



Population and Economic Analysis of the Penetration and Impact of Anti-smoking Mass Media Messages. United States, 2009 - 2018

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**Population and Economic Analysis of the
Penetration and Impact of Anti-smoking Mass
Media Messages. United States, 2009 - 2018**

A Thesis Presented by

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To

The Faculty of Medicine

in Partial Fulfillment of the Requirements

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in the Department of Oral Health Policy and Epidemiology

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Background and Rationale

In 1964, the United States Surgeon General released the first report on smoking and health, which was the result of an 18-month collaboration between a team of experts. In addition to identifying and assessing the effects of tobacco use on human health, the investigators discovered a causal relationship between smoking and lung cancer, cancers of the oral cavity and pharynx, and laryngeal cancer. The Surgeon General and his team also investigated a potential link between smoking and other diseases, such as chronic obstructive pulmonary disease and cardiovascular disease.¹ These studies were published across 32 Surgeon General reports, which persuasively documented the adverse health effects of smoking. The amalgamation of these reports not only broke the silence surrounding this insidious killer, it also fundamentally changed the way Americans viewed tobacco use and influenced public health policy.^{2,3}

Tobacco Control Interventions Timeline

Public health organizations have battled smoking for over 50 years.⁴ Since the 1950s, local, state, and federal governments have developed and implemented strategies aimed towards reducing the negative consequences of smoking (**Figure 1**). Legislation such as indoor smoking bans have successfully eradicated most indoor smoking, reducing the hazardous effects of secondhand smoke. Nowadays, approximately 33 states implemented laws which ban indoor smoking.⁵

The release of the 1964 U.S. Surgeon General’s report on smoking and health prompted Congress to address issues regarding the nation’s smoking laws and resulted in the passing of the “ Federal Cigarette Labeling and Advertising Act of 1965”, also known as the Cigarette Act.⁶ As a means to discourage smoking, the Cigarette Act, which was implemented 6 years later, required a package warning label that stated, “Caution: Cigarette Smoking May Be Hazardous to Your Health”.⁶ Since the Cigarette Act, several regulatory policies and other public health interventions were enacted to further reduce smoking rates.⁷⁻⁹ As of 2016, 15.5% of American adults (aged ≥ 18 years) smoked cigarettes, which is reduced compared to 20.9% in 2005 and 42.4% in 1965.^{5,10}

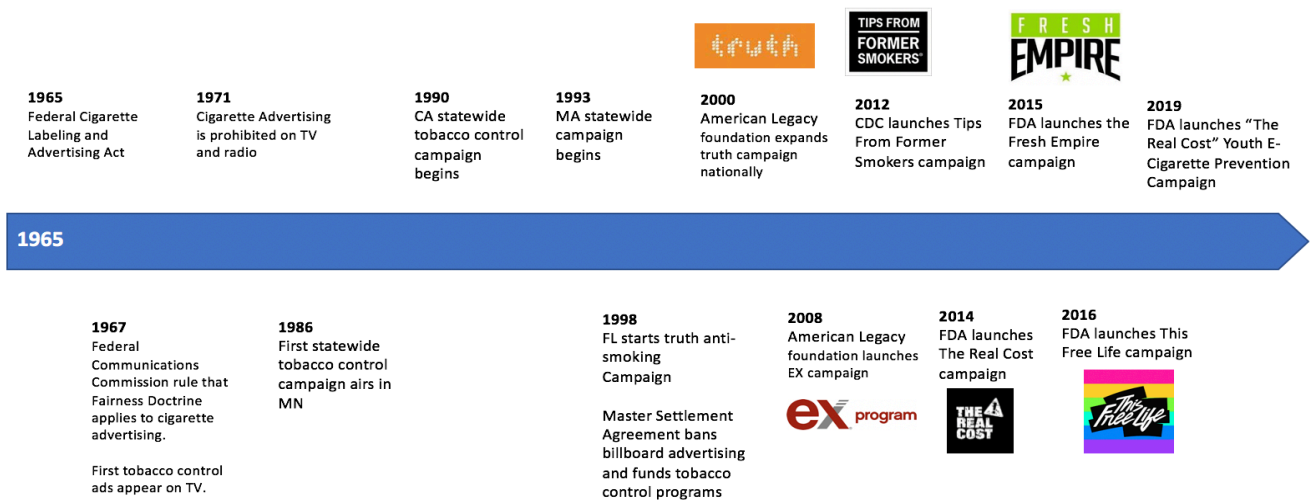


Figure 1: Timeline of the Tobacco Control Communication Interventions in the U.S.

A recent public health victory occurred in 2006 following the United States versus Philip Morris USA, Inc. (D.O.J. Lawsuit). Specifically, the United States District Court of Columbia determined that tobacco companies were to publish corrective statements remedies (CSs) on five specific topics: risks of smoking, risks of exposure to secondhand smoke, addictiveness of nicotine,

nicotine delivery manipulation, and deceptive marketing of cigarettes as “light” or “low tar”. The court also held several major tobacco companies liable for violations of the Racketeer Influenced and Corrupt Organization (RICO) Act. Therefore, defendants were ordered to publish the corrective statements to prevent them from making fraudulent public claims on smoking and health effects in the future.¹¹

The wording for the CSs was finalized in November 2012 and they appeared in early 2013 on cigarette package inserts, tobacco websites, and at points of sale.¹² However, mass media dissemination in national newspapers and primetime television did not occur until November 2017. Specifically, newspaper advertisements ended in March 2018 and TV advertisements stopped airing in November 2018. The CSs predominantly targeted adult audiences,¹¹ meanwhile the tobacco industry has a long history of featuring their products in appealing and accessible sites for youth, aggressively targeting adolescents as their critical market.^{13,14} Consequently, the Food and Drug Administration (FDA) executed campaigns to educate America’s youth, such as “The Real Cost”, “Fresh Empire Campaign”, and “This Free Life Campaign”.

Making the Case for Mass Media Communications

The past few decades have ushered in dramatic developments for public health and mass communication. While designing a tobacco-control campaign, developers must undergo a decision-making process involving several steps. Firstly, a target behavior (initiation versus cessation) and a target audience (youths versus adults, established smokers versus experimental smokers, etc) must be identified. Secondly, the communication channels of the campaign must be considered, with potential options including television, radio, print, and social media.¹⁵ Finally, developers must decide on appropriate campaign themes, which are generally guided by literature reviews, qualitative research, or representative quantitative analysis of a target audience. This behavior-focused design adopted by anti-tobacco health communications gives them the ability to empower individuals to change their behavior and communities to adopt anti-smoking policies.¹⁶

Mass Media Communications (MMCs) are essential for tobacco control programs

The role of MMCs is more prominent in influencing tobacco use behaviors compared to other health-related issues.¹⁷ This can be attributed to the fact that exposure to tobacco-related health advertisements occurs during routine media use, whereas advertisements for other health conditions must be explicitly sought out. This mainstream exposure of tobacco-related health advertisements suggests great potential for widespread and repeated population exposure.¹⁸

The Center for Disease Control (CDC) aids states in planning, establishing, and evaluating tobacco control programs. In their state's "Health Communications in Tobacco Prevention and Control Best Practices Guide", they identified mass-reach health communication as one of five key

components for a comprehensive tobacco control program. The other four components include state and community interventions, cessation interventions, surveillance and evaluation, and capacity-building, which involves administration and management procedures.^{3,19}

As the tobacco industry spends billions every year to advertise their products, a well-designed media campaign have the potential to counter their strategic marketing.¹⁹ A robust media communications plan includes a start and end date and a clear targeted behavior that is addressed through frequent, targeted messages through appropriate channels.¹⁹ Previous studies of mass media anti-tobacco campaigns demonstrated their effectiveness in changing behavior, such as promoting quitting or reducing smoking prevalence, when implemented with sufficient reach, intensity, and duration.^{20,21} Evidence further suggests that media interventions designed to target a specific tobacco use behavior within a particular population were more effective. For instance, previous campaigns indicated success in reducing tobacco consumption in youth and adults, reducing secondhand smoke exposure, and reducing youth reuptake of smoking.^{3,16,19,20,22,23,24,25} MMCs also increased quit attempts among smokers^{16,24} while reducing the probability of relapse among adult smokers who quit.²⁶

Mass media communications can also reduce tobacco-related disparities, which are risks associated with tobacco use that are not evenly distributed among the population.⁵ Cigarette smoking is predominant among men, adults aged 25–64 years, individuals with lower education, individuals living below the federal poverty level, individuals in the U.S. Midwest and South, individuals who are uninsured or use Medicaid, and the disabled or those suffering from serious psychological distress. Other groups who experience widespread risks include American Indians,

Alaska Natives, and multiracial individuals. In addition, minority sexual orientation groups, homosexuals, and bisexuals are known to have larger-than-average susceptibility to smoking.⁵ Media health communications can reduce tobacco-related disparities among these diverse groups by highlighting the adverse health effects of tobacco use while reaching diverse populations of races, genders, sexual orientations, ages, education levels, and income.^{19,20} In addition, tobacco use is a learned and socially mediated behavior, and health communication can discourage tobacco use by making it socially isolating to smoke.²⁷ Health communication has the potential to reach large numbers of people through media outlets and influence social norms surrounding tobacco use.^{4,19} Previous MMCs were successful at raising awareness of the harmful effects of smoking and secondhand smoke, and they changed environmental and social conditions which encouraged people to smoke.²⁸

Finally, health communications are cost-effective. In the U.S., a cost-effective intervention from a societal perspective is \$50,000 per life years (LYs) saved and quality-adjusted life years (QALYs) gained.²⁹ The design and implementation of tobacco control campaigns such as “Tips from Former Smokers” cost approximately \$48 million in 2012.³⁰ Health messages from this campaign promoted 100,000 campaign-attributable quits and averted an estimated 17,109 premature deaths, at the cost of \$2,819 per premature death averted, \$393 per LY saved, and \$268 per QALY gained.³⁰

Justification Statement

The purpose of this study was to perform a three-pronged analysis of the penetration and impact of anti-smoking mass media messages in the U.S.

Prior to CSs, misinformation about tobacco products was circulated to the public by the tobacco industry for decades. However, given that CSs advertisements only ran for only a few months and were sponsored by tobacco companies, skepticism of the genuine nature of these advertisements may exist among consumers.³¹ The purpose of disseminating these CSs was to force tobacco companies to publicly confess that they misled the public for decades through false and deceptive advertisements. However, research showed that repeated exposure to false promotional material rendered misleading information more salient in people's minds.^{32,33} In general, an individual's attitudes and intentions are decided with easily accessible and readily retrievable information.^{34,35} As a result, widespread health misinformation was reported to influence consumer behavior, knowledge, beliefs, attitudes, and intentions.^{33,36} Evidence displayed that even when misinformation was debunked immediately, simple and direct retractions were often ineffective.³³ Since the development and dissemination of the CSs advertisements, no study has evaluated the salience of all five court-approved messages, and whether exposure to these corrective statements was significantly associated with positive behaviors among U.S. adults.

It is also necessary to examine youth media interventions that counter pro-tobacco marketing strategies, particularly because of the significant role industry marketing has on encouraging youth

to smoke.^{13,14} Tobacco promotional marketing elevates curiosity levels, which may lead committed non-smokers to become susceptible to smoking. As a result, this increases the probability of tobacco experimentation and subsequently, the established use of tobacco.^{37,38} Despite youth-specific tobacco educational campaigns such as “The Real Cost”, there are limited nationally representative data evaluating their impact on youth cigarette risk perception, curiosity, and quit attempts.

Effective public health media campaigns against tobacco use are complicated by the fact that the tobacco industry outspends the public health industry in advertising. In 2018, leading cigarette companies spent \$8.4 billion dollars on advertising and promoting cigarettes within the U.S.,³⁹ while the CDC and states reported spending around \$136 million to counter the industry’s promotion efforts.¹⁹ In 2018, industry-sponsored CSs advertisements were disseminated through mass media outlets. However, few studies have analyzed the expenditure trends of the tobacco industry’s promotional marketing. Additionally, there are no reports contrasting the tobacco industry’s marketing expenditures with the cost of publishing the corrective statements in 2018.

Significance

In a recent study (C-Amajuoyi et. al. 2019), researchers concluded that the penetration of tobacco industry-sponsored anti-smoking advertisements was suboptimal when compared to campaigns conducted by federal and state public health agencies.⁴⁰ Mass media messages must have high penetration levels in order to achieve their expected outcomes. In the first manuscript, all five CS messages will be reviewed to analyze if segments within the U.S. population received and understood these messages differently. Furthermore, the paper will measure the underlying motivation to seek health information as a proxy for positive behavior change, such as the transition from the precontemplation to contemplation stage in the Transtheoretical Model (Change theory).⁴¹ The Change theory posits that individuals move through six stages of change for health-related behaviors: precontemplation, contemplation, preparation, action, maintenance, and termination.⁴¹ We hypothesize that motivation to seek health information may be the first step people take to meet behavioral goals.

Tobacco use among adolescents was shown to be associated with low perceived risk by the individual-in-question.^{42,43} Adolescents display poor decision-making and risk-assessment skills, leading them to assume invulnerability to harm.^{44,45} Therefore, it is critical that anti-tobacco interventions reach and positively influence adolescents. The predominant statistics underlying such claims are based on the fact that 90% of current smokers began smoking before 18 years old, and 99% before 26 years of age.⁴ My second manuscript examine “The Real Cost” campaign’s impact on youth cigarette risk perception, curiosity, and quit attempts.

The debate on which tobacco industry-related deceptive practices need correcting is ongoing. Some argue that deceptive strategies go beyond the false text and verbal statements made by the tobacco industry, and that they include misleading marketing which implies reduced harm and even health benefits associated with smoking.⁴⁰ That is why tobacco companies were ordered to publish the CSs in 2006 in traditional media, like newspapers and TV, which were popular among American consumers. The industry spends billions every year on product promotion and invests extensively in audience research to optimize consumer marketing.^{30,39} Previous research documented the use of persuasive themes and strategies to market tobacco; these techniques are arguably among the industry's deceptive practices.^{46,47} The tobacco industry also tends to respond to new marketing regulations by reallocating advertising funds to less regulated channels. The industry delayed dissemination of the CSs for over 11 years, which could be another strategic tactic to weaken their effects. Therefore, tobacco industry retail activity must be monitored and documented in the hopes of countering it. My third manuscript will analyze the expenditure trends of advertisements by tobacco manufacturers over the past decade. It will also contrast the estimated cost of disseminating the corrective statements advertisements to the cost of promoting tobacco in a similar medium in 2018.

Recall of Tobacco Corrective Statements Advertisements and Effects on Health Information-seeking Behavior among Adults - United States 2018

Abstract

Background:

In a 2006 landmark ruling, U.S. District Judge Gladys Kessler instructed tobacco companies to disseminate Corrective Statements (CSs) against their products through media advertisements. Five court-approved messages were published to address tobacco-related common misperceptions among the public. The objectives of this study are (1) examine the proportion of adults who were exposed to each of the five CSs messages; and to (2) describe the association between exposure to CSs and health-information seeking behavior among the U.S. adult population.

Methods: Data, settings, participants, outcomes, and statistical approach.

Analysis of most recent nationally representative data from the population-based cross-sectional survey of U.S. adults, the Health Information National Trends Survey (HINTS5-Cycle2,2018). Data collection began in January 2018 and concluded in May 2018, and CSs dissemination took place from November 2017 to March 2018. Statistical significance was defined as a *p-value* less than 0.05, and all tests were 2-tailed. All data were weighted to be nationally representative.

Results: Key findings.

Exposure to CS was not independently associated with health-information seeking behavior. Among the exposed, those with lower than a high school education sought significantly less health information (70.2%, 95%CI=53.8-86.5) compared to college graduates (93.3%, 95%CI=90.8 - 95.7) ($p<0.0002$). Females reported higher prevalence of seeking health information 88.4% (95%CI= 85.9– 90.96) compared to males at 75.4% (95%CI =6.3– 83.6) ($p<0.0001$). Assessing the impact of CS language and advertisement frame on message recall we noted that the majority of respondents reported exposure to Message 1 (Health effects of smoking) estimated at 85.8% (95%CI= 82.9 – 88.6). This was followed by 65.8% (95%CI= 61.1 – 70.5) recalling Message 2 (health effects of secondhand smoke). Our logistic regression analysis revealed that the odds of health information seeking were two times higher in females (Adjusted Odds Ratio [AOR], 2.07; 95%CI=1.59- 2.69); while odds were 2.55 folds higher among those who had a college education (95% CI= 1.26 - 5.21), compared with less than high school education. Compared to white adults, the odds of seeking health information were lower among Blacks (AOR=0.46; 95%CI=0.29 - 0.74) and Hispanics (AOR=0.51; 95%CI= 0.33 - 0.79).

