal weaknesses when using the PHII survey to measure youth smoking. This survey was designed to measure the overall smoking rate in Iceland, not the youth smoking rate. The sample size is much smaller when only the youth data is viewed, leading to a confidence interval of +/- 4%. Accordingly, even a change from 15% in one year to 23% in the next is not statistically significant. In the letter cited in the previous note, the Research and Development Director from PHII states that they prefer to use the ESPAD data when measuring youth smoking as opposed to their own survey, because the ESPAD data has narrow confidence intervals and any change greater than a percentage point is statistically significant.

[45] Lisa Henriksen et al., *Association of Retail Tobacco Marketing with Adolescent Smoking*, 94 AM. J. PUB. HEALTH 2081, 2082 (2004).

[46] Melanie Wakefield et al., *An Experimental Study of Effects on Schoolchildren of Exposure to Point-of-Sale Cigarette Advertising and Pack Displays*, 21 HEALTH EDUC. RES. 338, 346 (2006).

[47] J. Paynter et al., *supra* note 5, at 272 (2009).

[48] While the data as a whole is strong, when it is broken down by province and by age the sample size in each category becomes smaller and more susceptible to random error. This random error is the cause of the variance between individual years. Letter from Sheila Duffy, ASH Scotland, to Scotland Health and Sport Committee (June 2, 2009), *available at* http://www.scottish.parliament.uk/s3/committees/hs/inquiries/TGPBill/documents/2009.06.02ASHScotland.pdf (found in appendix C). Approximate sampling variability tables for the Canadian Tobacco Use Monitoring Survey are available at http://www.statcan.gc.ca/dli-ild/data-donnees/ftp/survey-tobacco-enquete-tabac-eng.htm.

[49] Propel Centre for Population Health Impact, *Youth: Smoking Prevalence*, *available at* http://www.tobaccoreport.ca/ytu_cs_sp_byage.html (data from the Canadian Tobacco Use Monitoring Survey).

[50] George Thompson et al., *Evidence and Arguments on Tobacco Retail Displays: Marketing an Addictive Drug to Children?*, 121:1276 J. NEW ZEALAND MED. ASS'N 87, 90 (2008). Discussing the fact that retailer incentive payments have continued subsequent to the implementation of display bans (although the amount of the payments has decreased), Thomson et al., write: "These figures imply that tobacco companies are now paying retailers to *handle and sell* their products, rather than to display them. From a marketing point of view, this explanation is logical, since tobacco companies will want retailers to maintain the same range of brands and brand variants as they did prior to the display ban." Id. (emphasis in original).

[51] ASH Scotland, *supra* note 26 (citing quotes given to *Your Convenience Manager*, a publication of the Canadian convenience store industry).

[52] Thompson, *supra* note 50, at 20.

[53] *Dealing with Display Bans: Solutions and Support*, GLOBAL CONVENIENCE STORE FOCUS, Dec. 2009, *available at* http://www.globalcstorefocus.com/0912/4.html.
[54] Id.
[55] Id.
[56] See 4 Solutions Display Corp., *Restricted Tobacco Overview*, http://www.4solutionsdisplay.com/restricted_tobacco_overview (last visited Oct. 8, 2010).
[57] Kate Lunau, *Butts on the Line*, MACLEANS.CA, July 23, 2008, *available at* http://www.macleans.ca/business/economy/article.jsp?content=20080723_24986_24986&page=1.
[58] Indeed, any minimal costs imposed on businesses are likely vastly outweighed by the economic and health benefits that result from reduced smoking rates. Moreover, businesses that are strongly reliant on tobacco sales have another option – closing their premises to youth. Some retailers in Canada chose this option following the implementation of display ban laws. See Health Canada, *A Proposal to Regulate the Display and Promotion of Tobacco and Tobacco-Related Products at Retail, available at* http://www.hc-sc.gc.ca/hc-ps/consult/_2006/tob-ret/index-eng.php (Section 3.4).
[59] Federal Cigarette Labeling and Advertising Act, Pub. L. No. 89-92, 79 Stat. 282 (1965) (codified as amended at 15 U.S.C. §§ 1331-1341).
[60] Id. at § 5 ("(a) No statement relating to smoking and health, other than the statement required by section 4 of this Act, shall be required on any cigarette package. (b) No statement relating to smoking and health shall be required in the advertising of any cigarettes the packages of which are labeled in conformity with the provisions of this Act.").
[61] Federal Cigarette Labeling and Advertising Act, Pub. L. No. 91-222, §4, 84 Stat. 87, 88 (1970) ("Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.").
[62] Id. at § 5, 88 ("(b) No requirement or prohibition based on smoking and health shall be imposed under State law with respect to the advertising or promotion of any cigarettes the packages of which are labeled in conformity with the provisions of this Act.")
[63] Joseph R. DiFranza et al., *RJR Nabisco's Cartoon Camel Promotes Camel Cigarettes to Children*, 266 J. AM. MED. ASS'N 3149 (1991).
[64] Family Smoking Prevention and Tobacco Control Act, Pub. L. No. 111-31, 123 Stat. 1776 (2009).
[65] Family Smoking Prevention and Tobacco Control Act, Pub. L. No. 111-31, 123 Stat. 1776, 1786 (2009) (codified at 21 U.S.C.A. § 387a(a)).
[66] Food & Drug Admin. v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 121 (2000) ("[I]t is clear that Congress intended to exclude tobacco products from the FDA's jurisdiction.")
[67] Family Smoking Prevention and Tobacco Control Act, Pub. L. No. 111-31, 123 Stat. 1776, 1842 (2009) (to be codified at 15 U.S.C.A. § 1333(a)(1)) ("WARNING: Smoking can kill you." "WARNING: Cigarettes cause fatal lung disease." "WARNING: Cigarettes are addictive.").
[68] 15 U.S.C. § 1334 (2010) (emphasis added). The FSPTCA also contains another preemption provision, 21 U.S.C. § 387p. This provision prohibits state and local governments from regulating "tobacco product standards, premarket review, adulteration, misbranding, labeling, registration, good manufacturing standards, or modified risk tobacco products," but provides that state and local governments may impose more stringent restrictions than the federal government with regard to "requirements relating to the sale, distribution, possession, information reporting to the State, exposure to, access to, the advertising and promotion of, or use of, tobacco products by individuals of any age, or relating to fire safety standards for tobacco products."
[69] 940 MASS. CODE REGS. 21.04(5)(a).
[70] Lorillard Tobacco Co. v. Reilly, 533 U.S. 525, 551(2001) ("Congress pre-empted state cigarette advertising regulations like the Attorney General's because they would upset federal legislative choices to require specific warnings and to impose the ban on cigarette advertising in electronic media in order to address concerns about smoking and health. Accordingly, we hold that the Attorney General's outdoor and point-of-sale advertising regulation targeting cigarettes are pre-empted by the FCLAA.").
[71] N.Y. PUB. HEALTH LAW § 1399-cc(7) (2010).
[72] Edenfield v. Fane, 507 U.S. 761, 770-71 (1993) ("It is well established that the party seeking to uphold a restriction on commercial speech carries the burden of justifying it. This burden is not satisfied by mere speculation or conjecture; rather, a governmental body seeking to sustain a restriction on commercial speech must demonstrate that the harms it recites are real and that its restriction will in fact alleviate them to a material degree.") (internal quotation marks and citations omitted).

[73] See, e.g., Lorillard Tobacco Co. v. Reilly, 533 U.S. 525, 563 (2001) ("[A] case specific analysis makes sense, for although a State or locality may have common interests and concerns about underage smoking and the effects of tobacco advertisements, the impact of a restriction on speech will undoubtedly vary from place to place.").
[74] See Part 3, *supra*.
[75] U.S. CONST., AMEND. I.
[76] Schneider v. New Jersey, 308 U.S. 147, 160 (1939) ("The freedom of speech and of the press secured by the First Amendment . . . against abridgment by the United States is similarly secured to all persons by the Fourteenth against abridgment by a state.")
[77] Police Dep't of Chicago v. Mosley, 408 U.S. 92, 96 (1972) ("[O]ur people are guaranteed the right to express any thought, free from government censorship. The essence of this forbidden censorship is content control. Any restriction on expressive activity because of its content would completely undercut the 'profound national commitment to the principle that debate on public issues should be uninhibited, robust, and wide-open.'")
[78] See Chaplinsky v. State of New Hampshire, 315 U.S. 568, 571-572 (1942) ("There are certain well-defined and narrowly limited classes of speech, the prevention and punishment of which has never been thought to raise any Constitutional problem. These include the lewd and obscene, the profane, the libelous, and the insulting or 'fighting' words-those which by their very utterance inflict injury or tend to incite an immediate breach of the peace.")
[79] See Virginia State Bd. of Pharmacy v. Virginia Citizens Consumer Council, Inc., 425 U.S. 748, 770 (1976) ("In concluding that commercial speech, like other varieties, is protected, we of course do not hold that it can never be regulated in any way. Some forms of commercial speech regulation are surely permissible.")
[80] See Central Hudson Gas & Electric Corp. v. Public Service Commission of New York, 447 U.S. 557, 561 (1980) (defining commercial speech as "expression related solely to the economic interests of the speaker and its audience").
[81] See, e.g., Bailey v. Morales, 190 F. 3d 320 (1999) (hiring others to solicit customers constitutes commercial speech protected by the First Amendment).
[82] Central Hudson, 447 U.S. at 564. If however, the court finds that the law at issue is directed solely at *conduct* and is "unrelated to the suppression of free expression," it may apply the less stringent test developed in *O'Brien v. United States* (the "*O'Brien* test"). O'Brien v. United States, 391 U.S. 367, 377 (1968). Under this test, the government regulation is more likely to be upheld. In *Lorillard v. Reilly*, 533. U.S. 525, 569 (2001), the Supreme Court applied the *O'Brien* test and found that a law requiring tobacco products to be kept behind the counter did not violate the First Amendment.
[83] Central Hudson, 447 U.S. at 566.
[84] Id. at 565.
[85] Id. at 563.
[86] Id. at 564, 566.
[87] Id. at 566.
[88] Id. at 565 (internal reference omitted).
[89] 533 U.S. 525 (2001).
[90] Id. at 562.
[91] Id.
[92] Id. at 528.
[93] 940 CODE OF MASS. REGS. §§ 21.04(5)(b), 22.06(5)(b) (2000).
[94] Lorillard, 533 U.S. at 566.
[95] Central Hudson, 447 U.S. at 564.
[96] Justice Thomas has suggested abandoning the *Central Hudson* test and providing commercial speech with the same amount protection from regulation as non-commercial speech. Thus far, other justices have not been willing to endorse that position. See, e.g., 44 Liquormart, Inc. v. Rhode Island, 517 U.S. 484, 522 (1996) (Thomas, J., concurring) ("I do not see a philosophical or historical basis for asserting that 'commercial' speech' is of 'lower value' than 'noncommercial' speech.").
[97] Central Hudson, 477 U.S. at 563 ("The First Amendment's concern for commercial speech is based on the informational function of advertising . . . Consequently, there can be no constitutional objection to the suppression of commercial messages that do not accurately inform the public about lawful activity. The government may ban forms of communication more likely to deceive the public than to inform it . . . or commercial speech related to illegal activity.")

[98] However, specific ads or specific types of tobacco promotions that are demonstrably false will not be protected by the First Amendment. See, e.g., United States v. Philip Morris USA, Inc., 566 F.3d 1095, 1123-26 (D.C. Cir. 2009) (finding that the tobacco companies' marketing of "light" cigarettes as less harmful than regular cigarettes constituted fraud, and that "the First Amendment does not protect fraud").
[99] Lorillard, 533 U.S. at 579 (Thomas, J., concurring).
[100] Id. at 580 (Thomas, J., concurring).
[101] See, e.g., David G. Yosifon, *Resisting Deep Capture: The Commercial Speech Doctrine and Junk-Food Advertising to Children*, 39 LOY. L.A. L. REV. 507, 558 (2006) (suggesting that "[i]n *Lorillard*, the government . . . irredeemably sandbagged its own case by its unwise waiver of the first part of the *Central Hudson* inquiry").
[102] See Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: Some Evidence of Market Manipulation*, 112 HARV. L. REV. 1420, 1467-1551 (1999).
[103] Lorillard, 533 U.S. at 555.
[104] Central Hudson, 447 U.S. at 569.
[105] Edenfield v. Fane, 507 U.S. 761, 770-771 (1993).
[106] Florida Bar v. Went for It, Inc., 515 U.S. 618, 628 (1995).
[107] U.S. v. Philip Morris USA, Inc., 449 F. Supp 2d 1 (D.D.C. 2006).
[108] Central Hudson, 447 U.S. at 566.
[109] Greater New Orleans Broadcasting Ass'n, Inc. v. U.S., 527 U.S. 173, 183 (1999) ("In a number of cases involving restrictions on speech that is 'commercial' in nature, we have employed *Central Hudson's* four-part test to resolve First Amendment challenges . . . [i]n this analysis, the Government bears the burden of identifying a substantial interest and justifying the challenged restriction").
[110] See Centers for Disease Control and Prevention, *Cigarette Use Among High School Students --- United States, 1991-2009*, 56 MORBIDITY & MORTALITY WEEKLY REP'T 797 (2010) (demonstrating the rate of decline in youth smoking rate has significantly decreased since 2003 and suggesting that additional tobacco control measures are needed).
[111] *See* Weiss, *supra* note 19, at 462.
[112] U.S. CONST. Art VI, cl. 2 (proving that the laws of the United States "shall be the Supreme Law of the Land").
[113] Rice v. Santa Fe Elevator Corp., 331 U.S. 218, 230 (1947).
[114] N.Y. MUN. HOME RULE LAW § 10(1)(ii)(a)(12) ("Every local government . . . shall have power to adopt and amend local laws . . . relating to . . . [t]he government, protection, order conduct, safety, health and well-being of persons therein. This provision shall include but not be limited to the power to adopt local laws providing for the regulation or licensing of occupations or businesses . . . .").
[115] N.Y. PUB. HEALTH LAW § 308.
[116] In other words, expensive enforcement measures will become unnecessary because compliance with the law will become the societal norm and violations will be reported by the public.

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Appendix A: Model Ordinance

MODEL NEW YORK ORDINANCE PROHIBITING THE DISPLAY OF TOBACCO PRODUCTS IN FACILITIES OPEN TO MINORS

Section 1: Findings

The **[Common Council]** of **[City]** hereby finds and declares that:

Tobacco use is the foremost preventable cause of premature death in the United States, causing over 400,000 deaths in the United States each year;

More than XXX high school age youth and XXX adults in **[City]** currently smoke and smoking kills approximately XXX adults in **[City]** each year;

Tobacco companies sell products that are addictive and inherently dangerous, causing cancer, heart disease, and other serious illnesses;

[City] has a substantial interest in reducing the number of individuals of all ages who use cigarettes and other tobacco products, and a particular interest in protecting adolescents from tobacco dependence and the illnesses and premature death associated with tobacco use;

An overwhelming majority of Americans who use tobacco products begin using such products while they are adolescents and become addicted to those products before reaching the age of 18;

Tobacco product displays lead minors to develop favorable beliefs about tobacco use, overestimate the prevalence of tobacco use, and engage in illegal purchases of tobacco products;

The display of tobacco products plays a crucial role in the decision of individuals, and adolescents in particular, to begin using tobacco products;

The World Health Organization has endorsed a ban on retail tobacco product displays as an effective method of reducing tobacco use;

Research suggests that preventing the display of tobacco products will lead to a significant decrease in the number of adolescents becoming addicted to those tobacco products and will assist individuals in their efforts to quit smoking;

Tobacco companies recognize the importance of tobacco product displays in increasing product sales and therefore pay tobacco retailers for prominent display locations;

Consider Who Will Adopt the Law: In addition to cities, counties and county boards of health may possess the legal authority to prohibit the display of tobacco products.

County boards of health can adopt such a rule by adding it to the county's sanitary code. However, this model would have to be adapted somewhat for that purpose. Please contact the Center for Public Health and Tobacco Policy to discuss this option further.