Conclusions: Key message and implications.

This study found that the court ordered national antismoking advertising campaign had different exposure and recall patterns in subgroups depending on the message category. While some messages were easier to recall others, perhaps more technical ones, were less likely to make an impact on participants' memory and prompt change to health behavior.

INTRODUCTION

Over the past few decades, the world has evolved dramatically with regards to mass media communications (MMCs), which is a powerful tool used to project health advocacy messages and advance public health.³ With regards to anti-tobacco educational campaigns, MMCs are a key component of comprehensive tobacco control programs^{3,23} and they also act as an evidence-based intervention for promoting cigarette cessation.³ Tobacco control MMCs are composed of paid and earned media disseminated through television, radio, out-of-home placements (i.e. billboards, bus shelters, etc), magazines, newspapers, and digital platforms. A recent review of MMCs demonstrated that they have greater effects on tobacco use compared to any other health-related issue.¹⁷

Because exposure to tobacco-related advertisements (ads) occurs during routine media use, rather than being explicitly sought out, there is great potential for widespread population exposure.¹⁸ Previous studies of mass media anti-tobacco campaigns revealed that they can effectively promote quitting and reduce smoking prevalence when implemented with sufficient reach, intensity, and duration.^{3,6} Furthermore, contemporary healthcare systems can improve health literacy outcomes by motivating people to educate themselves and seek health information, which may be required to break bad habits and meet behavioral goals. Targeted approaches are explicitly important, given that the risks associated with tobacco consumption are not evenly distributed among population demographics, nor is the awareness of the risks of tobacco use.^{5,56} In particular, individuals with low socioeconomic status are significantly more likely to believe myths about smoking and hold inaccurate beliefs about the risks of smoking.¹¹ Another concern is that health messages are usually developed by subject matter experts by using models and theories available from behavioral

change research. These messages are then communicated in a highly technical language, which is largely inaccessible to many members of society.⁴⁸ Therefore, the overall structure of health communications may affect an individual's message comprehension, recall, and behavioral modification.⁴⁸

The tobacco industry far outspends public health institutes in advertising. In 2016, leading cigarette companies spent \$8.7 billion dollars on advertising and promoting cigarettes within the U.S.⁴⁹ While the CDC and states spent around \$136 million to counter market the industry.¹⁹ Thus, despite the substantial growth in scientific evidence regarding health consequences of smoking,^{1,2} nearly 38 million American adults smoked cigarettes in 2016.⁵ Moreover, tobacco use remains a leading cause for preventable morbidity and mortality, killing more than 480,000 U.S. adults annually.⁵

In 2006, the tobacco industry was ordered to publish and disseminate five court-approved corrective statements to address tobacco-related common misperceptions among the public.¹¹ However, the wording of the corrective statements was not finalized until November 2012. In early 2013, corrective statements appeared on cigarette package inserts, tobacco company websites and retail points of sale for tobacco.¹² Unfortunately, due to bureaucracy, it was not until November 2017 that tobacco companies disseminated these corrective statements through advertisements in newspapers and during primetime on major television networks. Furthermore, newspaper advertisements ended in March 2018 and TV advertisements terminated in November 2018.⁵⁰ Since the implementation of this campaign, the salience of these messages and whether exposure to corrective statements is correlated with positive behavioral modification among U.S. adults has

not been investigated. Court-ordered CSs aimed to provide new health information while correcting common misunderstandings about the tobacco industry's deceptive practices. Exposure to these advertisements may motivate individuals to educate themselves by seeking accurate public health information. The quantification of motivation to seek health information can serve as a proxy for positive behavioral modification from the precontemplation to contemplation stage of the Transtheoretical Model.⁴¹ To address this knowledge gap, the objectives of this study were to (1) examine the proportion of adults who were exposed to each of the five CS messages, and (2) to characterize the association between exposure to CSs and health information seeking behavior among the U.S. adult population.

METHODS

Study population, Design, Setting

We analyzed the most recent nationally representative data from the Health Information National Trends Survey of U.S. adults 18 years or older administered by the National Cancer Institute (HINTS5-Cycle2, 2018). Data collection for Cycle 2 of HINTS 5 began in January 2018 and concluded in May 2018. The sampling frame of addresses, provided by Marketing Systems Group (MSG), was grouped into three strata, including addresses in areas with high concentrations of minority populations, addresses in areas with low concentrations of minority populations, and addresses located in counties comprising Central Appalachia regardless of minority population. The second stage was equal probability sampling and consisted of selecting one adult within each sampled household using the next-birthday method. Overall household response rate was 32.39%,

calculated using the American Association for Public Opinion Research response rate 2 (RR2) formula.⁵¹ A detailed description of survey methodology was published based on a sample size of 3,504 participants.⁵² CSs television advertisements ran from November 2017 to November 2018, and newspaper advertisements ran from November 2017 to May 2018. HINTS 5 Cycle 2 data were collected from January 26, 2018, to May 2, 2018.

Harvard Institutional Review Board was obtained, protocol number IRB20-0164.

Measures

Health Information Seeking Behavior

The primary outcome of this study was self-reported health information seeking behavior among U.S. adults. This was defined as an affirmative response to the question, “Have you ever looked for information about health or medical topics from any source?”

Exposure to corrective statements in the past 6 months

Exposure to corrective statements was quantified based on participant reports confirming they had received the corrective statements. Within the survey, this was defined as an affirmative response to the question, “In the past 6 months, have you seen messages in newspapers or on television that say that a Federal Court has ordered tobacco companies to make statements about the dangers of smoking cigarettes?”

Respondents who reported exposure to court-ordered corrective statements messages were asked a follow-up question:

“Which of the following messages about the dangers of smoking cigarettes have you seen?”

Responses could be:

(Message 1) “federal court-ordered tobacco messages about: health effects of smoking.”, (Message 2) “federal court-ordered tobacco messages about: health effects of secondhand smoke.”, (Message 3) “federal court-ordered tobacco messages about: addictiveness of smoking and nicotine.”, (Message 4) “federal court-ordered tobacco messages about: how cigarettes are designed to enhance the delivery of nicotine.”, and (Message 5) “federal court-ordered tobacco messages about: low tar and light cigarettes being just as harmful as regular cigarettes.

Participant Characteristics

Sociodemographic characteristics included level of education, age, sex, race/ethnicity, rural-urban residence, household annual income, and smoking status. Level of education was divided into four categories, including less than high-school, 12 years of education or high school graduate, post-high school education or some college, and college graduate or more (post-graduate). Age was grouped into four categories as follows: 18–34 years, 35–49 years, 50–64 years, and 65 years or older. Race/ethnicity was categorized as non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic Asian, and non-Hispanic other. Residence was defined using the U.S. Department of Agriculture’s 2013 Rural-Urban Continuum Codes. Codes 1 to 3 were designated as urban while

codes 4 to 9 were categorized as rural. Household annual income was categorized into four categories: less than \$35,000, between \$35,000–49,999, between \$50,000–74,999, and \$75,000 or greater.

To derive respondents' smoking status, respondents were asked, "Have you smoked at least 100 cigarettes in your entire life?" Those who answered, "No" were categorized as "never smokers". Among those who answered, "Yes", a follow-up question was asked: "Do you now smoke cigarettes every day, some days, or not at all?" Those who answered, "Not at all" were categorized as "former smokers", while others were considered to be "current smokers".

Statistical Analyses

Data was cleaned prior to analysis, and approximately 13% of the population (n = 480) which had missing information in the variables of interest were excluded. Comparison of these 480 excluded individuals to the 3024 individuals with complete information found no statistically significant differences between the two groups by key demographic variables such as age, sex, education, race, income, residence, or smoking status.

Prevalence of healthy behavior among U.S. adults exposed and non-exposed to CSs messages was calculated for the overall sample as well as by sociodemographic characteristics such as age, sex, race/ethnicity, level of education, rural-urban residence, household annual income, and tobacco use status. The proportion of participants who were exposed to each type of anti-smoking message was calculated for the general population and by sociodemographic characteristics. Group

differences were assessed using chi-square analysis and associations between exposure to CSs and health information seeking behavior was assessed using logistic regression. Regression models were fitted after comparing the independent association of each variable to the outcome (health information seeking behavior) using bivariate analysis at P value less than 0.1, followed by assessment of the dependent variables' collinearity. Next, binary logistic regression was performed with non-overlapping variables. The final model was adjusted for four demographic confounding variables including sex, education, income and race/ethnicity.

Because the category of smoking-related advertisements seen could affect health information seeking behavior, we examined the prevalence of information seeking behavior by message category (Messages 1–5) that participants were exposed to. The proportion of participants who were exposed to each message category was evaluated for the overall sample as well as by sociodemographic characteristics to assess message salience. Statistical significance was defined as a P value less than 0.05, and all tests were 2-tailed. All data were weighted to be nationally representative and analyzed with STATA version 14.

RESULTS

The estimated exposure among U.S. adults to court-ordered CSs anti-smoking advertisements was 41.4% (95% CI = 39.8–43.1%). Among those exposed to CSs advertisements, the prevalence of health information seeking behavior was 81.57% (95% CI = 77.36–85.78%) compared to

79.37% (95% CI = 75.6–83.2%) in unexposed ($p = 0.4$). However, exposure to CSs was not independently associated with health information seeking behavior. Table 1 further describes the prevalence of health information seeking behavior among U.S. adults exposed and non-exposed to Federal Court–Ordered Anti-smoking Advertisements by sociodemographic characteristics. Group differences in education were found to be statistically significant among individuals exposed to CSs ($p < 0.0002$), where those with less than high school education sought out health information significantly less (70.2%; 95% CI = 53.8–86.5%) compared to individuals who were college graduates or more (93.3%; 95% CI = 90.8–95.7%). A significant difference between sexes was also discovered among those who were exposed to CSs ($p < 0.0001$; Table 1), with females reporting higher prevalence of health information seeking behavior at 88.4% (95% CI = 85.9–90.96%) compared to males at 75.4% (95% CI = 67.3–83.6%).

Assessing the participants' CSs message recall (Figure 1), the majority reported exposure to message 1, “health effects of smoking”, estimated at 85.8% (95% CI = 82.9–88.6%). Next, participants were exposed to message 2, “health effects of secondhand smoke”, at 65.8% (95% CI = 61.1–70.5%). Message 3, “addictiveness of smoking and nicotine”, reached 54.8% of participants (95% CI = 50–59.6%), and message 5, “low tar and light cigarettes being just as harmful as regular cigarettes”, reached 36.3% of individuals (95% CI = 33–39.6%). Finally, the lowest proportions were reported for message 4, “How cigarettes are designed to enhance the delivery of nicotine”, at 28% (95% CI = 22.7–33.3%).

Furthermore, Figure 2 illustrates that the vast majority (72.62%) of U.S. adults reported exposure to more than one federal court-ordered message. Among exposed adults, 28.8% (95% CI

= 27.3–30.3%) reported seeing two CSs messages, compared to 17.9% (95% CI = 16.6–19.2%) who reported seeing three CSs messages. Only 10.7% (95% CI = 9.7–11.8%) reported exposure to four or more CSs messages (data not shown in Figure 2). Moreover, among exposed adults who reported seeing multiple messages (72.62%), the most common combination of messages was Message 1 and Message 2 at 23.1% (95% CI = 20–26.2%), followed by 19.2% (95% CI = 16.8–21.5%) reporting exposure to Message 1 and Message 3, and 17.1% (95% CI = 14.8–19.5%) reporting exposure to Message 2 and Message 3. The least common combination was Message 4 and 5 at 8% (95% CI = 6.8–9.2%).

In Table 2, the prevalence of health information seeking behavior among U.S. adults exposed to CSs anti-smoking advertisements stratified by category of message reported was explored. Among the overall sample, no significant difference in health information seeking behavior was observed by type of CS. Furthermore, significant variation was seen with education, where people with high-school education reported the least health information seeking behavior with prevalence as low as 63.5% (95% CI = 40.1–86.9%) with exposure to Message 4 compared to 76.9% (95% CI = 59.6–94.1%) with exposure to Message 5. Meanwhile, participants with a college degree or more were more likely to engage in health information seeking behavior regardless of category of advertisement exposure. There were also statistically significant differences in healthy behavior between males and females, with generally lower estimates observed for males. These estimates ranged as low as 66.3% (95% CI = 82.3–95.2%) with exposure to Message 4, compared to 88.8% (95% CI = 42.3–90.4%) in females ($p < 0.01$).

Our logistic regression analysis revealed that the association between exposure to CSs advertisements and health information seeking behavior was not statistically significant. Odds of

health information seeking behavior were two times greater in females [adjusted odds ratio (AOR), 2.07; 95% CI = 1.59–2.69; $p = 0.0001$]. Odds were 2.55 folds higher among those who had a level of education of college or more (95% CI = 1.26–5.21), compared with those who had less than high school education ($p = 0.01$). Compared to white adults, odds of health information seeking behavior were lower among black individuals (AOR = 0.46; 95% CI = 0.29–0.74; $p = 0.002$) and Hispanics (AOR = 0.51; 95% CI = 0.33–0.79; $p = 0.003$). Furthermore, adults with incomes of \$75,000 or more had 2.53 folds higher odds of undergoing health information seeking behavior (95% CI = 1.58–4.03) compared to adults with annual incomes of \$35,000 or less ($p = 0.0001$; Table 3).

DISCUSSION

This study, to our knowledge, is the first to explore the association between the federal court-ordered anti-smoking corrective statements campaign and health information seeking behavior within the U.S. adult population. Although a large proportion of U.S. adults reported exposure to CSs messages, exposure was not significantly associated with health information seeking behavior. This important finding underscores the need for a multi-pronged approach as any single intervention may have limited impact on its own. Apart from education on the dangers of tobacco use, other evidence-based measures could be implemented as part of a comprehensive tobacco prevention and control strategy. Strategies may involve raising taxes on tobacco products, implementing comprehensive smoke-free policies, and enforcing stronger regulations on tobacco product design, manufacturing, and marketing. Specific consideration identifies reducing the use

of flavors and other design characteristics that enhance chemosensory aspects of smoking and increase appeal.

Large-scale public health campaigns, including those with mass media components, were reported to produce ambiguous or no effects.⁴² One possible explanation as to why we did not find a significant association between CSs exposure and health information seeking behavior includes our inability to specifically assess tobacco-related information seeking activity as this was not included in the HINTS 5 survey. Exposed individuals who smoked were possibly at the contemplation or preparation stages of the transtheoretical model, however, this did not lead to health information seeking behaviors.⁴¹ Future research could explore the temporality of positive behavior after established exposure to health advertisements. In this study, women displayed stronger responses to CSs compared to men, which was consistent with prior research. Specifically, women were found to be more likely to report that CSs messages were serious and that it motivated them to quit.³¹ Conversely, our results indicating that U.S. adults with lower educational attainment (high school or less) experienced weaker responses to CSs contradicted previous reports, in which individuals with a high school education or less were more responsive to anti-smoking warning labels.⁵³

Our report explores the reach of the five topics on which the tobacco industry was obligated to issue CSs. Variations in proportions were reported on exposure to CSs by message topic. While 85.8% (95% CI = 82.9–88.6%) of U.S. adults reported exposure to Message 1 “health effects of smoking”, only 28% (95% CI = 22.7–33.3%) of adults reported exposure to Message 4 “How cigarettes are designed to enhance the delivery of nicotine”. Given that each of the five messages

appeared equally on major TV programs and newspapers during the campaign,⁵⁴ this variation may reflect differences in message salience, where simpler messages like Message 1 may be easier to recall compared to messages with more technical terms, such as Message 4. One previous study reported that CSs message novelty was associated with higher reported information relevance, anger at the industry, and motivation to quit among the exposed.³¹

Our findings were consistent with studies done by Chido-Amajuoyi et.al. in 2019, in which the exposure prevalence of CSs with previous federal and state sponsored anti-smoking campaigns were compared. They concluded that the impact of CSs advertisements on health behaviors was suboptimal,⁴⁰ possibly because misinformation about tobacco products was circulated in public communication environments as part of the tobacco marketing strategies for decades.¹¹ Conversely, corrective statements advertisements ran only for a few months and originated from the tobacco industry, which may have produced suspicion among consumers.³¹ Health advertisement relative salience is crucial because people are more likely to respond positively to its message and perceive it as more important. Because CSs were industry-sponsored, the content may have imposed suspicion in the public's intuition. Generally, it is important to ensure that one domain is upheld in the public health message, which can be fulfilled either by highlighting the consequences of engaging in unhealthy behavioral decisions or by showing how the that domain is inherently superior to another. At this stage, people deliberately and consciously weigh the importance of competing intuitions and thoughts, leading to a more positive attitude to the message.⁵⁵

This landmark federal-court ruling represented a pivotal point in history and legislation regarding the anti-tobacco battle. However, our analysis and other reports suggest that real-world recall rates and association with promoting healthy behavior may be limited, especially among high-risk groups, such as males and those with low educational attainment. Mass media campaigns normally compete with several factors while broadcasted, which include previous product marketing, well-established social norms, and consumption driven by addiction or habit.²¹ Thus, we propose that future campaigns should simplify anti-tobacco health message language, improve advertisement design, target males and ethnic minority media channels, and invest in longer campaigns to achieve adequate population exposure to media health messages and improved behavioral outcomes.