Add Localized Findings: Communities can add more localized facts into the findings and can add other findings compelling to the community. It is also important to introduce supporting materials into the record during common council hearings. Those materials can be referenced in the findings.

Prior efforts by the city and state to limit tobacco use, while effective, have not precluded the need for further efforts to reduce tobacco use by adolescents;

The Centers for Disease Control recognizes that a comprehensive, multi-faceted approach is necessary to adequately address the issue of youth tobacco use;

Due to federal preemption, **[City]** lacked the legal authority to limit the display of tobacco products prior to the enactment of the Family Smoking Prevention and Tobacco Control Act in 2009;

Preventing the display of tobacco products will reduce the number of adolescents who use tobacco products, while still affording tobacco companies numerous ways to communicate product information and provide other advertising to their legal adult customers;

[Common Council] desires to reduce adolescent smoking and the public health consequences of smoking without prohibiting the sale of tobacco products to adult consumers;

The purpose of this legislation is to further the strong governmental interest in protecting the health of its citizens, and particularly its children, by restricting the display of tobacco products in retail environments that are open to children; and

This measure does not restrict expressive conduct any more than necessary and will leave tobacco companies with reasonable and adequate ways to communicate non-misleading commercial information to their legal adult customers.

Central Hudson/ Commercial Speech Test: Keep in mind the Central Hudson *factors when developing findings. Use findings that demonstrate that (a) the government has a substantial interest in prohibiting the display of tobacco products, and (b) the law directly advances the government's interest.*

Section 2: Definitions

As used in this Chapter, the following terms shall have the meanings indicated:

(A) ADULT-ONLY ESTABLISHMENT means a facility where the operator ensures or has a reasonable basis to believe (such as by checking the identification of any person appearing to be under the age of 25) that no person under the Legal Age is permitted entrance.

(B) AGE-VERIFIED CUSTOMER means any individual who has presented a driver's license or other photographic identification card issued by a government entity or educational institution indicating that the individual is of Legal Age. Such identification need not be required of any individual who reasonably appears to be at least twenty-five years of age, provided, however, that such appearance shall not constitute a defense in any proceeding alleging a violation of this Chapter. It shall be an affirmative defense to a violation of this Chapter that the Tobacco Retailer

Adult-Only Establishments: This model ordinance exempts adult-only establishments (see Section 3). Note that there is no separate exception for tobacco stores. Tobacco stores must prohibit access to minors in order to continue displaying tobacco products.

successfully performed a Transaction Scan of an individual's identification as defined by New York Public Health Law 1399-cc and that a Tobacco Menu or Tobacco Product was provided to such individual in reasonable reliance upon such identification and transaction scan.

(C) LEGAL AGE means the minimum age at which individuals are permitted to legally purchase tobacco products.

(D) DEPARTMENT means the **[Department of XXX]**.

(E) PERSON means any natural person, company, corporation, firm, partnership, business, organization, or other legal entity.

(F) TOBACCO MENU means a booklet, pamphlet, or list that contains a listing of tobacco products offered for sale by the Tobacco Retailer and the price of such products. The Tobacco Menu may contain pictures of and advertisements for Tobacco Products.

(G) TOBACCO PRODUCT means any manufactured product containing tobacco or nicotine, including but not limited to cigarettes, cigars, pipe tobacco, snuff, chewing tobacco, dipping tobacco, bidis, snus, dissolvable tobacco products, and electronic cigarette cartridges, whether packaged or not; any packaging that indicates it might contain any substance containing tobacco or nicotine; or any objects utilized for the purpose of smoking or inhaling tobacco or nicotine products, including but not limited to pipes, hookahs, cigarette or cigar wrapping papers, and electronic cigarettes. However, "Tobacco Product" does not include any product that has been approved by the U.S. Food and Drug Administration, pursuant to its authority over drugs and devices, for sale as a tobacco use cessation product or for other medical purposes and is being marketed and sold solely for that approved purpose.

(H) TOBACCO RETAILER means any Person who sells or offers for sale any Tobacco Product, or any employee of such a person.

Section 3: Adult-Only Establishments Exempted

Sections 4 through 7 of this Chapter shall not apply to Adult-Only Establishments.

Section 4: Display of Tobacco Products Prohibited

(A) No Tobacco Retailer shall display or permit the display of any Tobacco Product in a manner that permits a consumer to view any Tobacco Product prior to purchase. Except as provided for in Subsection 4(B), this Section is not violated if:

(1) at the direct request of an Age-Verified Customer, such a customer handles a Tobacco Product to inspect the product for quality and freshness prior to purchase; or

Exceptions: There are limited exceptions that allow for tobacco products to be briefly handled during the course of business. However, retailers cannot permit the display of tobacco products for any longer than necessary.

(2) Tobacco Products are temporarily visible during restocking, the sale of the Tobacco Products, or the carriage of the Tobacco Products into or out of the premises.

(B) No Tobacco Retailer shall display or permit the display of any Tobacco Product for any longer than necessary to complete the purposes identified in Subsection 4(A)(1) or Subsection 4(A)(2).

Section 5: Use of Tobacco Menu

(A) No Tobacco Retailer shall store any Tobacco Menu in a location where it is visible to customers or accessible to customers without the assistance of a Tobacco Retailer.

(B) No Tobacco Retailer shall provide any Tobacco Menu to any individual other than an Age-Verified Customer.

(C) After a customer has completed viewing a Tobacco Menu, the Tobacco Retailer shall immediately return the Tobacco Menu to its storage location.

(D) Any tobacco advertisements or promotions included in the Tobacco Menu shall include any warning labels required by federal law or regulation.

Section 6: Enforcement

(A) The Department or its authorized designee(s) shall enforce the provisions of this Chapter. The Department may conduct periodic inspections to ensure compliance with this Chapter.

(B) Any citizen who desires to register a complaint under this Article may do so with the Department.

(C) In addition to the remedies provided by the provisions of this Chapter, the Department or any other person aggrieved by the failure of a Tobacco Retailer to comply with the provisions of this Chapter, including but not limited to any other Tobacco Retailer located in **[City]**, may seek injunctive relief against the violator to enforce the provisions of this Chapter and prevent future violations.

(D) In any action brought pursuant to Section 6(C), the Department or other person who initiates such an action shall, if the prevailing party, be entitled to recover reasonable attorneys' fees and costs involved in bringing the action, plus interest.

Tobacco Menu: Retailers are free to determine the content of the Tobacco Menu (so long as warnings required by federal law are provided). The menu can only be provided to customers who are old enough to purchase tobacco products.

Enforcement: Enforcement of this Chapter is through both city and public inspection.

The Department can: (1) issue monetary fines and (2) seek injunctive relief. The fines are described in Section 8. Injunctive relief means that the city can go to court and ask the judge to order someone to stop doing something—here, it would be violating the law and conducting illegal activities.

Someone in the community can: (1) alert the Department about the illegal activity, and/or (2) seek injunctive relief. The person who goes to court can seek, as part of the case, reimbursement for the cost of bringing the case to court.

Section 7: Penalties

(A) Any Tobacco Retailer found to be in violation of Section 4 of this Chapter shall be liable for civil penalty of not more than $500 for the first violation, not more than $1000 for the second violation within a two-year period, and not more than $2000 for the third and each subsequent violation within a two-year period. Each day on which a violation occurs shall be considered a separate and distinct violation.

(B) Any Tobacco Retailer found to be in violation of Section 5 of this Chapter shall be liable for civil penalty of not more than $250 for the first violation, not more than $500 for the second violation within a two-year period, and not more than $1000 for the third and each subsequent violation within a two-year period. Each day on which a violation occurs shall be considered a separate and distinct violation.

(C) In addition to the fines established by this Section, violation of this Chapter by a Tobacco Retailer may result in the suspension or revocation of any permit or license issued to the Tobacco Retailer.

(D) All civil penalties and fines recovered by under this Chapter shall be provided to the Department for use in enforcing this Chapter and other city laws relating to Tobacco Products.

Penalties: Penalties could be tailored to reflect other similar local laws. The penalties section would have to be modified before inclusion in a county sanitary code. (Fines allowable under a county sanitary code cannot exceed $500.)

Section 8: Severability

The provisions of this Chapter are declared to be severable, and if any section of this Chapter is held to be invalid, such invalidity shall not affect the other provisions of this Chapter that can be given effect without the invalidated provision.

Section 9: Effective Date

The effective date of this ordinance shall be one hundred and eighty (180) days from the date of its enactment.

Effective Date: The effective date should be set at a time that gives the Department and retailers enough time to prepare for the new law. The time period between enactment of the law and the effective date should, however, be no longer than necessary.

The Center for Public Health & Tobacco Policy
at New England Law | Boston
http://www.tobaccopolicycenter.org/

NEW ENGLAND LAW BOSTON
154 Stuart St.
Boston, MA 02116

Contact:
Phone: 617-368-1465
Fax: 617-368-1368
tobacco@nesl.edu

The Center for Public Health and Tobacco Policy is a new resource for the New York tobacco control community. It is funded by the New York State Department of Health and will be working with the New York State Tobacco Control Program and its contractors to develop and support policy initiatives that will reduce tobacco-related morbidity and mortality in New York.

This work provides educational materials and research support for policy initiatives and does not constitute and cannot be relied upon as legal advice.

Appendix B: Compliance Guidance

New South Wales (Australia), British Columbia (Canada), Ontario (Canada)

FACTS

RETAILER FACTSHEET 5

Ban on display of tobacco and smoking products in retail outlets

Section 9 of the *Public Health (Tobacco) Act 2008* prohibits the display of tobacco products, non-tobacco smoking products and smoking accessories.

Large retailers (more than 50 employees) must now comply.
Small retailers (50 or fewer employees) must comply by 1 July 2010.

Why is the law changing to ban the display of tobacco products?

Research suggests that tobacco displays can influence children's perceptions about the availability and accessibility of cigarettes in their community and can also make it harder for intending quitters to quit.

In 2008, a NSW Government public consultation process found that over half of the submissions received indicated support for a proposal to place tobacco out of sight in retail outlets.

What does a display ban mean?

In NSW the display of tobacco products, non tobacco smoking products and smoking accessories will be phased out in shops and retail outlets, including specialist tobacconists, and tobacco vending machines.

Tobacco retailers will need to ensure that tobacco products, non-tobacco smoking products and smoking accessories **cannot be seen by the public from inside or outside the premises.**

The exceptions are where:

- ✓ a member of the public displays their own tobacco or smoking products; or
- ✓ a tobacco or smoking product or products is displayed to a customer at his or her direct request, including during the actual transaction/sale.

It is also acknowledged that retailers may need to periodically restock their tobacco storage units and that there may be some unavoidable display of tobacco products, non-tobacco smoking products or smoking accessories in this process. (See page 5 of the FAQs).

What types of smoking accessories are covered by the display ban?

The types of smoking accessories covered by the display ban are defined in the Act and include cigarette papers, pipes, cigarette holders, hookahs, water pipes or any other smoking implements. Matches and lighters are not covered by the display ban and therefore may continue to be displayed.

How will the changes affect my business?

Removing tobacco products from sight in premises may require some retailers to make changes to their premises. Therefore, the Act allows for a staged phase-in providing existing retailers with time to plan and make any relevant changes. *See over*

Tobacco retailers that employed 50 employees or less as at 25 September 2008 (the date of the introduction of the *Public Health (Tobacco) Bill 2008)* will need to comply with the display ban by 1 July 2010. Retailers that employed more than 50 employees as at 25 September 2008 must now comply with the display ban. New tobacco retailing businesses need to comply with the display ban from 1 July 2009 and therefore do not receive any additional implementation time.

How can retailers be sure they comply with the display ban requirements?

All tobacco retailers need to ensure they are aware of their obligations introduced by the display ban under the *Public Health (Tobacco) Act 2008*.

There is a variety of ways in which premises retailing tobacco and smoking products may be configured. The key performance measure underpinning the display ban is that **tobacco and smoking products cannot be seen by members of the public from inside or outside the premises.**

Tobacco retailers need to therefore determine how best to meet the display ban performance measure in their specific premises and operating environment to ensure compliance with the legislation. Tobacco retailers are encouraged to apply the following test when undertaking compliance self-assessment: **Can members of the public see any tobacco or smoking products from inside or outside my premises?**

Is general information about implementing the display ban available?

Different types of retail outlets may require different storage configurations for storing their tobacco products. Some retailers may need to amend their tobacco storage units in order to ensure that products are kept out of sight. In general, any option that could allow for the exposure of tobacco or smoking products during business operating hours, including incidental exposure, is not allowed. (Refer to the exceptions on page 1. See the FAQ attachment with further descriptions. Photos will be available in the near future).

Some general tips for tobacco retailers are provided below:

- ✓ Arrangements should minimise exposure of tobacco products during a retail transaction, the use of a large public-facing tobacco storage device with a single opening is unlikely to comply;
- ✓ Tobacco storage devices should not be left open for a period of time allowing tobacco products to be displayed to members of the public (see the FAQ attachment regarding customer transactions);
- ✓ Tobacco products should not be shown to a customer to help in product selection, except when requested by the customer;
- ✓ Retailers need to ensure that members of the public are not exposed to tobacco or smoking products when multi-facing storage devices are used in retail premises (Refer to the exceptions on page 1. See the FAQ attachment which provides additional context);
- ✓ Retailers need to ensure that members of the public are not exposed to tobacco or smoking products when accepting inventory (Refer to the exceptions on page 1. See the FAQ attachment which provides additional context); and
- ✓ Retailers should not allow any broken storage devices, which allow the display of tobacco products to members of the public, to remain unrepaired.

How will customers know what brands and types of tobacco are available in a retail outlet?

Tobacco retailers may choose only one method to display basic information about tobacco products, such as prices and names, through the use of:

- ✓ price tickets; or
- ✓ a single price board.

Retailers may use one or the other of the above methods but NOT both. Therefore the same method of displaying prices and product names must be used for all product lines carried by your business.

The use of tobacco and smoking product catalogues is not allowed. Information about how prices of tobacco products may be displayed is contained in the *Public Health (Tobacco) Regulation 2009*.

Requirements for price tickets

If tobacco retailers choose to use price tickets, they must ensure that they:

- ✓ only use two colours - one for the ticket and one for the price;
- ✓ are not coloured in fluorescent colours or in a more distinctive manner than price tickets used for other merchandise in the retail outlet;
- ✓ are not highlighted by any lighting;
- ✓ are no larger than 35 square centimetres in area;
- ✓ contain lettering not more than two centimetres in height and not more than 1.5 centimetres in width;
- ✓ do not contain information other than the name of the product line, a bar code or other identifying codes, the price and a symbol indicating the country of origin;
- ✓ display the price and product name only once for each product line carried by the retailer;
- ✓ have no other article or thing attached to them; and
- ✓ are not arranged with other price tickets so as to create an image or visual effect from the arrangement that would be incomplete if any one ticket were removed.

Requirements for a price board

If tobacco retailers choose to use a price board, they must ensure that they only use one and it must:

- ✓ not contain information other than the names of the product lines and prices;
- ✓ be no larger than 2,000 square centimetres in area;
- ✓ have a black background with white lettering or a white background with black lettering (but not both);
- ✓ contain lettering that is not more than two centimetres in height and not more than 1.5 centimetres in width;
- ✓ display the price and product name only once for each product line carried by the retailer;
- ✓ have no other article or thing attached to it; and
- ✓ not be highlighted by any lighting.

FACTS

RETAILER FACTSHEET 5

Ban on display of tobacco and smoking products in retail outlets

Further information

For further information about the tobacco control reforms, please access the NSW Health website: **www.health.nsw.gov.au** or call the Tobacco Information Line on 1800 357 412.

The Tobacco Information Line can be accessed by non-English speaking persons via the Translating and Interpreting Service (TIS) on 13 14 50.

NSW GOVERNMENT

NSW HEALTH

Last updated March 2010.