Strengths and Limitations

This report is the first to assess the proportion of U.S. adults who were exposed to CSs by CS message type. Our findings suggest that some CSs messages may be more salient than others and indicate that most of the exposed population were able to recall more than one CSs message.

There are several limitations inherent in cross-sectional studies. Firstly, as information on the source of CS exposure (television or newspaper) were not available in the survey, this prevented more detailed analyses of the reach of CSs by different media. In addition, though HINTS data are nationally representative, it remains cross-sectional and causal inferences cannot be determined.

Finally, HINTS was self-reported, which is vulnerable to recall and social desirability bias at the individual level.

CONCLUSION

This study found that the court-ordered national-level anti-smoking campaigns produced different exposure and recall patterns in subgroups depending on message category. While some messages were easier to recall, other messages with more technical jargon were less likely to make an impact on participants' memory and prompt change to health information seeking behavior. This study highlights the important role of well-designed mass media campaigns in countering the deceptive marketing strategies implemented by tobacco companies, as well as in increasing awareness of adverse consequences of smoking, secondhand smoke exposure, and changing environmental conditions that encourage people to smoke. District Judge Kessler's may have set a precedent with her ruling for similar practices in other areas relevant to public health, where industry deceptive marketing practices take place.

Table 1: Prevalence of Health information seeking behavior among US adults exposed and non-exposed to Federal Court–Ordered Antismoking Advertisements by Sociodemographic Characteristics

Characteristic	Total Respondents	Respondents with Exposure *		Respondents Without Exposure **	
	No.	No.	% (95% CI) *	No.	% (95% CI) *
Overall	3,024	1,234	81.9% (77.2 - 86.7) %	1790	79.37% (75.6 - 83.2) %
Education level					
Less than high school	210	81	70.2% (53.8 - 86.5) %	129	64.9 % (43.6- 86.3) %
12 years of education or high school	529	183	70.9 % (60.2 - 81.7) %	346	66.5% (57.6 -75.5) %
Some college	909	297	80.1 % (70.2 – 89.9) %	512	82.7% (78.5 -86.97) %
College degree or more	1,376	573	93.3 % (90.8 – 95.7) %	803	88.9% (85.4 – 92.2) %
Age					
18-34	391	156	78% (59.8 – 96.2) %	235	81.1% (73.1 – 89.1) %
35-49	610	249	85.9 % (79.5 – 92.3) %	361	85.1% (79.3 -90.8) %
50-64	1,002	414	80.6% (73.8 – 87.4) %	588	75.7% (67.6 –83.9) %
65+	1021	415	83.1% (78.4 – 87.9) %	606	74.2% (69.2 -79.2) %
Sex					
Female	1,797	732	88.9 % (86.3 – 91.5) %	1,065	83.2% (79.4 –86.9) %
Male	1,227	502	75.4% (67.3 – 83.6) %	725	75.3% (69.2 -81.5) %
Race					
Non-Hispanic White	1,909	784	83.6 % (76.4 - 90.8) %	1,125	85.7 % (82.1 -89.4) %
Non-Hispanic Black or African American	417	179	79.7 % (72.1 - 87.3) %	238	60.9 % (46.4 -75.4) %
Hispanic	443	178	72.5% (61.3 -83.7) %	265	67.2% (55.2 - 79.1) %
Non-Hispanic Asian	133	45	92.5% (82.7- 102.3) %	88	69.9% (54.6 - 85.1) %
Non-Hispanic Other	122	48	88.9% (80.5- 97.3) %	74	80.8% (57.7 -103.8) %
Residence					
Urban	2,616	1,061	81.7% (76.5 - 86.9) %	1,555	80.1% (76.3 -83.9) %
Rural	408	173	83.5% (75.8 - 91.2) %	235	74.9% (64.7 -85.2) %

Characteristic	Total Respondents	Respondents With Exposure *		Respondents Without Exposure **	
	No.	No.	% (95% CI) *	No.	% (95% CI) *
Income					
less than 35K	930	349	81.7% (74.9 - 88.4) %	581	64.4% (57.1 - 71.8) %
35K-50K	395	161	70.8% (57.6 - 84.1) %	234	76% (65.9 - 86.1) %
50K-75K	554	234	75.7% (52.3 - 99.1) %	318	83.1% (77.6 - 88.6) %
>75K	1,145	488	87.9% (82.2 - 93.5) %	657	90.4% (87 - 93.7) %
Smoking status					
Current	396	210	81.6% (74.3 - 88.8) %	186	78.3% (63.6 - 93.1) %
former	750	299	88.2% (83.8 - 92.6) %	451	83.1% (78 - 88.3) %
Never	1878	725	79.9% (72.9 - 87.1) %	1,153	78.4% (74.3 - 82.5) %

*Results represent the number and weighted percentage of participants who replied yes to the following question: “In the past 6 months, have you seen messages in newspapers or on television that say that a federal court has ordered tobacco companies to make statements about the dangers of smoking cigarettes?”

**Results represent the number and weighted percentage of respondents who replied No to the following question: “In the past 6 months, have you seen messages in newspapers or on television that say that a federal court has ordered tobacco companies to make statements about the dangers of smoking cigarettes?”

Table 2: Prevalence of Health seeking information behavior among US adults exposed to Federal Court– Ordered Antismoking Advertisements by category of advertisement recalled seeing

Characteristic	Total Responders who answered (Yes) to seeing CSs	Message 1 “Federal court–ordered messages about: health effects of smoking “		Message 2 “Federal Court has ordered message about: Adverse Health Effects of Exposure to Second-Hand Smoke”		Message 3 “Federal Court has ordered message about Addictiveness of Smoking and Nicotine”		Message 4 “Federal Court has ordered messages about Manipulation of Cigarette Design and Composition to Ensure Optimum Nicotine Delivery”		Message 5 “Federal Court has ordered messages about Lack of Health Benefit from Smoking "Low Tar," "Light," "Ultra Light," "Mild," and "Natural" Cigarettes”	
	No.	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
Overall	1,234	1,036	82.3% (77 -87.7)%	786	81% (74.7-87.2)%	687	84.6% (79.9- 89.4)%	330	76.1% (61.5-90.7)%	450	83.3% (77.2- 89.4)%
Education											
Less than high school	81	64	74.3% (57.8- 90.7)%	59	70.8% (52.8 - 88.8)%	40	80.4% (62.7-98.01)%	24	77.2% (50.8-103.5)%	30	81% (58.3- 103.7)%
12 years of education or high school	183	149	72.7% (60.6 - 84.8)%	110	70.8% (58.4 - 83.1)%	95	69.6% (54.5 -84.7)%	44	63.5% (40.1- 86.9)%	69	76.9% (59.6 -94.1)%
Some college	297	336	78.9 % (67.6- 90.3)%	260	78.9% (65.3 -92.6)%	229	83.8% (76.9 -90.7)%	111	71.9% (42- 101.7)%	139	79.7% (67.1- 92.3)%
College degree or more	573	487	93.9% (91.3 -96.4)%	357	92.7% (89.6 -95.8)%	323	94.7% (92.3 -97.1)%	151	91.4% (86.1- 96.8)%	212	92.7% (89.03 -96.4)%
Age											
18-34	156	135	78.6 % (58.3 -98.9)%	117	73.7% (51.8- 95.7)%	87	86.5% (72.7-100.3)%	40	60.7% (0.3- 121.8)%	56	77.1% (52.8 -101.4)%
35-49	249	217	86.9 % (79.7- 94.02)%	154	88.3% (80.4 - 96.2)	133	86.7% (77.3- 96.1)%	52	86.6% (64.9-108.2)%	75	90.5% (77.2 -103.8)%
50-64	414	348	80.6% (73.8- 87.3)%	265	80% (72.2- 87.7)%	232	81.7% (74.3- 89.1)%	116	76.7% (64.4 - 89)%	150	80.7% (70.8- 90.6)%
65+	415	336	83.3% (77.3 -88.7)%	250	82.4% (76.2- 88.6)%	235	84.6% (77.7- 91.4)%	122	83,6% (73.2 - 94.04)%	169	83.9 % (75.4- 92.4)%
Sex											
Female	732	624	89.6% (86.7 - 92.5)%	487	88.3% (85.2 - 91.5)%	408	89.8% (86.6 - 93.1)%	186	88.8% (42.3 - 90.4)%	248	88% (82.9 - 93)%
Male	502	412	75.6% (66.3- 84.8)%	299	73.5% (61.9- 84.9)%	279	79.4% (71.4 - 87.4)%	144	66.3% (82.3 - 95.2)%	202	79.4% (68.5 - 90)%
Residence											
Urban	1,061	892	81.9% (76.2 – 87.8)%	673	80.5% (73.4 - 87.7)%	588	85% (80.1- 89.9)%	283	72.8% (55.7 - 89.8)%	378	82.3% (75.3 - 89.3)%
Rural	173	144	84.9% (76.2- 93.7)%	133	83.8% (74.1- 93.4)%	99	82.5% (71.4- 93.6)%	47	94.6% (87.5 - 101.6)%	72	88.2% (79.1 - 97.4)%

Characteristic	Total Responders who answered (Yes) to seeing CSs	Message 1		Message 2		Message 3		Message 4		Message 5	
		No.	No. % (95% CI)	No. % (95% CI)	No. % (95% CI)	No. % (95% CI)	No. % (95% CI)	No. % (95% CI)	No. % (95% CI)		
Race											
NH White	784	668	83.7% (75.6 - 91.7)%	488	81.7% (72.4 - 91)%	454	86.8% (80.7 - 92.8)%	226	75.6% (55.7 - 95.6)%	316	84.2% (76.5 - 92)%
NH Black or African American	179	143	78.6% (68.3 - 88.8)%	123	80.6% (70.1 - 91.1)%	88	76.8% (64.7 - 88.9)%	39	77.4% (55.9 - 98.9)%	52	81% (64 - 98.1)%
Hispanic	178	145	74% (61.1 - 86.9)%	122	76.3% (65.1 - 87.4)%	96	77.4% (63.9 - 90.9)%	39	72.7% (42.5 - 102.9)%	53	78.9% (55.3 - 102.5)%
Non-Hispanic Asian	45	38	92.5% (81.9-103)%	22	88.4% (74.3-102.5)%	20	89.5% (74.5-104.6)%	8	86.6% (56.3 - 117)%	9	89.2% (64.6 - 113.9)%
Non-Hispanic Other	48	42	90.6% (82.5 - 98.7)%	31	88.2% (77.1 - 99.3)%	29	88.3% (78.3-98.3)%	18	89.6% (77.9 - 101.4)%	20	84.7% (69.3 - 100.1)%
Income											
less than 35K	349	284	84.4% (77 - 91.7)%	228	83.3% (75.8 - 90.8)%	173	84.1% (73.9 - 94.2)%	85	83.4% (73.3 - 93.6)%	131	83.6% (75.9 - 91.3)%
35K-50K	161	129	73.2% (58.1 - 88.3)%	106	68.9% (53.9 - 83.8)%	94	69.1% (54.2 - 83.9)%	40	67.9% (35.9 - 99.9)%	65	71.3% (46.4 - 96.2)%
50K-75K	234	201	74.4% (48.1 - 100.6)%	144	70.5% (35.8 - 105.1)%	140	88% (81.2- 94.9)%	77	59.8% (7.5 - 112.1)%	79	86.2% (75.4 - 97)%
>75K	488	422	86.9% (80.6 - 93.2)%	308	87.8% (79.8 - 95.8)%	280	88.6% (79.5 - 97.7)%	128	86.8% (79.2 - 94.4)%	175	86.9% (74.5 - 99.3)%
Smoking status											
Current	210	178	81.4% (73.8 - 89)%	145	80.6% (72.3 - 88.9)%	126	81.5% (72.7 - 90.3)%	70	79.6% (66.01-93.2)%	109	84.6% (76.7- 92.4)%
former	299	251	87.8% (82.7 - 92.8)%	190	88.8% (83 - 94.6)%	169	89.3% (82.8 - 95.7)%	80	87% (78 -96)%	120	86.6% (78.1 - 95)%
Never	725	606	80.9% (72.8 - 89)%	451	78.3% (68.4 - 88.2)%	392	84% (76.4 - 91.6)%	180	70.8% (48.9- 92.7)%	221	81.2% (69.7 - 92.7)%

Table 3. Adjusted Logistic regression of exposure to US Federal Court–Ordered Antismoking Advertisements and health information seeking by Sociodemographic Characteristics.

Characteristic	Adjusted Odds Ratio (95% CI)	P Value
Seen CSs Advertisements		
No	1 [Reference]	NA*
Yes	1.11 (0.76 %- 1.63%)	0.76
Education		
Less than High school	1 [Reference]	NA*
12 years or completed high school	0.80 (0.4% - 1.58%)	0.51
Some college	1.46 (0.72% - 2.95 %)	0.29
College graduate or higher	2.56 (1.26% - 5.21%)	0.01
Sex		
Male	1 [Reference]	NA*
Female	2.07 (1.59 % - 2.69%)	0.0001
Race		
White	1 [Reference]	NA*
Black	0.46 (0.29% - 0.74 %)	0.002
Hispanic	0.51 (0.33% - 0.79 %)	0.003
Asian	0.67 (0.27% - 1.67 %)	0.382
Income		
< 35K	1 [Reference]	NA*
35K-50K	1.11 (0.72% - 1.70 %)	0.63
50K-75K	1.38 (0.69% - 2.75 %)	0.36
> 75K	2.53 (1.58% - 4.03 %)	0.0001

**NA, not applicable.

Figure1: Percentage of Reported Exposure to All five Federal Court–Ordered Messages Among Exposed US Adults