ISBN 978-1-74187-535-5 (CHA) 100065

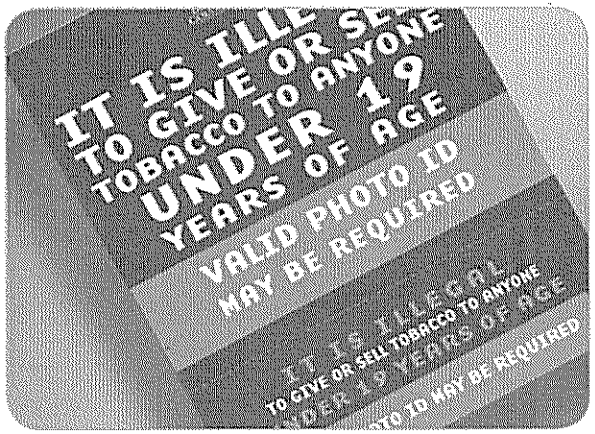
Enforcing the Law

Enforcement officials, employed by the provincial health authorities, are responsible for the day-to-day enforcement of the *Tobacco Control Act* and Regulation.

Provincial enforcement officers can use one of two penalty options for owner/operators. They could receive 1) a violation ticket or 2) a penalty under the Administrative Penalty Process. Penalties for first convictions could result in a fine of up to $1,000 and/or a sales prohibition up to 30 days. These penalties can increase up to $3,000 and/or a 180-day tobacco sales prohibition.

Key Facts

- If minors are allowed in a store, then tobacco products and promotional items cannot be displayed.
- If minors are not allowed in a store, then tobacco can be displayed provided it cannot be clearly seen from outside.
- When minors can enter a store, tobacco displays must be hidden from view between every sales transaction.
- Retail signage is restricted to two types: point-of-sale signs produced by the Ministry of Health and product-price signs.
- Tobacco products cannot be sold in public sector sites such as health, hospital, government, recreational or post secondary facilities.



For further information, contact your local health authority:

Vancouver Island Health Authority
250 360-1450

Vancouver Coastal Health Authority
604 675-3800

Fraser Health Authority
604 476-7000

Interior Health Authority
250 851-7300

Northern Health Authority
1 877 617-6777

Or visit the Tobacco Control website at:
www.health.gov.bc.ca/tobacco

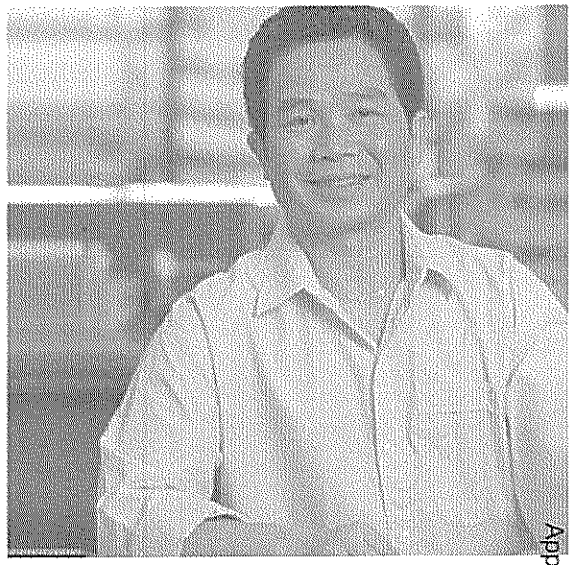
Information in this brochure is intended to provide general information on B.C.'s Tobacco Control Act and Regulation. It should not be used as a substitute for legal or other expert advice.

BRITISH COLUMBIA
The Best Place on Earth

Promoting Better Health for All British Columbians

Tobacco Retail Display and Promotion Restrictions

What you need to know about B.C.'s tobacco laws effective March 31, 2008.



BRITISH COLUMBIA
The Best Place on Earth

Ministry of Health

Appr

Almost all provinces ban the retail display and promotion of tobacco products.

This includes products made from tobacco such as cigarettes, cigars, smokeless tobacco as well as signs, lighters, videos and clothing promoting tobacco products. Since most people start smoking before the age of 19, limiting youth access to tobacco advertising is an important step in promoting healthier choices for British Columbians.

The Rules

As of March 31, 2008, under the provincial *Tobacco Control Act* and Regulation, a retailer in B.C. cannot:

- Display or promote tobacco products if they can be seen or accessed by a minor inside the establishment;
- Display or promote tobacco products in a way that is clearly visible to a person outside the retail establishment.

All tobacco retailers must prevent minors from seeing and accessing their tobacco products and promotional items. There are no exemptions.

Sales Bans

After March 31, 2008, tobacco products cannot be sold in hospitals, health authority or government buildings, public recreation centres, or public post secondary institutions.

Displaying Tobacco for Sale

If minors have access to the store, tobacco products and promotional items must be hidden from view between each sales transaction. To do this, it is up to retailers to determine which method would work best for their store. It could be as simple as using a curtain that remains closed between sales, or stocking tobacco products behind doors or in drawers that are closed after every sale.

Tobacco and tobacco products can be displayed provided that:

- No one under the age of 19 can enter the store.
- Tobacco products and promotions cannot be clearly visible to a person from outside the store.
- The part of the store with the tobacco display is restricted to persons 19 years of age or older and products and promotions cannot be seen or accessed from outside the restricted area.

What about cigarette papers, tubes and filters?

Under provincial regulation, these kinds of products cannot be displayed as they promote tobacco use.

What Kind of Tobacco Signs Can I Post at My Store?

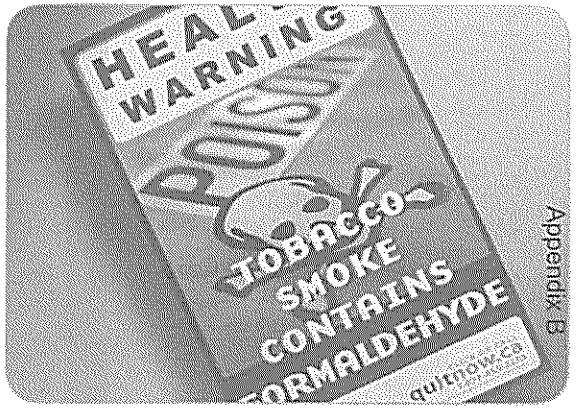
There are only two types of tobacco signs allowed by regulation in a store: point-of-sale signs and product-price signs.

Point-of-sale signs

These signs are produced by the Ministry of Health and must be posted as described in the regulation. They include 1) two decals for the cash register or drawer - one facing the customer and other facing the clerk, and 2) a warning sign to be displayed so the customer can clearly see it when they purchase their tobacco product. These signs can be obtained from your local health authority.

Product-price signs

A maximum of three signs per store are allowed to describe the tobacco products available and their price. These signs are restricted in their content, dimensions, colour and print size, and can be produced by the retailer. They may be viewed from inside or outside of the store. See section 4.32 of the Tobacco Control Regulation on the Tobacco Control web site for more details. www.health.gov.bc.ca/tobacco



Appendix B

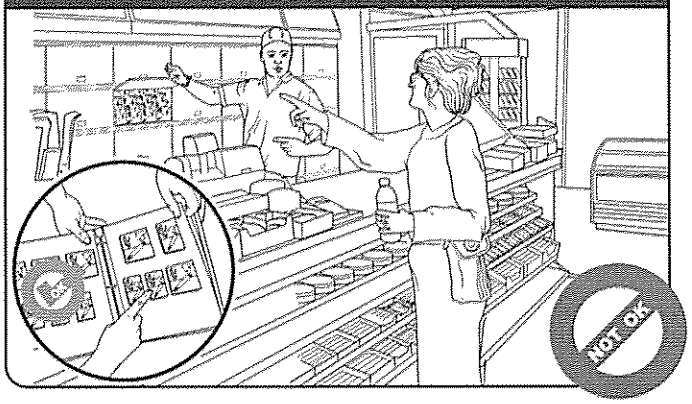
SMOKE-FREE ONTARIO ACT
TOBACCO DISPLAY BAN
FEBRUARY 2008

TOBACCO DISPLAY BAN
EXAMPLES FOR TOBACCO VENDORS

You CAN'T leave doors open that allow tobacco to be shown.

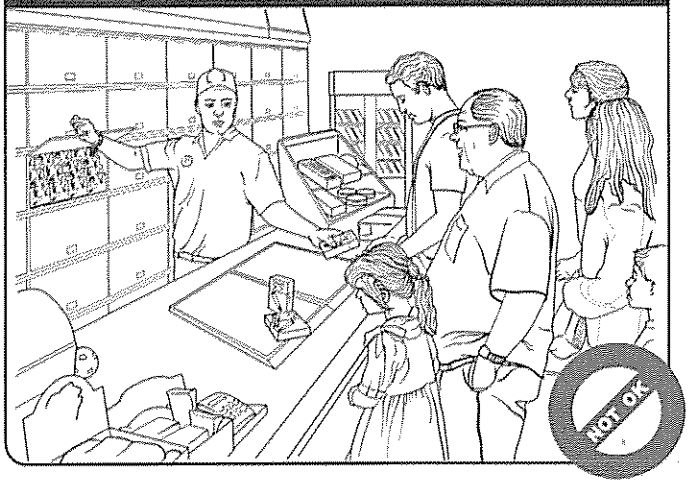


You CAN'T show the tobacco to help someone choose.



OK Let them see a list or binder to choose which product they want.

You CAN'T get tobacco for more than one customer at the same time.



You CAN'T have broken doors that allow tobacco to be shown.



For Further Information

Contact Your Local Public Health Unit

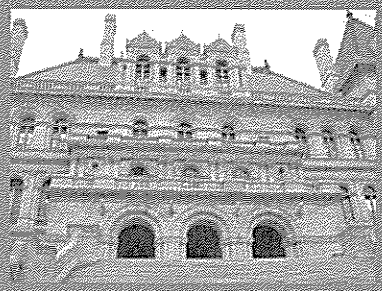
Ministry of Health Promotion
Smoke-Free Ontario Legislation
www.ontario.ca/smokefree

The Smoke-Free Ontario Act and Regulation are available online at: www.e-laws.gov.on.ca.

Ontario







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NYC Finance

Introductory Number 1021
Testimony of Commissioner David M. Frankel
Before the New York City Council
Committee on Health

May 2, 2013

Introductory Number 1021
Testimony of Commissioner David M. Frankel
Committee on Health
May 2, 2013 – 1:00 P.M.

Good morning, Chair Arroyo and members of the Committee on Health. I am David M. Frankel, Commissioner of the Department of Finance, and I am joined by Edgar Domenech, who is our City's Sheriff. Thank you for the opportunity to testify regarding Introductory Number 1021, which would give the Department of Finance new and greater authority to enforce cigarette tax laws.

Before I discuss the bill's provisions, I would first like to describe our current enforcement efforts. Over the past three years, Finance has made Cigarette Tax enforcement one of the core responsibilities of the Office of the Sheriff. In 2011, we created the Tobacco Task Force, consisting of investigators, deputies, and a lieutenant charged with combating the flow of untaxed cigarettes into New York City. To date, the Task Force has performed more than 2,063 inspections, and as you can see from the map behind me, our enforcement efforts have blanketed the five boroughs. Through these efforts, however, it has become clear that cigarette tax evasion is pandemic to our City. During inspections, Deputy Sheriffs found contraband — that is to say, cigarette packs with counterfeit stamps or no stamps at all — at more than 970 (47%) retail establishments. Some inspections resulted in the seizure of a significant amount of untaxed product: the Sheriff's Office made 235 arrests, including 21 felony arrests in situations where retailers were in possession of more than 50 cartons of cigarettes at the time of inspection. And, we seized more than 7,300 cartons of illegal product. That's 1.4 million cigarettes.

The pervasiveness of cigarette tax evasion presents serious problems. First, it puts law abiding cigarette retailers at an incredible disadvantage. When smokers patronize retailers who, because they are not paying tax, sell their product at a cut rate, it diverts those customers from small business owners who play by the rules. Once they are in the door, smokers also make all of their other purchases — their newspaper, lottery tickets, coffee, et cetera — at the same location. That means that law-abiding store owners lose out on untold revenue; simply put, they can't compete. Furthermore, cigarette tax evasion takes an enormous toll on our City's budget. Illegal tobacco sales are estimated to cost federal and state governments $5 billion annually, and here in New York City, we lose out on significant revenue in unpaid taxes from cigarette trafficking. Through this lens, it's all New Yorkers — not just the law-abiding small business owners — who suffer the consequences of a tax evading cigarette retailer's illegal behavior.

Clearly, there is still much to be done to crack down on those who break the cigarette tax laws. For our part, Finance is doubling our efforts: we recently announced the hiring of a new class of 20 Deputy Sheriffs — our first new class in more than 15 years. With this added personnel, we will create a second tobacco squad to augment our existing enforcement. And, beyond that, we strongly support the legislation before you today.

Introductory Number 1021 is an important step in enhancing our ability to effectively enforce against those who break the law. Time and time again, the lax regulations currently on the books hamstring our inspectors from issuing summonses — and the modest monetary penalties for those caught with bags full of contraband are chalked up to the cost of doing business. This bill would create new, firm penalties along every point of tax evaders' operations — from

purchasing cigarettes from unauthorized sources, to transporting untaxed product, to selling counterfeit tax stamps, to hiding the contraband. Most importantly, though, it would also give the Sheriff's Office the authority to padlock the stores of repeat offenders for 60 days. This will send a clear message that tax evasion will not be tolerated, and the Sheriffs will use every tool at their disposal to shut down illegal operations.

Thank you for the opportunity to testify. Sheriff Domenech and I will be happy to answer any questions you may have.

Charles J. Hynes
District Attorney



Jerry Schmetterer
Director of Public Information

KINGS COUNTY DISTRICT ATTORNEY CHARLES J. HYNES ANNOUNCES 23 ARRESTS FOR DISTRIBUTING 550 CASES OF UNTAXED CIGARETTES, EVADING OVER $2 MILLION IN CITY AND STATE TAXES

HALF OF ALL CIGARETTES SOLD IN NEW YORK CITY ARE UNTAXED, COSTING THE CITY OVER HALF A BILLION DOLLARS IN TAX REVENUE EACH YEAR

Brooklyn, February 29, 2012 – Kings County District Attorney Charles J. Hynes, today announced the arrest of 23 people as the result of "Operation Buttlegger", an eight-month investigation conducted by the Money Laundering and Revenue Crimes Bureau targeting distributers of untaxed cigarettes. District Attorney Hynes thanked the Federal Bureau of Alcohol, Tobacco, Firearms and Explosives, the Shenandoah County Sheriff's Office in Virginia and the Fairfax County Police Department in Virginia for assisting in the investigation. Two of the defendants were also charged with robbery.

All cigarettes sold in New York City must bear a joint New York City/New York State tax stamp. Only licensed stamping agents can possess untaxed cigarettes and affix the stamps on the packages. The average price of a carton of cigarettes purchased legally in New York City is $120-$150. Untaxed, illegal cigarettes can be sold on the black market for $30-$50 per carton. According to New York City Department of Finance, half of all the cigarettes sold in the City are untaxed and as a result of the sale of untaxed cigarettes in New York City alone, over a half a billion dollars in tax revenue is lost each year.

"I want to send a clear message that tax cheats, no matter how they try to deprive the citizens of this state of legitimate revenue, they will be arrested and prosecuted," said District Attorney Hynes. "Since this investigation is not over, others who believe that they are above the law and seek to evade cigarette taxes, should take heed of what happened to these defendants."

Under "Operation Buttlegger" Detective Investigators from the District Attorney's Office posed as sellers of black-market cigarettes. Based on information from confidential informants, they sold over 550 cases of untaxed cigarettes, with a retail value of $4,290,000.

Mamadou Barry, 34, and Ching Chung Lam, 46, each purchased 100 cases (60 cartons per case, 10 packs per carton) from undercover agents.

On September 22, 2011, Barry paid $239,880 cash, which he handed over in a garbage bag. Lam was arrested on February 17, 2011, after giving an undercover detective a grocery bag full of $179,880 in cash.