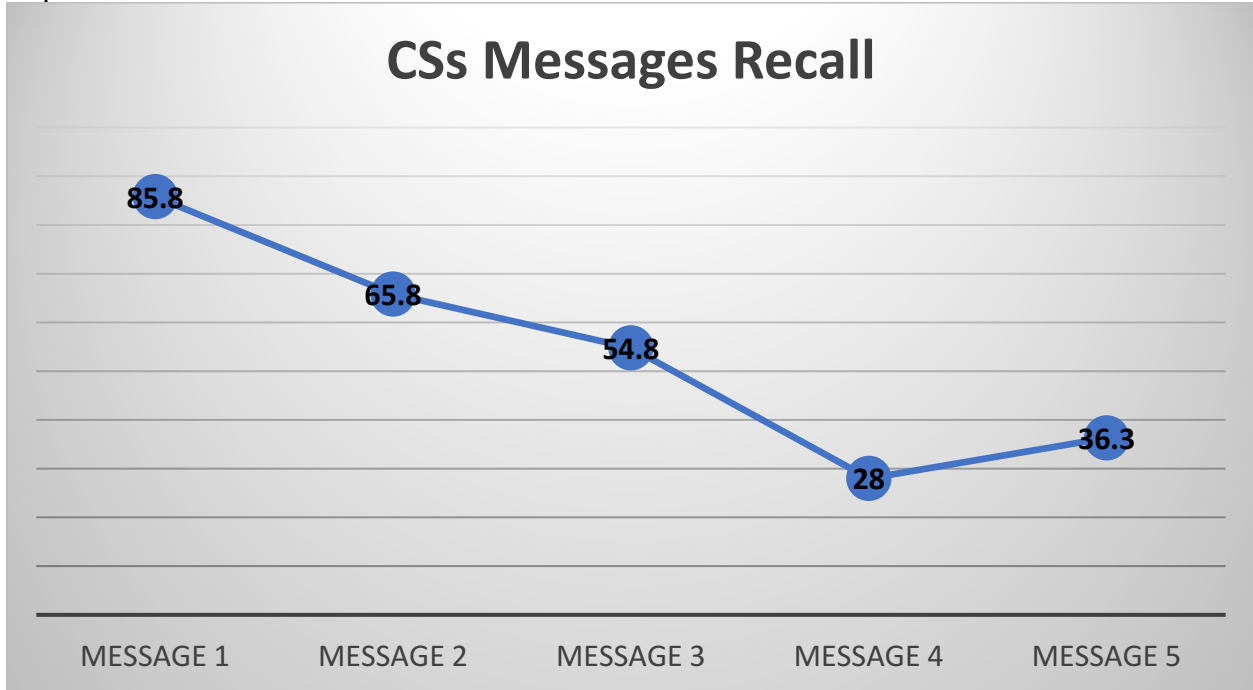
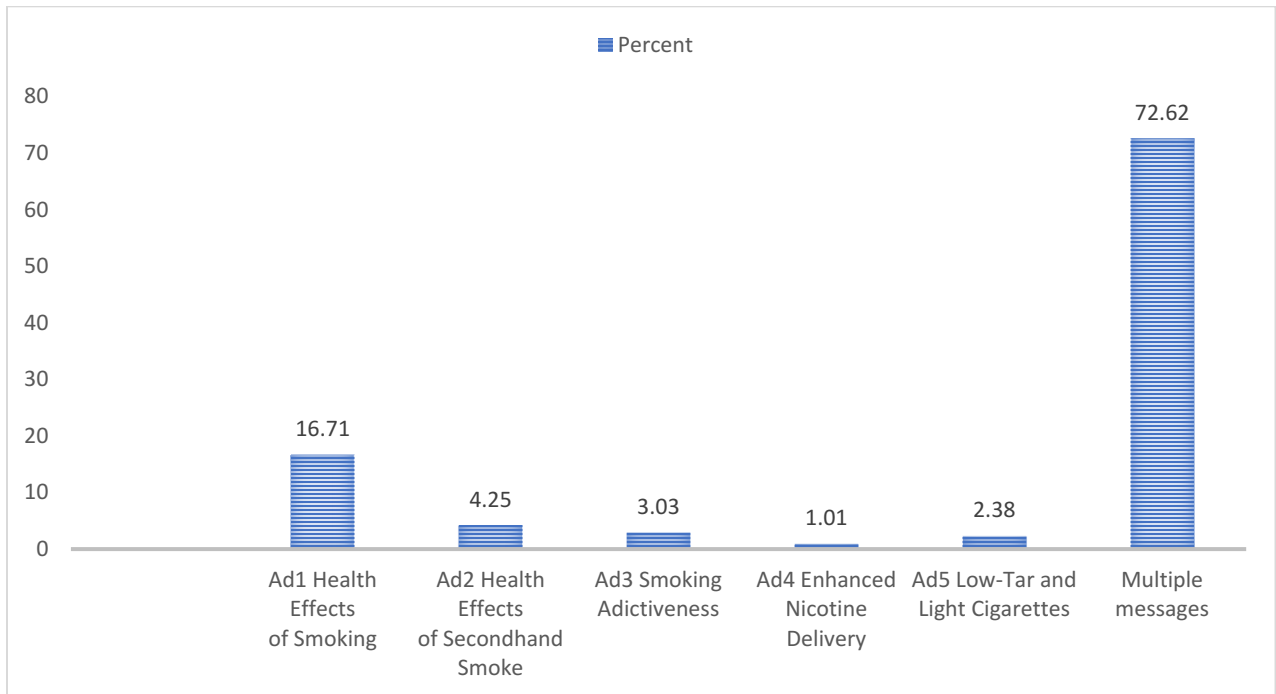


Figure2: Percentage of Reported Exposure to Federal Court–Ordered Messages Among Exposed US Adults



The Association between Exposure to “*The Real Cost*” Campaign and Smoking Risk Perceptions, Curiosity, and Quit Intentions among Youths - United States 2018

Abstract

Background:

Tobacco use behaviors are usually established in adolescence, which coincides with the tobacco industry’s targeted marketing age group. In February 2014, the Food and Drug Administration (FDA) launched “The Real Cost” youth tobacco prevention campaign to counter tobacco marketing efforts directed toward children and youth. The objectives of this study were to: (1) describe the association between exposure to “The Real Cost” campaign and tobacco risk perception among U.S. adolescents, (2) to compare smoking curiosity among non-smoking adolescents across different exposure status, and (3) to compare the intention to quit cigarette smoking among current cigarette smokers by exposure status to the campaign.

Methods: Data, settings, participants, outcomes, and statistical approach.

To address these objectives, we analyzed the National Youth Tobacco Survey (NYTS-2018), a nationally representative data set from a cross-sectional survey of U.S. middle school (grades 6–8) and high school (grades 9–12) students. Statistical significance was defined as a P value less than 0.05, and all tests were 2-tailed. Data were weighed to be nationally representative and

analyses were performed using STATA version 14.2 to account for specific features of survey design.

Results: Key findings.

Exposure to the FDA's "The Real Cost" campaign was associated with higher cigarettes risk perceptions among U.S. youth. Estimated exposure to the anti-smoking advertisements was 70.94% (95% CI = 69.4–72.1%). Mean perceived risk among exposed individuals to "The Real Cost" was 91.15% (95% CI = 90.3–92.0%) compared to 85.66% (95% CI = 84.1–87.3%) in unexposed individuals ($p < 0.0001$). Exposure to the campaign was associated with higher cigarette smoking curiosity among youth who were non-smokers ($p < 0.0001$). Finally, exposure to tobacco control advertisements was not found to influence intention to quit among youth smokers ($p = 0.0009$).

Conclusion: Key message and implications.

The FDA's "The Real Cost" campaign achieved exposure levels that are essential for population-level perceptual changes. The campaign led adolescents to have increased perception of harm towards smoking. However, the campaign's anti-smoking advertisements were associated with elevated curiosity and perhaps susceptibility to cigarette smoking among adolescents who were non-smokers. Our findings support the messaging strategies implemented by the FDA for "The Real Cost" national tobacco prevention campaigns.

INTRODUCTION

Even after decades of progress in the war against tobacco, cigarette smoking remains the leading cause for preventable morbidity and mortality in the United States.⁴ Most adult tobacco use habits are predominately established during adolescence, with 90% of current adult smokers having started smoking before the age of 18. These adolescent smokers exhibited symptoms of nicotine dependence within days or weeks of initiating smoking.^{4,56} Moreover, tobacco companies aggressively target young people in their marketing strategies.^{4,57} The industry identifies youth as their critical market, and even labels them as “replacement smokers” and/or “learners” in industry documents.^{58,59} Their strategy consists of marketing tobacco products in attractive sites that are accessible to youth, and challenging health interventions aimed to protect young individuals from initiating smoking.^{13,14} Additionally, the industry’s marketing plays an important role in youth tobacco use initiation. Marketing elevates levels of curiosity in the product, which may lead committed non-smokers to become susceptible to smoking, and therefore, increase the probability of tobacco experimentation and subsequently established use.^{37,38}

Consequently, developing effective interventions which counter the tobacco industry’s marketing and prevent adolescents from initiating tobacco use remains a major public health priority. Mass media communications (MMCs) are widely used to expose large proportions of a population to health messages, making them an effective tool to reach and influence change in knowledge, attitudes, and health-related behaviors.²¹ However, public health communication needs to compete for the public’s attention with a number of other compelling factors, such as previous industry marketing, established social norms, and addiction-driven behaviors.²¹ A

growing body of evidence suggests that media campaigns designed with “persuasive messages” aiming to challenge social norms may lead to positive behavior change, and that this is particularly effective in adolescents and youth.⁶⁰⁻⁶³ Tobacco use among adolescents was shown to be associated with low perceived risks related to smoking.⁴³ Since adolescents have poor decision-making and risk-assessment skills, they may believe they are invulnerable to harm caused by tobacco use.^{44,45} Therefore, MMCs are designed with an emphasis on “risk perception” and “fear appeal” following the rationale that the audience must identify a risk before they can take positive steps toward health improvement.^{64,65}

In 2009, the U.S. FDA gained regulatory authority over tobacco products through the “Family Smoking Prevention and Tobacco Control Act”, which granted the FDA responsibility to educate the public about the adverse health effects of tobacco use. As a result, this prompted the launch of the national, youth-targeted, tobacco counter-marketing campaign “The Real Cost”. This campaign aimed to prevent and reduce tobacco use by focusing on the true impact of tobacco use and its harmful effects. “The Real Cost” was developed based on the Theory of Planned Behavior, which hypothesizes that “change in behavior is a result of changes in beliefs that, in turn, influence attitudes toward a behavior, perceptions of associated social norms, and/or self-efficacy to engage in or refrain from a behavior”.^{66,67} This same theoretical framework is endorsed by the Centers for Disease Control and Prevention (CDC) in their evidence-based guide for designing effective anti-tobacco media communication.¹⁹ Therefore, “The Real Cost” was developed to influence youth tobacco use habits by raising negative attitudes and perceptions, shaping social and normative beliefs, and reducing influences of peer pressure.^{19,68} Hence, the message development strategy for young audiences was to focus on three youth smoking-related themes, including loss of control

and independence due to addiction, negative health consequences due to smoking (including cosmetic effects), and dangerous chemicals in cigarettes.^{69,70} In contrast, when the CDC designed their adult campaign “Tips from Former Smokers,” the themes implemented were fear, graphic images, and personal testimonials. These adult-relevant themes were designed to arouse negative reactions to the physical act and the thought of smoking in mature audiences.⁷¹

Despite the fact that youth-specific campaigns like “The Real Cost” were implemented since 2014, there are limited nationally representative data evaluating their impact on youths’ tobacco risk perception, curiosity, and quit attempts. To address this knowledge gap, the objectives of this study were to: 1) describe the association between exposure to “The Real Cost” campaign and tobacco risk perception among the U.S. adolescent population overall, (2) to compare curiosity levels about cigarette smoking between those exposed and non-exposed adolescent non-smokers, and (3) to compare the intention to quit cigarette smoking among current cigarette smokers by exposure status to the campaign.

METHODOLOGY

Study Population, Design, and Setting

To address these objectives, we analyzed the nationally representative data from the National Youth Tobacco Survey (NYTS 2018). NYTS is an annual, school-based, self-administered survey with cross-sectional samples of U.S. private and public school students in grades 6–12 which assesses self-reported tobacco-related beliefs, attitudes, behaviors, and risk factors.

The 2018 NYTS employed a stratified, three-stage cluster sample design to produce the nationally representative sample of middle school and high school students in the U.S. Sampling procedures were probabilistic and conducted without replacement at all stages and entailed selection of: 1) Primary Sampling Units (PSUs), defined as a county, or a group of small counties, or part of a very large county within each stratum, 2) Secondary Sampling Units (SSUs), defined as schools or linked schools within each selected PSU, and 3) students within each selected school.

In 2018, the sample consisted of 310 schools in 33 different states, of which 238 participated, yielding a school participation rate of 76.8%. Students were selected for participation by default via the selection of whole classes. A total of 20,189 student questionnaires were completed out of a sample of 22,729 students, yielding a student participation rate of 88.8%. Out of the total sample, the overall participation rate was 68.2%. Harvard Institutional Review Board was obtained, protocol number IRB20-0270.

Study Variables

Independent variable: Exposure to “The Real Cost” Campaign

We assessed exposure to “The Real Cost” anti-tobacco MMC by an affirmative response to the question, “In the past 12 months, have you seen or heard “The Real Cost” on television, the internet, social media, or radio as part of ads about tobacco?” The answer choices provided were “Yes”, “No”, and “Not sure”, and respondents who answered, “Yes” were considered exposed to “The Real Cost” campaign. Those who answered, “No” were classified as unexposed to “The Real Cost” campaign. Finally, responses of, “Not sure” were classified as indeterminate.

Outcome measures: risk perception, smoking curiosity, and quit intentions

The primary outcome in the study was self-reported cigarette smoking risk perception among U.S. youth after exposure to “The Real Cost” advertisement

We assessed smoking risk perception with the following question, “How much do you think people harm themselves when they smoke cigarettes some days but not every day?” We categorized respondents who answered, “No harm” and, “Little harm” as negative responses and those who chose, “Some harm” or, “A lot of harm” into positive responses.

Secondary outcomes included smoking curiosity among never-smokers and quit intentions among current smokers.

The secondary outcome in the study was self-reported Curiosity towards cigarette smoking

Curiosity was defined as any response other than “Definitely not” to the question, “Have you been curious about smoking cigarettes?” Other response choices were, “Probably not”, “Probably yes”, and, “Definitely yes”. This measure was dichotomized because it separated committed never-smokers, who exhibit low-risk cognition, from susceptible never-smokers, who display high-risk cognition.⁷²

Intention to Quit was based on the question, “Are you seriously thinking about quitting cigarettes?” In line with the stages of change model, smokers who responded with, “Yes, within 30 days” or “Yes, within the next 6 months” or “Yes, within the next 12 months” were considered to have serious intention to quit, characteristic of the contemplation and preparation stages. Conversely, smokers who responded, “Not planning to quit” or “Yes, but within more than 12 months” or “Do not know” were considered to have no intention to quit, and were exhibiting the precontemplation stage.⁴¹ This measure was dichotomized because our main interest was to understand campaign effect on smoker's intention to quit, rather than when they were planning to quit. Additionally, the frequency distribution of this variable was greatly skewed, with most observations resembling no intention to quit.

Measures

Sociodemographic characteristics included sex (male, female), race (non-Hispanic white, non-Hispanic black, Hispanic, and all other races), and school level (middle school or high school).

Cigarette Smoking status and other tobacco use behavior

-*Established cigarette smokers*: smokers who smoked at least 100 cigarettes.

-*Experimental cigarette smokers*: High-risk youth described as having already tried smoking, but not yet smoked 100 cigarettes.

-*Non-cigarette smokers*: Low-risk youth, described as never having tried smoking cigarettes (not even one or two puffs) .

Non-cigarette tobacco product use was measured by a “Yes” response to at least one of the following 4 questions: 1) "Have you ever tried smoking cigars, cigarillos, or little cigars, even one or two puffs?", 2) "Have you ever used chewing tobacco, snuff, or dip, even just a small amount?", 3) "Have you ever used an e-cigarette, even once or twice?", and 4) “Have you ever tried smoking tobacco in a hookah or waterpipe, even one or two puffs?”.

Tobacco users in the household

We assessed living with a tobacco user based on the question, “Does anyone living with you now: 1) ‘smoke cigarettes, cigars, cigarillos, or little cigars?’, 2) ‘use chewing tobacco, snuff, or dip?’, 3) ‘use e-cigarettes (electronic cigarettes)?’, 4) ‘smoke tobacco in a hookah or water pipe?’, 5) ‘smoke pipes filled with tobacco (not water pipe)?’, 6) ‘use snus?’, 7) ‘use dissolvable tobacco products?’, or 8) ‘smoke bidis (small brown cigarettes wrapped in a leaf)?’. The ninth possible response was “No one who lives with me now uses any form of tobacco”. Living with a tobacco user was measured with any response other than, “No one who lives with me now uses any form of tobacco”.

Exposure to pro-tobacco advertisements

Exposure to pro-tobacco marketing was measured across four media outlets, including the internet, newspapers and magazines, convenience stores, supermarkets, or gas stations, and television or movies. We considered respondents as exposed if they selected “Sometimes”, “Most of the time”, or “Always” to seeing pro-tobacco advertisements in any of the assessed channels, while any other responses were categorized as non-exposed.

Statistical Analysis

Descriptive analyses were restricted to complete case observations (n = 18,402); missing observations accounted for 8.9%. For regression analysis, we accounted for selection bias and adjusted for measured confounding by using Inverse Probability Weighting (IPW) to estimate weights of the American middle and high school student population.⁷³ 95% confidence intervals (CIs) were calculated to account for the complex survey design. Statistical significance was defined as a P value less than 0.05, and all tests were 2-tailed. All analyses were performed using STATA version 14.2 to account for the survey design features. Chi-squared tests were used to compare differences in perceptions across groups.