During the investigation, detectives contracted with Meshulam Rothschild, 46, and three others, to purchase untaxed cigarettes from Virginia, along with 10,800 counterfeit Virginia tax stamps to affix to the cigarette packages. Rothschild had access to a warehouse at 81 Spencer Street, where the contraband was delivered. Working with the Federal ATF and the Shenandoah County Sheriff's Office, KCDA investigators arrested Rothschild, Nasmi Havolli, 51, his son, Nart Havolli, 20, and nephew, Blerim Havolli, 24. Rothschild, Nasmi Havolli and his nephew were charged with a top count of Criminal Possession of a Forged Instrument in the First Degree, and face up to 15 years in prison if convicted. Nart Havolli is charged with a tax violation.

Defendants Gani Hodja, 25, and Abdul Herkash, 43, arranged to meet with investigators on December 22, 2011 to purchase black market cigarettes. An informant working with the detectives drove a van to meet the defendants and deliver the contraband. When he arrived, the defendants allegedly maced the informant and carjacked the shipment. Detectives apprehended Hodja and Herkash with the van and the cigarettes. They were indicted for charges including Robbery in the First Degree, Grand Larceny in the Second Degree, Assault in the Second Degree, Criminal Possession of a Weapon in the Fourth Degree and tax code violations. If convicted, they face 25 years in prison.

Another defendant, Usama Abdo, 35, offered to sell over 60 cases of counterfeit cigarettes to a confidential informant. Counterfeit cigarettes may contain toxins that pose additional health risks to consumers, since it is unknown where and how these cigarettes were manufactured. The Detective Investigators seized the cigarettes. Abdo is charged with Trademark Counterfeiting in the Second Degree, felony possession of untaxed cigarettes and other charges. If convicted, he faces 1-3 years in prison.

Additional information was gathered as a result of this seizure and was turned over to the New Jersey State Police and Passaic County Prosecutor's Office. The New Jersey authorities seized a truck full of counterfeit clothing, cigars, cigarettes and drug paraphernalia.

Ali Ahmed, 48, was arrested on February 27, 2012 at the Rio Deli and Grocery at 3678 Norstrand Avenue. He was allegedly selling bootlegged cigarettes out of the deli, which he owns. Nabil Zayed, 39, was arrested at his deli, the 8 Star Food Corp., 8 Saratoga Avenue, where he was allegedly selling untaxed cigarettes. Also on February 27, 2012, Ahmed Almhen, 46, was arrested at the Smart 1 Deli, 3325 Snyder Avenue, which he allegedly owned and used to sell contraband cigarettes. They are charged with tax violations.

In addition to these defendants, 11 others have been arrested and charged with crimes including possession of untaxed cigarettes, tax violations and criminal possession of forged instruments, specifically, counterfeit tax stamps. More arrests are expected as the investigation is ongoing.

An indictment is an accusatory instrument and not proof of a defendant's guilt.

George Terra is the Assistant Chief Investigator, Special Investigations Unit. Joseph Ponzi is Chief of Investigations.

The cases are being prosecuted by Assistant District Attorneys Joel Dowling and Denis Brogan of the Money Laundering and Revenue Crimes Bureau. Joseph McCarthy, Executive Assistant District Attorney, Money Laundering & Revenue Crimes Bureau. Gregory Mitchel is the Bureau Chief of the Money Laundering and Revenue Crimes Bureau. Steven Kramer, Counsel, Money Laundering & Revenue Crimes Bureau. Michael Vecchione is Chief of the Rackets Division.

###

Contact: Mia Goldberg
(718) 250-2300

LINDA B. ROSENTHAL
Assemblymember 67th District

FTR

THE ASSEMBLY

STATE OF NEW YORK

ALBANY

CHAIR
Commission on Science &Technology
Subcommittee on Mitchell-Lama

COMMITTEES
Agriculture
Corporations, Authorities & Commissions
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Housing
Tourism, Parks, Arts & Sports

TESTIMONY OF ASSEMBLYMEMBER LINDA B. ROSENTHAL BEFORE THE NEW YORK CITY COUNCIL HEALTH COMMITTEE ON PROPOSED INT. NO. 250-A RAISING THE LEGAL TOBACCO PRODUCTS SALES AGE TO TWENTY-ONE YEARS

May 2, 2013

I am Assemblymember Linda B. Rosenthal and I represent the Upper West Side and parts of the Clinton/Hell's Kitchen neighborhoods in Manhattan. I am here today to voice my strong support for Int. No. 250-A, which would raise the legal age at which tobacco products may be purchased in New York City from 18 to 21 years old. This is a measured policy that will reduce and delay initiation of smoking among young people, and will have a significant, positive impact on New York City's collective public health. I am the sponsor of similar legislation on the State level, bill A.7105/S.4863 with Senator Diane Savino, which would raise the legal age to purchase cigarettes to 21 statewide.

Over the past decade, New York has led the nation in implementing effective tobacco control programs to encourage teenagers and young adults to quit smoking, through a combination of increasing taxes on tobacco products to funding robust anti-smoking programs. The New York State Department of Health has an impressive Tobacco Control Program, which uses evidence-based strategies to prevent and reduce tobacco use. Its main goals are to implement policy changes statewide to push smokers to quit, keep the price of tobacco products high, eliminate exposure to secondhand smoke for all New Yorkers, prevent the initiation of tobacco use among youth and young adults and implement tobacco dependence screening and treatment in all health-care settings. In fact, its vision is to have "all New Yorkers living in a tobacco-free society." From 2003 to 2010, such efforts have led to a more rapid decline in the adult smoking population in New York State (−29%) than in the rest of the country (−9%). As New York State marked the tenth anniversary of the New York State Clean Indoor Air Act, which ushered in statewide ban on indoor smoking, in public spaces, restaurants and bars, there is work that still needs to be done. Every year, more than 50,000 New Yorkers under the age of 18 start smoking and are more likely to become addicted to it.

Research has shown that the younger one begins smoking, the more likely one is to become a life-long smoker. However, statewide efforts to curb smoking in youth populations have been stymied by the advertising efforts of big tobacco companies. Each year, tobacco companies spend an estimated $196 million on marketing in New York State alone. It is no secret that tobacco companies subtly target young people in an effort to get them addicted at an early age. In New York City, 75% of tobacco retailers are located within 1000 feet of a school, meaning that much of the point-of-sale advertising efforts by big tobacco are being targeted to young people. Statewide, there is approximately one licensed tobacco retailer for every 194 children in the

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state. This accounts for roughly 31.6 million packs of cigarettes purchased and smoked by teenagers each year.

There is no dispute over the adverse health effects of smoking. Smoking kills, oftentimes slowly and quite painfully for both the smoker and their loved ones. Smoking is also a tremendous drain on both the city and state budgets. New York State spends $8.17 billion annually on tobacco-related health care, and $5.47 billion in Medicaid payments. Together, these sums account for nearly $13 billion of our state's budget that could be used for other unmet community needs.

For small businesses and local retailers whose business model is predicated on selling tobacco-related products to young people, I believe they ought to rethink their mission. It is awfully hard to argue the primacy of selling cancer sticks over the public health impact and taxpayer costs of this addicting product.

From increasing city taxes on tobacco product to banning smoking in public spaces, such as parks, beaches and pedestrian plazas, New York City has been a leader in the fight to reduce dependency on tobacco. Increasing the age at which people may legally purchase tobacco products is the logical next step. Doing so will help reduce the overall number of lifelong smokers by preventing young people from ever starting. However, the City cannot act alone; the State must follow suit. The state has a vested interest in the health of its citizens. In the absence of statewide action, young people seeking cigarettes can easily travel outside the City to purchase them legally.

More importantly, the introduction of this legislation on both the City and State levels has sparked a very important discussion about the dangers of smoking and the role of government in providing effective tools to combat the rising public health effects of smoking.

I am pleased that the City has taken on this important issue, and look forward to this measure's passage on the state level as well. The best way to reduce the number of smokers is to prevent them from starting in the first place. I was one of the lucky ones. I was a smoker for 20 years, but with a lot of effort and commitment, I was able to quit. Twenty years is a long time and a lot of damage may have already been done. For other people, quitting is a much more difficult, if not impossible task. Knowing how difficult it was to quit smoking, and the negative impacts it had on my health and my life, I wish that it would have been much harder for me to buy tobacco products when I was young.

To be sure, this bill will not stop every young person from smoking, but it will make it more difficult for young people to get access to tobacco products. There may be those who will try to get around the age restrictions set forth in the legislation proposed by both the City and the State of New York, but there will be many more who won't – and it those people that this legislation will protect.

NYPIRG

NEW YORK
PUBLIC INTEREST
RESEARCH GROUP

Statement of the
New York Public Interest Research Group (NYPIRG)
Regarding Tobacco Legislation
before the
Committee on Health of the New York City Council
May 2, 2013

Good afternoon. My name is Tiffany Brown and I am an organizer with the New York Public Interest Research Group (NYPIRG). NYPIRG is the state's largest student-directed, non-partisan research and advocacy organization. Our Board of Directors consists of college and university students elected from campuses with NYPIRG chapters from across the state. NYPIRG students learn civic engagement skills and advocacy by working on public policy issues, such as public health, environmental protection, consumer rights, voter registration, and higher education affordability.

We would like to thank the City Council's Committee on Health for holding this hearing today. NYPIRG will comment on the three proposed bills, Intros 250-A, 1020, and 1021, separately. We believe that it would benefit the city to consider these as separate initiatives. In short, we urge your support for Intros 1020 and 1021, but we urge your opposition to Intro 250-A.

By way of background, over the past three decades NYPIRG has been front and center in supporting city, state and national initiatives to reduce tobacco use. We surveyed tobacco vending machines in the city; helped run youth purchase retailer stings with the city; played a prominent role in the fight for the city and state to protect children and workers from exposure to tobacco smoke; advocated for programs designed to reduce underage smoking; supported tax hikes to discourage starting to smoke, encourage quitting, and fund tobacco-control programs; and was a leader in the 18-year battle that led to the state's landmark cigarette fire safety law, which ensures that cigarettes sold in New York meet strong fire-safety standards. NYPIRG's lawsuit drove Phillip Morris's *Marlboro 200* road race from lower Manhattan, depriving the tobacco giant of using the Big Apple as backdrop for its national television marketing campaign. More recently, NYPIRG worked in coalition on a successful campaign for smoke-free public parks and beaches in New York City, and we continue in our efforts to reduce youth smoking rates.

Youth smoking rates are of particular interest to Big Tobacco's bottom line. As the industry's "replacement" clientele, the youth demographic needs to be tapped in order for the industry to

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remain profitable by replacing smokers that die or quit. But, what's good for their business is bad for the health of our communities, our strapped public health budgets and staggering healthcare costs. Close to nineteen thousand public high-school students living in NYC currently smoke[1] and one-third of them will die prematurely because of the addictive habit.[2] Additionally, although youth smoking rates have decreased from 17.6% in 2001 to 8.5% today, this rate has remained stagnant since 2007.

We agree that tobacco is a scourge that must be addressed, but we do not agree that young adults should be subject to discrimination. We urge your opposition to Intro 250-A.

Youth smoking is clearly a problem that must be addressed. However, NYPIRG believes the proposal to raise the tobacco purchase age to twenty one years old, while well intentioned, is misguided. Eighteen, nineteen and twenty year olds are adults—they are legally old enough to vote, sit on juries, enlist in the armed services, make and enforce contracts, and run for mayor.

The data is clear that nearly 90% of adult smokers start before they turn 18 years of age.[3] Two studies out of Great Britain are being cited by those in favor of raising the tobacco purchase age. However, the reduction in youth smoking rates was not attributed in full to the purchase age law. *Moreover, the British law raised the purchase age from 16 to 18—not from 18 to 21 as the City Council is considering doing.* There's a world of difference between allowing *children to buy tobacco* as had been the case in Britain—which is already illegal in New York—and *preventing adults from purchase.* We need to continue to make inroads into the 90% of smokers that start before 18—that's where the public health energies must be directed.[4]

Tobacco researchers concede that there is *no firm scientific proof* that age restrictions reduce the incidence of smoking among young teens. Given that nearly 90% of smokers start before the age of 18, that conclusion is an obvious one. However, there is widespread agreement that enforcement of laws, such as penalizing retailers that make underage sales, is effective. "A lot of the studies have found that the direct impact depends on enforcement," Dr. Amanda Amos, a professor of health promotion at the University of Edinburgh, told *The New York Times.*[5] "The more you put into enforcement, the better it works."[6]

Thus the evidence points to focusing on the 90% of smokers who start before they hit 18 years of age. Moreover, adults—including those who are 18, 19 and 20—should be treated as adults for purposes of tobacco policy. Instead, public policy efforts should be focused on preventing

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[1] New York City Department of Health and Mental Hygiene. "New York City Youth Risk Behavior Survey 2011".
[2] Centers for Disease Control and Prevention. "Projected Smoking-Related Deaths Among Youth -- United States." MMWR 45(44). 1996.
[3] *Preventing Tobacco use Among Youth and Young Adults: A Report of the Surgeon General*, Executive Summary, U.S. Department of Health and Human Services (2012). Accessed at www.surgeongeneral.gov/library/reports/preventing-youth-tobacco-use/exec-summary.pdf.
[4] *Id.*
[5] *Debating Age Limits on Tobacco*, Nicholas Bakalar, *The New York Times*, April 29, 2013. Accessed at http://well.blogs.nytimes.com/2013/04/29/debating-age-limits-on-tobacco/.
[6] *Id.*

manipulative tobacco marketing that targets adolescents and young teens. NYPIRG opposes Intro 250-A on these grounds.

A real problem: Big Tobacco's efforts to entice minors to begin this deadly addiction. We urge your support for Intros 1020 and 1021 to respond to this threat.

Young people start smoking because of constant and appealing tobacco marketing. According to the 2012 U.S. Surgeon General's report, *Preventing Tobacco Use Among Youth and Young Adults*, scientific evidence "consistently and coherently points to the intentional marketing of tobacco products to youth as being a cause of young people's tobacco use." Research shows that the more tobacco advertising kids see, the more likely they are to start smoking.

Tobacco advertisements and products are designed to appeal to children and teenagers. The advertisements are colorful allusions to pleasure and an escape from stress that feature young, fun-loving and attractive smokers. Tobacco products mimic the colors and shapes of gum, mints, and other candies. Take Camel for example: Snus, Orbs, and Strips are three Camel products that can be easily mistaken for mints and gum. The products' packages and the smokeless tobacco products themselves are similar to TicTacs®, Altoids®, and mouthwash strips.

One of the most pervasive and dangerous marketing tools that the tobacco industry uses is the "power wall," a large display of tobacco products located behind the counters of tobacco sellers, such as bodegas, convenience stores, and pharmacies. Power walls prompt impulse purchases to attract new tobacco users and thwart attempts to quit and are often next to candy, gum, and other products popular with children.

The proposed legislation, Intro 1020, would require that power walls and other tobacco product displays be placed out of plain sight. As a student-directed organization concerned about public health and corporate responsibility, we believe it is a priority to protect young persons from exposure to marketing such as these tobacco product displays in stores. NYPIRG supports passage of Intro 1020.

Lastly, efforts to crack down on tobacco tax evasion, reduce tobacco industry discounting, and create a price floor for cigarette packs and little cigars will dissuade price-sensitive youth from starting to smoke and will level the playing field for law-abiding businesses. The estimated $500 million lost annually in New York City from unpaid tobacco taxes could be put towards tobacco control programs, including cessation and public education programs. A 2011 report, *Up In Smoke*, found that New York only spent 16% of the amount recommended by the Centers for Disease Control and Prevention on tobacco control programs.[7] NYPIRG supports passage of Intro 1021.

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[7] *Up In Smoke: New York Reaps Billions In Revenue From Tobacco While Shortchanging Anti-Smoking Programs,* Russ Sciandra and Blair Horner, American Cancer Society, Eastern Division (September 2011) . Accessed at http://www.cancer.org/acs/groups/content/@eastern/documents/document/acspc-030903.pdf

Big Tobacco targets those who they hope will be their future customer base with calculated and manipulative marketing tricks. To reduce smoking rates, we must take Big Tobacco's target off of young people's backs. We can and must do this while still respecting an 18, 19, or 20 year old adult's ability to make informed decisions.

Thank you again for holding this hearing. NYPIRG looks forward to working on promising proposals to restrict tobacco marketing that aggressively target the underage youth market and empowering youth to choose not to smoke through public education projects.