Percentages with 95% CIs of exposure to “The Real Cost” campaign and outcomes among the overall sample as well as separated by sociodemographic characteristics, including sex, race, and level of education were reported. Factors associated with exposure to “The Real Cost” campaign and outcome of smoking risk perception were explored using survey binary logistic regression. To measure associations between exposure to “The Real Cost” and cigarette risk perceptions,

multivariable logistic regression models were fitted while controlling for demographic characteristics which exhibited major variations in bivariate analyses (sex, school grades, and race/ethnicity). The models were also controlled for cigarette smoking status, other non-cigarette tobacco product use, household tobacco use, and exposure to other pro-tobacco media.

Furthermore, curiosity prevalence among non-smokers were reported across all exposure statuses to “The Real Cost” messages and separated by sociodemographic characteristics. Multivariable binary logistic regression models were fit for never-smokers and controlled for confounders to assess associations between curiosity toward smoking cigarettes and exposure to advertisements ($p < 0.05$). In addition, intention to quit was assessed among smokers and measured across all exposure statuses. Multivariable binary logistic regression models were fit for cigarette smokers to assess associations of intention to quit and exposure to advertisements ($p < 0.05$).

RESULTS

Exposure to “The Real Cost” messages

In 2018, estimated exposure to the FDA’s “The Real cost” anti-smoking advertisements was 70.94% ($n = 10,749$; 95% CI = 69.4–72.1%). Among those who were exposed, 50.64% were males, 60.58% were non-Hispanic white, 22.47% were Hispanic, and 11.52% were non-Hispanic black. Furthermore, 59.82% were in high-school and 18.96% were smokers (15.7% experimental

and 2.82% established). In addition, 35.25% of youth who were exposed reported using tobacco products other than cigarettes.

Alternatively, among youth who were unexposed to “The Real Cost”, 53.14% were male, 14.28% were non-Hispanic black, 28.46% were Hispanic, 14.72% were smokers (12.44% experimental smokers and 1.87% established smokers), and 25.31% of non-exposed individuals used tobacco products other than cigarettes.

Cigarettes risk perception:

Exposure to “The Real Cost” messages was independently associated with cigarette risk perceptions. Mean perceived risk among the exposed to advertisements was 91.15% (95% CI= 90.3–92%) compared to 85.66% (95% CI = 84.1–87.3%) in unexposed individuals ($p < 0.0001$).

Risk perception among U.S. youths exposed, unexposed, and unsure about exposure to the FDA’s “The Real Cost” anti-smoking advertisements by different sociodemographic characteristics are shown in **Table 1**. Group differences in school grades were found to be statistically significant. Cigarette risk perceptions mean was 92.77% (95% CI = 91.8–93.7%) among exposed students in middle school, compared to 90.16% (95% CI = 88.9–91.4%) in exposed high schoolers ($p < 0.0019$). Unexposed high school students, on the other hand, reported the lowest risk perception at 84.57% (95% CI = 82.3–86.9%) ($p < 0.0001$). Significant differences were observed between sexes, with a greater proportion of females reporting perceived cigarette risk regardless of exposure status ($p < 0.0001$). The highest risk perception was reported by exposed females at

92.72% (95% CI = 91.8–93.62%) compared to exposed males at 89.8% (95% CI = 88.6–91.0%) ($p < 0.0001$; Table 1).

Differences in risk perception between exposed and unexposed individuals of the same race and differences between races among unexposed individuals were significant. Conversely, differences between races among exposed individuals were not significant. Mean risk among exposed Hispanic students was 90.15% (95%CI = 88.6 – 91.7) compared to 80.72% (95%CI = 77.6 – 83.9) in unexposed ($p < 0.0001$). Similarly, with exposed Black students, where mean smoking risk was 91.26% (95%CI = 89.06 – 93.5) compared to 85.44% (95%CI = 81 – 89.9) in unexposed ($p = 0.02$; Table 1).

Curiosity toward smoking among never smokers

The impact of “The Real Cost” advertisements on curiosity towards smoking in youth never-smokers was assessed. Exposed youth had higher curiosity prevalence, at 33.9% (95% CI = 32.2–35.6%) compared to 24.3% (95% CI = 22.3–26.3%) in unexposed ($p < 0.0001$). Group differences between sexes were found to be statistically significant in the exposed group, with females being more curious than males ($p = 0.0084$). Furthermore, exposed females reported higher curiosity levels toward smoking, at 35.8% (95% CI = 33.6–38.0%) compared to 22.4% (95% CI = 19.7–25.1%) in unexposed females ($p = 0.0001$; Table 1).

Curiosity toward smoking was highest among exposed Hispanic adolescents, at 36.6% (95% CI = 33.6–39.5%) compared to 33.9% (95% CI = 31.9–35.6%) in exposed non-Hispanic white individuals ($p = 0.037$). Additionally, exposed African American adolescents reported higher

prevalence of curiosity, at 30.6% (95% CI = 26.5–34.61%) compared to 19.3% (95% CI = 14.9–23.7%) among unexposed individuals ($p = 0.0003$; Table 1).

Intention to Quit among smokers

We explored the intention to quit within the next 12 months among high-risk U.S. youth who were categorized as experimental and established smokers. Exposed youth had greater intention to quit estimates, at 31.5% (95% CI = 28.3–34.7%) compared to 23.3% (95% CI = 19.1–27.5%) in unexposed individuals ($p = 0.0009$; Table 1). Group differences in intention to quit between experimental smokers and established smokers were not found to be significant across different exposure statuses. However, group differences within the same exposure group were significant. Intention to quit among unexposed established smokers was 20.7% (95% CI = 11.2–30.2%) compared to 35.05% (95% CI = 27–43.1%) among unexposed experimental smokers ($p = 0.0001$; Table 1). Sex differences were not significant across campaign exposure statuses. However, differences within the same sex were significant, with exposed females reporting higher intention to quit prevalence, at 32% (95% CI = 27.03–36.8%) compared to 23.4% (95% CI = 16.9–29.9%) in unexposed females ($p = 0.04$). Differences between races in intention to quit were not significant across all exposure statuses. However, significant variations were seen for exposed African Americans, who reported greater intention to quit prevalence, at 36.1% (95% CI = 26.4–45.8%) compared to 15.3% (95% CI = 7.5–23.2%) among unexposed individuals ($p = 0.009$). Finally, no differences were observed in intention to quit between high school and middle school students (Table 1).

Multivariable analyses:

Table 2 summarizes results from three logistic regression models adjusted for possible confounders.

The first logistic regression model was adjusted for age/school level, sex, race, cigarette smoking status, other non-cigarette tobacco product use, household tobacco use, and exposure to other pro-tobacco media. There was a statistically significant association between exposure to “The Real Cost” advertisements and cigarette smoking risk perception among U.S. adolescents ($p < 0.0001$). Odds of youth perceiving cigarettes as harmful were 1.7 times higher in individuals who were exposed to “The Real Cost” [adjusted odds ratio (AOR): 1.68; 95% CI = 1.3–2.19; $p = 0.0001$]. Compared to females, odds of perceiving tobacco as harmful was lower among males (AOR = 0.83; 95% CI = 0.6–1.03). In addition, African Americans reported lower odds of smoking risk perception than white adolescents (AOR = 0.62; 95% CI = 0.44–0.86; $p = 0.006$; Table 2.b). Furthermore, compared to non-smoker adolescents, experimental and established smokers had lower smoking risk perception odds (AOR = 0.33; 95% CI = 0.25–0.45; $p < 0.0001$, and AOR = 0.28; 95% CI = 0.14–0.57; $p = 0.001$, respectively). Similarly, with non-cigarette tobacco products, users reported lower risk perception odds (AOR = 0.59; 95% CI = 0.45–0.77) compared to non-users ($p = 0.0001$). Additionally, youth with smokers in their households had lower risk odds (AOR = 0.67; 95% CI = 0.59–0.76) compared to youth who did not live with smokers ($p < 0.0001$). Finally, youth who recalled seeing tobacco promotional advertisements had higher risk perception odds (AOR = 1.51; 95% CI = 1.21–1.89) compared to those who did not ($p < 0.0001$; Table 2.a).

The second logistic regression model adjusted for age, school level, sex, race, household tobacco use, and exposure to other pro-tobacco marketing media (Table 2.b). The model assessed exposure to “The Real Cost” and its association with cigarette smoking curiosity among youth non-smokers, which was significant ($p < 0.0001$). Curiosity odds were lower among African American students (AOR = 0.80; 95% CI = 0.60–0.90) compared to white students ($p = 0.012$). Similarly, middle school students reported lower curiosity odds (AOR = 0.79; 95% CI = 0.7–0.9) compared to high school students ($p = 0.006$). Youth with smokers in the household reported higher curiosity odds (AOR = 1.29; 95% CI = 1.16–1.40) compared to youth who did not live with smokers ($p < 0.0001$). Finally, exposure to promotional tobacco advertisements was associated with higher curiosity odds (AOR = 1.42; 95% CI = 1.2–1.7) compared to youth who were not exposed to these advertisements ($p < 0.0001$; Table 2.b).

Our third logistic regression model, which assessed the association between exposure to “The Real Cost” advertisements and intention to quit cigarette among U.S. adolescent smokers, was not significant ($p = 0.2049$; Table 2.c). The model was adjusted for age, school level, sex, race, cigarette smoking status, other non-cigarette tobacco product use, household tobacco use, and exposure to other pro-tobacco media.

DISCUSSION:

To our knowledge, this study is the first to explore the association between the FDA’s “The Real Cost” anti-smoking advertising campaign and risk perception, smoking curiosity, and intention to quit smoking among U.S. adolescents. Tobacco use among youth remains a major public health

concern in America, especially considering the tobacco industry's history of targeting this vulnerable population with advertisements to make them more susceptible of developing life-long smoking habits.²⁻⁵

Exposure to the FDA's "The Real Cost" messages influenced beliefs and attitudes about tobacco use among youth nationwide. Firstly, the campaign achieved widespread reach across various demographic groups, with the majority of adolescents (70.9%) recalling exposure to at least one advertisement from the campaign. Evidence from this report indicates that the campaign achieved measures of initial success regarding increasing risk perceptions among adolescents. Additionally, a greater proportion of high-risk students reported exposure to the campaign.

While "The Real Cost" campaign addressed youth-relevant themes, like physical appearance, and loss of control, the overarching message emphasized that tobacco use leads to negative health outcomes, which may be expressed in the context of risk perception measures.⁷⁴ Risk perceptions, described as an individual's perceived judgement of the probability, likelihood, or susceptibility for negative health consequences,⁷⁵ are a necessary predictor in health behavior theories.⁷⁶ Meta-analytic evidence suggests that interventions which positively influence and alter risk perceptions could consequentially improve healthy behaviors. Thus, risk perceptions are often considered a major indicator of campaign effectiveness.^{75,77}

Similar to a previous report, our study concluded that exposure to "The Real Cost" campaign was associated with increased risk perceptions of adverse effects caused by tobacco use. American adolescents who recalled exposure to anti-smoking mass media advertisements were more likely

to report higher risk perceptions.⁶² Racial disparities were seen in African American adolescents, who were most disadvantaged in relation to perceiving tobacco risks, as compared to their white peers. This may be explained by the industry's history of targeted marketing efforts in African American publications and cultural events, rendering that demographic more exposed to cigarette advertisements.⁷⁸ Moreover, non-smokers were more likely to perceive tobacco use as risky to their health compared to smokers. Smokers were likely underestimating health risks of cigarette smoking due to the role of self-exempting beliefs or cognitive dissonance-reducing beliefs. Possessing such beliefs makes it difficult for smokers to accept that their smoking habit causes disease or harm.⁷⁹

In this report, we also described the prevalence of curiosity about cigarette smoking among a middle and high school students who were committed never-smokers. Adolescents exposed to the advertisements displayed greater curiosity than unexposed individuals. About one-third of youth non-smokers in the U.S. were curious about cigarette smoking, resulting in a serious public health concern. Curiosity may indicate interest and increased sensitivity to behavior-relevant stimuli, such as advertising, which may lead to impulsive behavior.^{37,80} It is possible that exposure to anti-smoking advertisements stimulates the rebellious and curious nature of middle school and high school students. This can further be elaborated by the theory of psychological reactance, which describes the way in which attempts to prevent youth from establishing poor habits may backfire.^{81,82} According to the psychological reactance theory, messages perceived to challenge personal freedoms, such as not smoking, increase a motivational state and reactance, which may point individuals toward regaining control of that threatened freedom.^{81,82}

Evidence from anti-smoking media campaigns and controlled field experiments indicate that they can promote quitting, especially with adequate funding and design, such as incorporating evidence-based strategies.^{3,83,84} Our descriptive findings agree with other reports, where adolescent experimental and established smokers were more likely to experience intentions to quit within the next 12 months or less after being exposed to “The Real Cost” campaign.^{85,20} However, this study did not report a significant association between intentions to quit and exposure to anti-tobacco messages among youth smokers. Contrary to previous research which highlighted positive correlations between anti-tobacco communications and smoking cessation predictions,^{88,89,90} our unusual findings may be attributed to our relatively small sample size after limiting the analysis to only complete case observations. Because our model had relatively lower statistical power, statistically significant findings are harder to detect.⁹¹

Limitations

The current study has several limitations. Firstly, while NYTS data are nationally representative, they are still cross-sectional, which limits our ability of identifying causal relationships. Additionally, NYTS data are collected from public or private school students and may not be generalizable to all adolescents, such as those that are home-schooled, those that dropped out of school, or youth in detention centers. Moreover, this study involved self-reported data, which may be subject to social desirability and recall bias. Furthermore, due to data constraints, we could not empirically separate the individual mechanisms responsible for explaining the effects of media advertisements on normative beliefs, such as presumed influence, and heuristic judgment. Studying the independent effects of such mechanisms would be an interesting follow-up topic for

future research. Future longitudinal studies could provide a clearer assessment of the “The Real Cost” campaign impact on smoking related beliefs, attitudes, and smoking cessation. Despite these limitations, the findings of this study hold some implications for future public health campaign design and implementation. Additionally, these findings have implications for emerging products, particularly ones with a strong advertising component.

CONCLUSIONS

The FDA’s “The Real Cost” campaign has not only achieved exposure levels deemed essential to have national impact, it also resulted in adolescents expressing more negative attitudes towards tobacco products following advertisement exposure. We found that non-smoking students were more curious about smoking after exposure to campaign advertisements. Additionally, exposure to the campaign was not associated with higher intention to quit among cigarette smokers. Our findings support the messaging strategies implemented by the FDA for the “The Real Cost” national tobacco prevention campaigns. While our report suggested initial success for the mass media campaign, further research is necessary to explore the longitudinal impact of this tobacco prevention campaign, with a particular focus on its impact on smoking behavior. Additionally, future investigations should consider the impact of the campaign on risk perception of alternative tobacco products such as e-cigarettes, which are currently under the jurisdiction of the FDA.

Table 1. Prevalence of perception and behaviors among US adolescents exposed, non-exposed and unsure of exposure to “Real Cost” Antismoking Advertisements by Sociodemographic Characteristics

Outcome	Characteristics	Total Respondents	Respondents With Exposure *		Respondents Without Exposure**		Respondents Unsure of Exposure ***	
		No.	No.	% (95% CI)*	No.	% (95%CI)**	No.	% (95% CI)***
Risk Perceptions	Overall	18,402	10,165	91.15 (90.3 - 92)	4,236	85.66 (84.1 - 87.3)	4,001	90.49 (89.4 - 91.6)
	Sex							
	Female	9,158	4,991	92.72 (91.8 -93.62)	2,009	87.42 (85.5 - 89.4)	2,158	91.59 (90.1 - 93.1)
	Male	9,098	5,098	89.8 (88.6 - 91)	2,188	84.34 (82.4 -86.3)	1,812	89.3 (87.7 - 90.9)
	Race							
	NH White	9,096	5,445	91.6 (90.7 - 92.5)	1,775	88.56 (86.9 - 90.2)	1,876	92.13 (90.6 - 93.6)
	NH Black or African American	2,266	1,162	91.26 (89.1 - 93.5)	578	85.44 (81 - 89.9)	526	88.18 (84.6 - 91.7)
	Hispanic	5,252	2,679	90.15 (88.6 - 91.7)	1,377	80.72 (77.6 - 83.9)	1,196	88.7 (86.6 - 90.9)
	Non-Hispanic Other	1,070	543	91.4 (88.5 - 94.3)	293	90.29 (86.7 - 93.9)	234	88.99 (82.2 - 95.7)
School Grade								
Middle School	7,891	4,019	92.77 (91.8 - 93.7)	1,960	86.86 (82.3 - 86.9)	1,912	91.94 (90.5 - 93.4)	
High School	9,662	5,744	90.16 (88.9 - 91.4)	2,030	84.57 (82.3 - 86.9)	1,888	89.16 (87.6 - 90.8)	
Curiosity	Overall	15,962	8,529	33.9 (32.2–35.6)	3,761	24.3 (22.3 – 26.3)	3,573	28.8 (26.8 -30.8)
	Sex							
	Female	8,059	4,277	35.8 (33.6 - 38)	1,813	22.4 (19.7-25.1)	1,969	27.5 (24.6 - 30.4)
	Male	7,804	4,252	32 (29.8 - 34.2)	1,948	26 (23.2 - 28.9)	1,604	30.2 (26.8 - 33.6)
	Race							
	NH White	7,686	4,475	33.8 (31.9 - 35.6)	1,546	26.6 (23.5 - 29.6)	1,665	27.4 (24.7 - 30)
	NH Black or African American	2,064	1,052	30.6 (26.5 - 34.6)	548	19.3 (14.9 - 23.7)	464	24.1 (19.1 - 29.1)
	Hispanic	4,548	2,258	36.6 (33.6 - 39.5)	1,211	24 (20.6-27.5)	1,079	32.7 (28.6- 36.9)
	Non-Hispanic Other	958	483	35.6 (33.6 - 39.5)	260	24.7 (19.2- 30.2)	215	27.6 (18.5 – 36.8)
School Grade								
Middle School	7,934	3,970	33.7 (31.8 - 35.6)	2,031	21.9 (19 - 24.7)	1,933	28.8 (25.8 – 31.3)	
High School	7,909	4,549	34.1(31.6 - 36.6)	1,724	27.1 (24.1- 30)	1,636	28.6 (25.8 - 31.5)	

Intention to quit	Overall	3,206	1,900	31.5 (28.3-34.7)	757	23.3 (19.1-27.5)	549	24.7 (20.1-29.4)
	Smoking status	2,966	1,758	34.49 (29.9-39.1)	574	35.05 (27- 43.1)	501	29.06 (22.3 - 35.8)
	Experimental							
	Established	501	317	33.04 (25.6 -40.4)	88	20.7 (11.2 – 30.2)	55	37.16 (21.1 - 53.2)
	Sex							
	Female	1,401	859	31.9 (27.03- 36.8)	294	23.4 (16.9 - 29.9)	248	25.8 (19.5 - 32.1)
	Male	1,763	1,022	31.2 (27.3-35.1)	451	23.7 (18.9 - 28.5)	290	24.2 (18 - 30.4)
	Race							
	Non-Hispanic White	1,756	1,160	30 (26.1- 33.8)	337	22.2 (16.1 -28.3)	259	25.7 (19.1 - 32.3)
	Non-Hispanic Black or African American	342	154	36.1 (26.4 - 45.8)	118	15.3 (7.5 - 23.2)	70	17.9 (4.3 - 32.4)
	Hispanic	845	72	35.9 (30.8 - 41.1)	229	30.4 (22.4 - 38.4)	158	27.2 (19.6 - 34.8)
Non-Hispanic Other	145	458	25.2 (15.8 - 34.5)	38	16 (4.1 – 27.9)	35	16.7 (3.6 - 29.7)	
School Grade								
Middle School	728	359	33.9 (27.5- 40.2)	182	17.9 (11- 24.9)	140	23 (12.3- 33.7)	
High School	2,449	1,462	31 (27.1- 40.2)	527	25.2 (19.9- 30.4)	373	30 (20.6- 30.8)	

* Results represent the number and weighted percentage of participants who replied “Yes” to the following question: “In the past 12 months, have you seen or heard “The Real Cost” on television, the internet, social media, or radio as part of ads about tobacco?”

** Results represent the number and weighted percentage of respondents who replied “No” to the following question: “In the past 12 months, have you seen or heard “The Real Cost” on television, the internet, social media, or radio as part of ads about tobacco?”

*** Results represent the number and weighted percentage of participants who replied “Not sure” to the following question: “In the past 6 months, have you seen messages in newspapers or on television that say that a federal court has ordered tobacco companies to make statements about the dangers of smoking cigarettes?”

Table 2

2.a Adjusted logistic regression of exposure to “Real cost” antismoking advertisements and *cigarettes risk perception* by sociodemographic characteristics and controlled for confounders : Sex, Race, Education grade, Smoking status, Family smoking status and Exposure to tobacco promotional advertisements.

Characteristic	Adjusted Odds Ratio (95% CI)	P Value
Seen “Real cost”		
No	1 [Reference]	NA*
Yes	1.68 (1.3 - 2.19) **	0.0001
Sex		
Female	1 [Reference]	NA*
Male	0.83 (0.67 – 1.03)	0.100
Race		
Non-Hispanic White	1 [Reference]	NA*
Non-Hispanic Black or African American	0.62 (0.44 - 0.86) **	0.006
Hispanic	0.71 (0.55 - 0.93) **	0.015
Non-Hispanic Other	0.79 (0.43 - 1.5)	0.461
Grade		
High School	1 [Reference]	NA*
Middle School	1.05 (0.79 - 1.39)	0.718
Cigarettes Smoking status		
Never Smoked	1 [Reference]	NA*
Experimental Smoker	0.33 (0.25 - 0.45) **	0.0001
Established Smoker	0.28 (0.14 - 0.57) **	0.001
Non-cigarette tobacco product user		
No	1 [Reference]	NA*
Yes	0.59 (0.45 - 0.77) **	0.0001
Family Smoking		
No	1 [Reference]	NA*
Yes	0.67 (0.59 - 0.76) **	0.0001
Seen Tobacco Promotional advertisements		
No	1 [Reference]	NA*
Yes	1.51 (1.21 - 1.89) **	0.0001

Note. Abbreviations: OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval; REF, reference group. Models adjusted for socio-demographics (sex, race, education grade) and cigarette smoking status.

*NA, not applicable.

** Statistically significant, $p < 0.05$.

2.b Adjusted Logistic regression of exposure to “Real cost” antismoking advertisements and *cigarettes curiosity* in never smokers by sociodemographic characteristics and controlled for confounders: Sex, Race, Education grade, Smoking status, Family smoking status and Exposure to tobacco promotional advertisements.

Characteristic	Adjusted Odds Ratio (95% CI)	P Value
Seen “Real cost”		
No	1 [Reference]	NA*
Yes	1.47 (1.2 - 1.7) **	0.0001
Sex		
Female	1 [Reference]	NA*
Male	0.95 (0.8 - 1.1)	0.525
Race		
Non-Hispanic White	1 [Reference]	NA*
Non-Hispanic Black or African American	0.80 (0.6 - 0.9) **	0.012
Hispanic	1.05 (0.9 - 1.2)**	0.036
Non-Hispanic Other	1.06 (0.8 - 1.3)	0.213
Grade		
High School	1 [Reference]	NA*
Middle School	0.79 (0.7 - 0.9) **	0.006
Family Smoking		
No	1 [Reference]	NA*
Yes	1.29 (1.16 - 1.4) **	0.0001
Seen Tobacco Promotional advertisements		
No	1 [Reference]	NA*
Yes	1.42 (1.2 - 1.7) **	0.0001

Note. Abbreviations: OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval; REF, reference group. Models adjusted for socio-demographics (sex, race, education grade) and cigarette smoking status.

*NA, not applicable.

** Statistically significant, $p < 0.05$.

2.c. Adjusted Logistic regression of exposure to “Real cost” Antismoking Advertisements and *Intention to Quit cigarettes* in smokers by sociodemographic characteristics and controlled for confounders: Sex, Race, Education grade, Smoking status, Family smoking status and Exposure to tobacco promotional advertisements.

Characteristic	Adjusted Odds Ratio (95% CI)	P Value
Seen “Real cost”		
No	1 [Reference]	NA*
Yes	1.15 (0.6 - 2.1)	0.655
Sex		
Female	1 [Reference]	NA*
Male	1.29 (0.7 – 2.4)	0.407
Race		
Non-Hispanic White	1 [Reference]	NA*
Non-Hispanic Black or African American	0.85 (0.3 - 2.3)	0.753
Hispanic	1.31 (0.8 - 2.1)	0.264
Non-Hispanic Other	0.83 (0.26 - 2.7)	0.757
Grade		
High School	1 [Reference]	NA*
Middle School	0.89 (0.39 - 2.1)	0.800
Cigarettes Smoking status		
Never Smoked	1 [Reference]	NA*
Experimental Smoker	7.21 (0.96 - 53.9)	0.054
Established Smoker	4.97 (0.66 - 37.2)	0.117
Non-cigarette tobacco product user		
No	1 [Reference]	NA*
Yes	0.96 (0.3 - 3.4)	0.946
Family Smoking		
No	1 [Reference]	NA*
Yes	1.16 (0.86 - 1.6)	0.339
Seen Tobacco Promotional advertisements		
No	1 [Reference]	NA*
Yes	1.27 (0.7 - 2.4)	0.455

Note. Abbreviations: OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval; REF, reference group. Models adjusted for socio-demographics (sex, race, education grade) and cigarette smoking status.

*NA, not applicable.

** Statistically significant, $p < 0.05$.

Analysis of the Tobacco Industry Cigarette Marketing Expenditures — United States, 2008–2019

Abstract

Background

Anti-tobacco campaigns are undermined by the fact that tobacco marketing outspends public health preventative initiatives. To effectively counter tobacco marketing, the tobacco industry's retail activity must be monitored and regulated. The objectives of this study were to: (1) perform a 10-year trend analysis of the total combined and print cigarette annual advertising and promotional expenditures by major tobacco companies in the United States during 2009–2018, and (2) contrast the 2018 print media cigarette advertising expenditures against the cost of disseminating anti-tobacco corrective statements in print advertisements incurred by the tobacco companies in the United States.

Methods

We collected information about cigarette marketing expenditures from the Federal Trade Commission Cigarettes reports. All expenditures were adjusted for inflation using the Consumer Price Index Inflation Calculator obtained from the U.S. bureau of labor statistics. Temporal trends during the 2009–2018 period were assessed using joinpoint regression with a level of significance

of $p < 0.05$. The cost of corrective statements published in print were estimated from the cost of a full-page newspaper advertisement with specifications similar to those used for CSs implementation.

Results

During 2009–2018, the total adjusted cigarette marketing expenditures did not experience any significant changes (AAPC = -1.5 confidence interval [CI] = -2.5–0.4; $p < 0.05$). Expenditure on print advertisements decreased from 0.43% in 2009 to 0.1% in 2018. Absolute dollar amounts on magazine cigarette marketing expenditures decreased from \$36.6 million in 2009 to \$8.5 million in 2018, a relative decline of 80% (AAPC = -13.5, 95% CI = -26.4–1.7; $p < 0.05$). The tobacco industry spent approximately \$8.5 million on print advertisements in 2018 to market cigarettes. We estimated that it cost \$5.5 million to disseminate the corrective statements in print within that same year, totaling 0.06% of what was spent on combined cigarette marketing and promotion in 2018.

Conclusion

Many traditional cigarette advertising categories lost funding in the past decade, however, total marketing expenditure remains unaffected. Tobacco companies respond to marketing regulations by reallocating funds to other less regulated channels. In 2018, most promotional expenditures were spent on various price discounts, which could expose vulnerable, unsuspecting children and youth to cigarette marketing. Finally, the impact of the corrective statements was weakened by delayed implementation, and consumer attention shifted from traditional media to other digital channels.

INTRODUCTION

The United States is one of the leading global producers and manufacturers of tobacco, causing cigarettes to be among the most heavily marketed consumer products.¹ In 2017 alone, it was estimated that tobacco companies spent over \$1 million every hour to promote cigarettes and smokeless tobacco.⁹² These expenditures were approximately 70 times more than what State and Federal public health entities spent cumulatively on tobacco prevention and control efforts (estimated at \$136 million).^{20,93} Businesses utilize different marketing strategies to create consumer demand and improve sales, particularly from new consumers. Consequently, monitoring tobacco industry retail and marketing activity is essential for effective tobacco control efforts and marketing regulations.^{4,94} Special considerations are required when addressing tobacco marketing for youth, as shown in internal industry documents describing adolescents aged 13-years as the “Industry’s key market”.^{58,59} Tobacco manufacturers have been reallocating resources to less restricted or unregulated channels following the Master Settlement Agreement between major U.S. cigarette companies and the Attorney Generals of 46 U.S. states to avoid any action focused on directly or indirectly targeting youth.^{95,20,23} This fit into their historical pattern of evasive behavior to target youth. In particular, when newspapers and billboard advertising were prohibited, funds were reallocated to point-of-sale, digital marketing, package branding, and forms of discounts.²⁰

According to the Federal Trade Commission, 93% of total tobacco industry advertising expenditure in 2013 was paid to retailers and wholesalers to optimize product placement and discount the price of cigarettes.^{93,20} Point-of-sale advertising is largely unregulated and a major medium for tobacco promotion. It involves the effective targeting of shoppers with product

placement, using a variety of displays, including power walls.^{93,20} Many susceptible children and youth are being exposed to tobacco marketing through these mediums.⁹⁶ Additionally, the tobacco industry invests in audience research to strategize product marketing and target coupons directly to susceptible consumers.⁹⁷ For instance, social media was predominantly used to promote electronic cigarettes (e-cigarettes), which may have led to their increased popularity among youth.

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Nonetheless, tobacco companies consistently claimed that their marketing strategies did not increase overall demand for their products, nor did it affect tobacco initiation among youth.⁹⁹ Furthermore, the tobacco industry has long used the “Free Market Economy” argument, claiming they are merely competing with other companies for market share of current product users, like established smokers.^{23,100} These arguments are invalidated by conclusions reached by the National Cancer Institute in its extensive review of current available evidence, namely, that the tobacco industry’s marketing hugely impacts tobacco initiation among youth, discourages quitting, and increases product demand among some established users.³ In addition, smoking inflicts considerably high economic costs on healthcare systems, costing the U.S. over \$300 billion annually, including almost \$170 billion used directly for medical care, and over \$156 billion of indirect cost to account for productivity loss. The latter estimate includes \$5.6 billion in lost productivity among non-smokers who suffer from smoking-attributable conditions due to involuntary exposure to secondhand smoking.^{4,101}

The need to regulate tobacco marketing led to the development of several public health policies and interventions designed to limit the industry’s marketing impact on tobacco initiation and consumption. For instance, the 1998 Master Settlement Agreement occurred between major U.S.

cigarette companies and the Attorney Generals of 46 States, four U.S. Territories, the Commonwealth of Puerto Rico, and the District of Columbia. This was the largest civil litigation settlement in U.S. history, in which the defendants agreed to restrict their advertising, promotion, and marketing of cigarettes in these states.⁹⁵ Additionally, the “Family Smoking Prevention and Tobacco Control Act”, which was signed into law in 2009, provides the U.S. Food and Drug Administration (FDA) with broad authority to regulate tobacco product marketing, including the jurisdiction to regulate manufacturing, distribution, and marketing of tobacco product.⁴ Finally, in November 2017, major tobacco companies sponsored and disseminated corrective statements (CSs) advertisements in newspapers and major television networks, which resulted from the 2006 United States District Court of Columbia ruling against major tobacco companies, aiming to relieve and prevent future fraud associated with cigarette marketing.¹¹ The CSs newspaper advertisements ran until March 2018 and TV advertisements ended in November 2018 (appendix 1). These industry-sponsored advertisements are expected to cost a fraction of the 2018 total cigarette promotional marketing expenditure.

There are limited reports which analyzed expenditure trends of tobacco industry promotional marketing over the years and contrasted it against expenditure on anti-smoking corrective statements. To address this gap, the objectives of this study were to (1) perform a 10-year trend analysis of total and print cigarette annual advertising and promotional expenditures by major tobacco companies in the United States during 2009–2018, and (2) contrast the 2018 print media cigarette advertising expenditures against the cost of disseminating anti-tobacco corrective statements in print advertisements in the United States.

METHODS

Data source

We analyzed tobacco company marketing expenditures, obtained from the Federal Trade Commission (FTC) Cigarette Reports during the years 2009–2018.^{39,49,92,93}

The FTC categorizes cigarette advertising and promotional expenditures into the following mutually exclusive classifications: newspapers, magazines, outdoor, audio/visual, transit, point-of-sale, price discounts, promotional allowances (i.e. retailers, wholesalers, and other), sampling, specialty item distribution (branded and nonbranded), public entertainment (adult-only and general audience), sponsorships, endorsements and testimonials, direct mail, coupons and retail-value-added, internet (i.e. company website, social media, and other), telephone, and all others.³⁹ The FTC report defines “other” as “advertising and promotional expenditures not covered by another category. To the extent that third-party agency fees relating to cigarette advertising, merchandising, or promotion cannot be divided based on materials to which they relate, they should be reported in this category.”³⁹

We collected information for total cigarette marketing expenditures as well as the percentage of all marketing expenditures that were in print. Tobacco advertising in magazines was defined by the FTC as, “expenditures used for magazine advertising, but excluding expenditures in connection with sampling, consumer engagement, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.”³⁹

Statistical Analyses

Expenditures were adjusted for inflation using the U.S. Consumer Price Index (CPI) Inflation Calculator from the bureau of labor statistics,¹⁰² where the average annual consumer price index for 2018 was used as reference. Temporal trends during 2009–2018 were assessed using joinpoint regression, with a level of significance of $p < 0.05$.¹⁰³

To analyze trends in annual combined and print expenditures, and to estimate the annual percentage change, we employed a joinpoint regression model using National Cancer Institute joinpoint software.¹⁰³ This procedure modeled the counts in U.S. dollars for each time period. The program begins with the minimum number of joinpoints (i.e. 0 joinpoints, which is a straight line) and tests whether more joinpoints are statistically significant and, therefore, should be added to the model (up to a maximum number). The algorithm uses a Monte Carlo Permutation method to test whether an apparent change in trend is statistically significant at ($p < 0.05$). Annual percentage change (APC) and average annual percentage changes (AAPC) were computed along with corresponding 95% confidence intervals to summarize the rate of change during the entire study period and during segments of the study period where points of inflection occurred. Annual percentage change is a quantitative estimate of the rate of change over a given period. For instance, an APC of +1.5 indicates an increase of 1.5% for each year over the preceding year, whereas a negative sign indicates a decline. All individual years during the study period were used in the estimation of APCs. Where significant joinpoints exist, a separate estimate of annual percentage change is computed for each separate time segment and the average of all segments yields the

average annual percentage change. Where no significant joinpoint exists, the APC is identical to the AAPC. We performed trend analyses on both nominal data as well as that adjusted for inflation.

To contrast the 2018 print media cigarette promotional advertising and corrective statements expenditures in the United States, cigarette marketing expenditure trends were obtained from the 2018 Federal Trade Commission Cigarette Report. Costs of the corrective statements published in print were estimated from the cost of newspaper advertisements with specifications similar to those used for CSs implementation. Tobacco companies featured the following specifications for dissemination: five, full-page, black and white advertisements, in the first part (section A) of the Sunday edition of 53 (national, regional, Hispanic media, African American community) newspapers. The newspapers rosters, CSs message wording, and running schedules were also specified by the court.⁵⁴

To estimate the amount spent by tobacco companies, we assumed the following based on the availability of valid data from all 53 newspapers specified by court (appendix 1). From January 2020–March 2020, the primary investigator SA contacted the 53 papers and inquired about the average cost of a full page, black and white, section A advertisement in a Sunday edition. When information was not provided by the newspaper, online data (2018 media kit, paper website) were used to get the average cost of a full page, black and white advertisement in a Sunday edition. Next, each newspaper advertisement average cost was multiplied by five to account for each CSs implementation. The resulting costs were then summed for the final estimate of the cost to publish all ads ($53 * 5 = 265$). We must recognize, however, that many newspapers gave discounts to clients who had contracts to purchase multiple advertisements.

RESULTS

Trends in pro-tobacco marketing expenditures during 2009-2018.

Adjusted aggregate expenditures for cigarette marketing across all advertising and promotional categories was \$9.9 billion in 2009 and \$8.4 billion in 2018 (Table 1). During 2009–2018, the total adjusted cigarette marketing expenditures declined, but it did not experience any significant changes (AAPC = -1.5 confidence interval [CI] = -2.5–0.4; $p < 0.05$; Figure 1). Similar trends were observed in the nominal cigarette marketing expenditures analysis (AAPC = 0.1 confidence interval [CI] = -1.1–1.2).

Expenditures on magazine advertisements decreased from 0.43% in 2009 to 0.1% in 2018. The absolute dollar amounts on magazine cigarette marketing expenditures decreased from \$36.6 million in 2009 to \$8.5 million in 2018 (Figure 5), a relative decline of 80% (AAPC = -13.5, 95% CI = -26.4–1.7; $p < 0.05$). These results were consistent after adjusting for inflation; expenditures increased during 2009–2013 (APC = 59.8; 95% CI = -27.1–250.4; $p < 0.05$), but declined during 2013–2018 (APC = -32.4; 95% CI = -61.2–17.7; $p < 0.05$). The overall rate of change (AAPC) during 2009–2018 was -0.9 (95% CI = -30.5–41.3; Figure 2).

In 2018, many traditional cigarettes advertising channels experienced less funding when compared to the same categories one decade ago. For instance, expenditures in magazines decreased from \$36.6 million in 2009 to \$8.5 million in 2018, whereas point-of-sale expenditures declined from \$112.1 million in 2009 to \$62.2 million in 2018. Similarly, direct mail decreased from \$68.8

million in 2009 to \$36.1 million in 2018. While the overall tobacco industry expenditure trends did not experience a significant decline, most industry advertising resources were reallocated to other categories, including price discounts paid to cigarette retailers or wholesalers, with a combined total of \$7.7 billion. This accounted for 92% of all 2018 expenditures (Figure 3).

Comparative analyses of print expenditures for pro-tobacco vs. anti-tobacco marketing by the industry in 2018

According to the FTC reports, the tobacco industry spent over \$8.5 million in 2018 to market cigarettes in print advertisements. In 2018, it was estimated that the court-ordered dissemination of the corrective statements in print cost the tobacco industry around \$5,528,000. This total amount included the price of implementing the CSs 265 times across big national publications, local, and community papers. The cost for implementing the five CSs advertisements in a single newspaper varied depending on the publication's location, circulation size, as well as frequency (mean = \$104,299.7; SD = \$187,405.8).

Altria, an American corporation and one of the world's largest producers and marketers of tobacco, estimated that implementing the corrective communications remedy, which includes newspaper print and online advertisements and TV primetime ads, will cost \$31 million.¹⁰⁵

DISCUSSION

This study analyzed the marketing expenditure trends of the tobacco industry during the 2009 – 2018 period. In the past decade, even with the expansion of tobacco marketing regulatory authority under the FDA, overall tobacco marketing expenditure did not experience any significant changes. This is consistent with the tobacco industry's tendency to challenge public health policies by reallocating resources to less regulated channels.

Tobacco companies have constantly argued that the billions of dollars spent on cigarette marketing were meant to attract and retain established adult smokers to their brand of cigarettes.⁹⁹ Beyond these claims, an ever-increasing body of evidence continues to link exposure to advertising and recruitment of new tobacco users, particularly adolescents.^{3,106} In 2000, tobacco companies spent \$217 million to advertise in 38 magazines which were popular among youth, violating the 1998 Master Settlement Agreement.¹⁰⁶ This evidence led Judge Gladys Kessler of the U.S. District Court to release her final opinion in the landmark U.S. government case against tobacco companies, which resulted in tobacco companies being ordered to make and disseminate corrective statements (CSs) remedies through popular mass media channels, such as TV and print in 2006.¹¹ Tobacco companies have since developed a comprehensive public relations and strategic legal plan in an attempt to oppose, delay, and weaken the impact of these corrective statements. It was not until late 2017 that they enacted the mass media dissemination, delaying this process by 11 years.¹⁰⁷ Based on the tobacco industry's history of targeted consumer and audience research, the delay in message communication may be an industry tactic to dilute the impact of anti-smoking messages. Especially over the past decade, consumer attention shifted from traditional media to

digital media. Media market research revealed that by 2017, consumers were less attracted to traditional media, such as broadcast TV, magazines, and newspapers, compared to the viewership and readership levels observed in mid-2000s, when the CSs were set to appear.^{108,109,11} Business investment in marketing and promotion usually follows consumer attention. Print media advertising had severely declined over the past decade, after an all-time high in 2007.¹⁰⁹ Similarly, we identified a significant downward trend in cigarettes print advertisement expenditure after 2014.

In 2018, many traditional cigarette advertising channels experienced less funding, compared to expenditures a decade ago. Fortunately, many channels that experienced declines were previously less regulated outlets, which potentially exposed susceptible children and adolescents to tobacco marketing.⁹⁶ For instance, point-of-sale advertisement expenditures in 2018 declined to half of what it was a decade ago, with similar downward trends being observed in direct-mail advertisements. While tobacco companies reported that \$0 were spent on social media cigarette advertising, this only applies to direct advertising and may not include expenditure on indirect cigarette advertising. The role of the tobacco industry is still under investigation when it comes to the high prevalence of tobacco use in content of online streaming platforms such as Netflix and Amazon prime.¹¹⁰ Therefore, we explored the advertising category, “other”, which includes expenditures denoted “N/A” in the FTC reports, and no significant changes in expenditure trends were observed over the 2009–2018 period (Figure 4). Additionally, in 2018, approximately 92% of total tobacco marketing expenditure was channeled to cigarette retailers and wholesalers discounts, including point-of-sale advertisements, price discounts, promotional allowances, consumer engagement, coupons, and special deals such as buy-one-get-one-free offers.¹¹⁰ Price

discounts is a loosely regulated advertisement channel, and therefore, continues to be a high-risk category which could expose or target vulnerable underage populations.

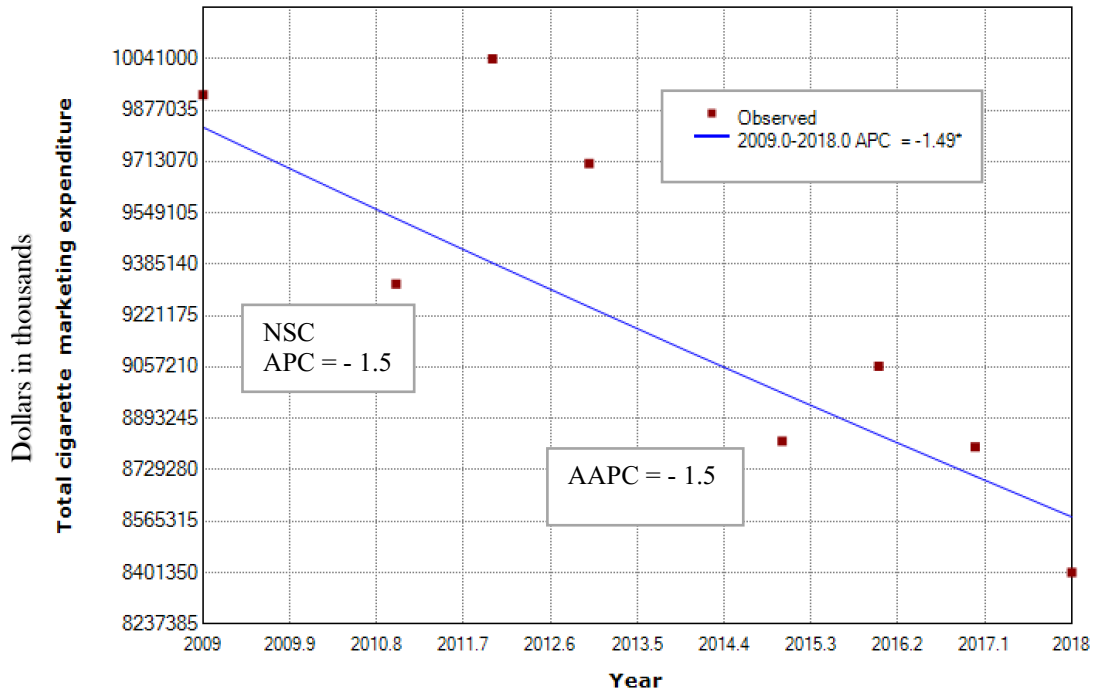
The FTC reported that tobacco companies spent over \$8.4 billion to market cigarettes in 2018, but anti-smoking advertisements are expected to cost just a fraction of that, estimated at \$31 million by Altria in their annual filing.¹⁰⁵ In this report, we further expanded on the estimated cost of implementing the print portion of the corrective statements remedies. The industry spent \$5.5 million to publish the corrective statements in 53 national and regional newspapers. The amount spent on CSs was about 0.06% of what was spent by the tobacco industry in 2018 to promote cigarettes. In addition, previous research concluded that the penetration and recall rates of these corrective statements was suboptimal in U.S. adults.^{40,112}

Finally, effective anti-tobacco communications are undermined by the fact that the tobacco industry outspends the public health industry in advertising. The debate on which deliberate deceptive practices need correcting remains ongoing, and industry marketing strategies are arguably among the industry's deceptive acts that must be addressed. Our study further supports the belief that the corrective statements were not as impactful as originally intended. This was largely due to delaying the implementation until some of the mandated dissemination channels were obsolete for consumers.

CONCLUSIONS

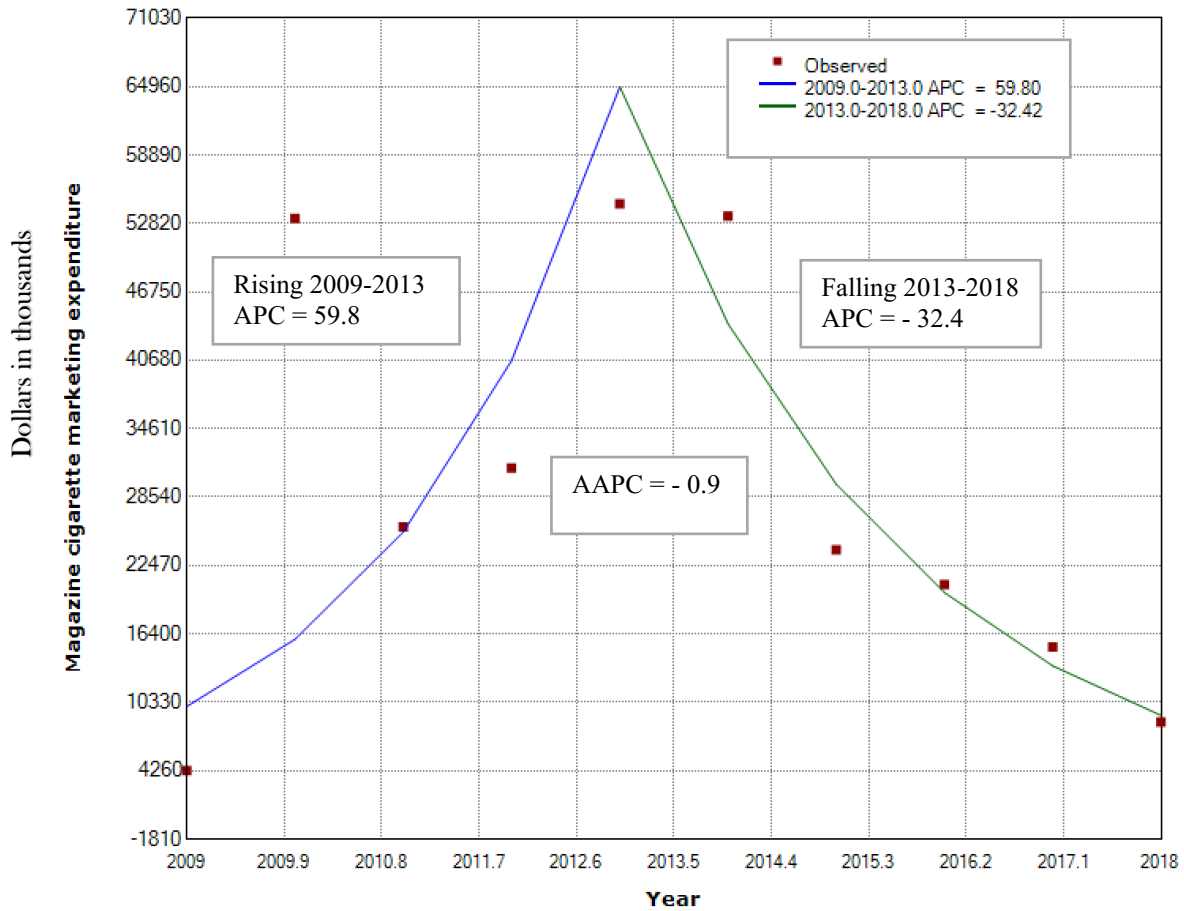
Significant marketing regulatory policy opportunities remain for tobacco despite the legal and financial obstacles. Many traditional cigarette advertising categories lost funding in the past decade, however, total marketing expenditure remained constant. Tobacco companies responded to marketing regulations by reallocating funding to other less regulated channels. In 2018, most expenditure was spent on price discounts which could expose susceptible youth to tobacco marketing. Future studies can examine the extent to which consumers, particularly youth, notice or engage with price promotions. Finally, the corrective statements cost the tobacco companies a fraction of what they spent to promote their products. The impact of these CSs on consumers was weakened by delayed implementation, and by a shift in consumer attention from traditional media to digital media.

Figure 1: Total domestic advertising and promotional expenditures by U.S. tobacco companies adjusted to 2018 dollars. 2009-2018



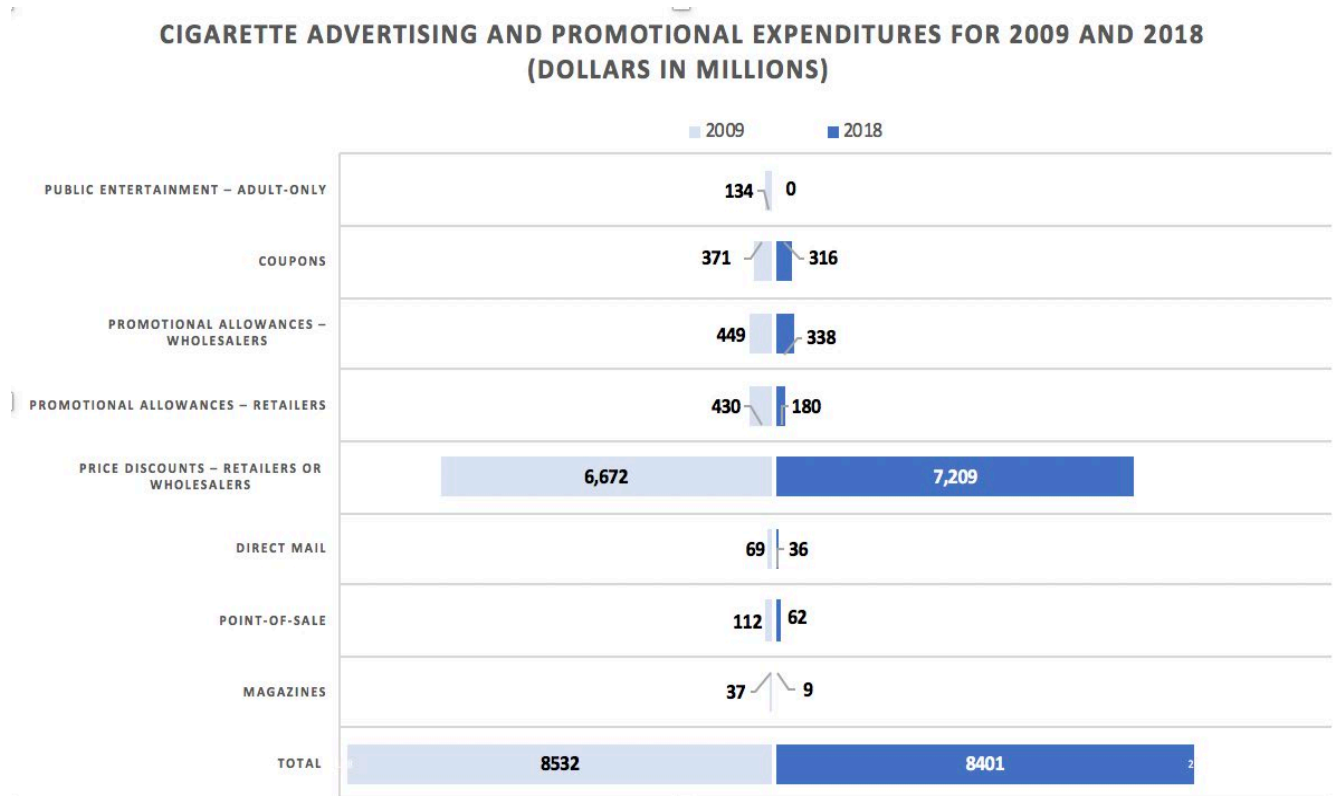
- Source: Federal Trade Commission Cigarette Report for 2008-2018.
- Estimates are adjusted to 2018 dollars using the Gross Domestic Product: Consumer Price Index (CPI) Inflation Calculator https://www.bls.gov/data/inflation_calculator.htm
- Regression lines are calculated using the Joinpoint Trend Analysis Software, Version 4.7 January 2020, National Cancer Institute.
- The Annual Percent Change (APC)
- The Average Annual Percent Change (AAPC)
- NSC: Non-Significant Change.

Figure 2 Magazine domestic cigarette advertising and promotional expenditures by U.S. tobacco companies adjusted to 2018 dollars. 2009-2018



- Source: Federal Trade Commission Cigarette Report for 2008-2018.
- Estimates are adjusted to 2018 dollars using the Gross Domestic Product: Consumer Price Index (CPI) Inflation Calculator https://www.bls.gov/data/inflation_calculator.htm
- Regression lines are calculated using the Joinpoint Trend Analysis Software, Version 4.7 January 2020, National Cancer Institute.
- The Annual Percent Change (APC) / The Average Annual Percent Change (AAPC) = SC Significant Change.

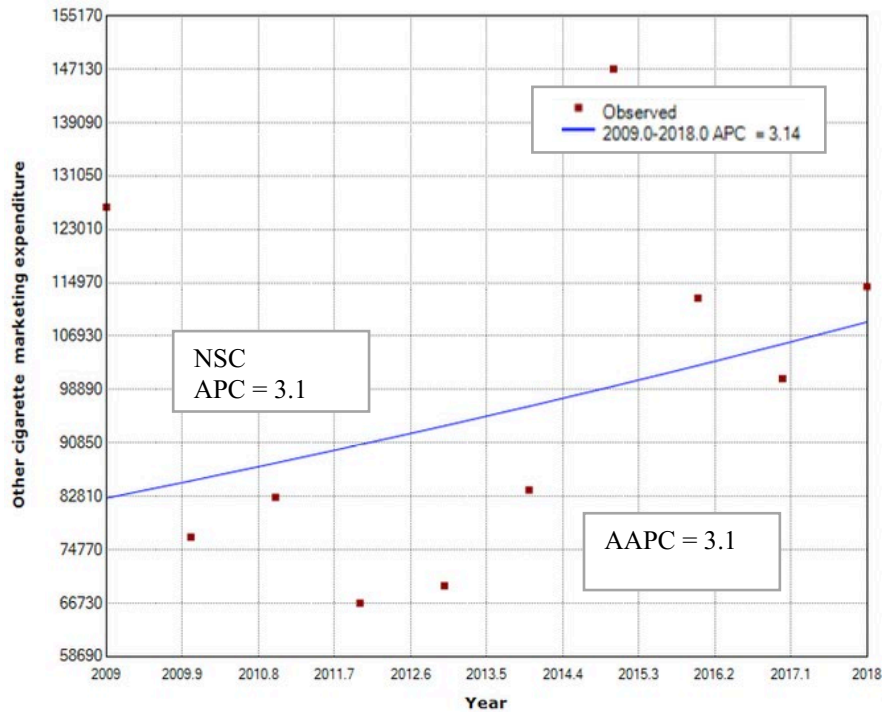
Figure 3: Comparing major cigarettes advertising and promotional categories expenditures by U.S. tobacco companies in years 2009 to 2018. **



*Prior to 2014, price discounts were not broken down by whether they were paid to retailers or wholesalers so they were combined for each year into one category.

** All counts adjusted to 2018 dollars.

Figure 4 Domestic cigarette advertising and promotional expenditures by U.S. tobacco companies adjusted to 2018 dollars. 2009-2018 for (Other category)



- Source: Federal Trade Commission Cigarette Report for 2008-2018.
- Estimates are adjusted to 2018 dollars using the Gross Domestic Product: Consumer Price Index (CPI) Inflation Calculator https://www.bls.gov/data/inflation_calculator.htm
- Regression lines are calculated using the Joinpoint Trend Analysis Software, Version 4.7 January 2020, National Cancer Institute.
- The Annual Percent Change (APC)
- The Average Annual Percent Change (AAPC)
- NSC: Non-Significant Change.

**TABLE 1: Total and magazine cigarette advertising and promotional expenditures, by year —
United States, 2009–2018**

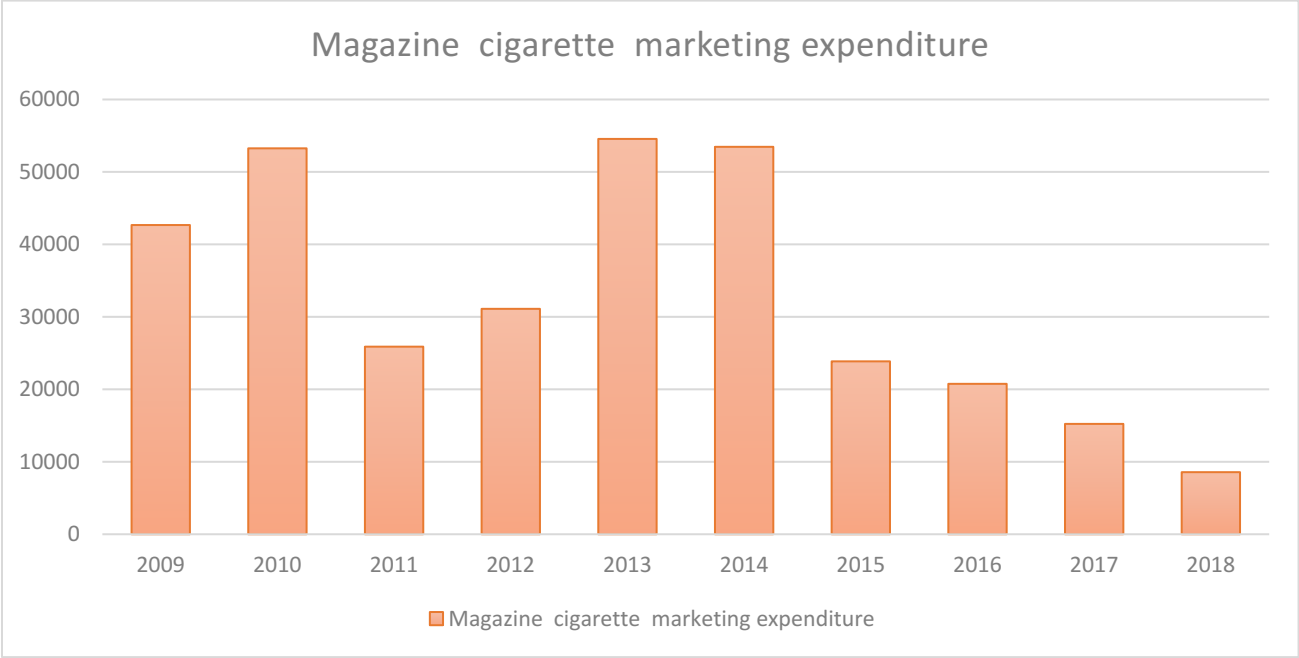
Year	Total expenditure on cigarettes advertising/promotion, all categories† (Thousands \$)		Total expenditure on cigarettes advertising/promotion, Print media (magazine)† (Thousands \$)		Proportion of total advertising/promotion expenditures spent on print (magazines)
	Unadjusted	Adjusted ¶	Unadjusted	Adjusted ¶	(%)
2009	\$8,532,375	\$9,926,483.42	\$36,680	\$42,673.16	0.43%
2010	\$8,052,790	\$9,230,476.41	\$46,463	\$53,258.02	0.58%
2011	\$8,373,260	\$9,321,666.97	\$23,254	\$25,887.89	0.28%
2012	\$9,176,411	\$10,040,972.23	\$27,943	\$31,108.00	0.30%
2013	\$9,004,229	\$9,706,797.56	\$50,609	\$54,557.84	0.56%
2014	\$8,071,975	\$8,636,468.73	\$49,972	\$53,466.67	0.62%
2015	\$8,303,569	\$8,819,915.66	\$22,463	\$23,859.83	0.27%
2016	\$8,706,234	\$9,059,666.02	\$19,948	\$20,757.79	0.23%
2017	\$8,636,833	\$8,801,810.23	\$14,944	\$15,229.45	0.17%
2018	\$8,401,354	\$8,401,354	\$8,567	\$8,567	0.10%

† Includes aggregate expenditures across the different cigarette advertising and promotional categories: newspapers; magazines; outdoor; transit; point-of-sale; price discounts; promotional allowances (retailers, wholesalers, and other); sampling distribution; specialty item distribution (branded and nonbranded); public entertainment (adult-only and general-audience); sponsorships; endorsements and testimonials; direct mail; coupons; retail-value-added—nontobacco bonus; company website; internet-other; telephone; social media marketing; and other.

§ Tobacco advertising in magazines was defined by the Federal Trade Commission (FTC) Magazine advertising; but excluding expenditures in connection with sampling, specialty item distribution, public entertainment, endorsements, sponsorships, coupons, and retail-value-added.

¶ Dollar values were adjusted by the consumer price index (all items) to constant 2018 \$US

Figure 5 trends in magazine cigarettes advertisement expenditure over a 10-years period (2009-2018) in the United States.



* Dollars are in Thousands

Thank you for Reading 😊

Appendix 1

Court-Ordered Corrective Statements Remedy: Implementation Details *United States v. Philip Morris USA Inc.*

In 2006, U.S. District Judge Gladys Kessler found the major tobacco companies guilty of violating civil racketeering laws (RICO) and engaging in a decades-long conspiracy to deceive the American public about the health effects of smoking and their marketing to children. Among her remedies, Judge Kessler ordered the tobacco companies to publish [corrective statements](#) about the adverse health effects of smoking and secondhand smoke and other topics. The companies must disseminate the corrective statements through television and newspaper advertising, their websites and cigarette packaging.

After 11 years of appeals by the tobacco companies to weaken and delay the corrective statements, a federal judge issued a final [order](#) directing them to begin running the corrective statement ads in newspapers on Sunday, November 26, 2017, with the television ads beginning the following day. Implementation details are still being finalized for the company websites and cigarette packs.

Television: The Defendant tobacco companies will purchase television ads with text and voice-over containing one of the five corrective statements.

- The ads will run five times per week for one year (52 weeks) for a total of 260 spots.
- The ads can run Monday through Thursday between 7:00 p.m. and 10:00 p.m. on one of the three major networks (CBS, ABC or NBC). Each month, up to one-third of the ads may be placed during programs on other networks or channels, provided that program has an overall audience at least as large as a program on one of the three major networks during the assigned time slots.
- To accommodate the length of the statements, four of the ads will be 45-second spots and one will be a 30-second spot.
- The spots will begin to air the week of November 26, 2017.

Newspapers: The Defendant tobacco companies will purchase five full-page ads in the first section of the Sunday edition of the 50+ newspapers specified by the Court. Each newspaper ad will contain one of the five corrective statements. The specific schedule is as follows:

- **Sun. November 26, 2017** – Adverse Health Effects of Smoking
- **Sun. December 10, 2017** – Addictiveness of Smoking and Nicotine
- **Sun. January 7, 2018** – Lack of Significant Health Benefit from Smoking “Low Tar,” “Light,” “Ultra Light,” “Mild,” and “Natural” Cigarettes
- **Sun. February 4, 2018** – Manipulation of Cigarette Design and Composition to Ensure Optimum Nicotine Delivery
- **Sun. March 4, 2018** – Adverse Health Effects of Exposure to Secondhand Smoke

For any newspaper that does not publish on a required Sunday, the corrective statement will appear in the first section of the Friday edition immediately preceding that Sunday. In Spanish language papers, the statements will appear in Spanish. The Defendants will also run the corrective statement as an advertisement on the website of each newspaper at approximately the same time as the print versions.

Newspapers for Corrective Statements Ads

National and regional papers

Atlanta Journal-Constitution
Boston Globe
Charlotte Observer
Chicago Sun-Times
Chicago Tribune
Dallas Morning News
Houston Chronicle
Los Angeles Times
Miami Herald
Daily News (N.Y.)
The New York Times
Philadelphia Inquirer
Richmond Times-Dispatch
San Francisco Chronicle
Tampa Bay Times
USA Today
Wall Street Journal
Washington Post
Star-Ledger (N.J.)
Detroit Free Press
Commercial Appeal (Memphis)
Baltimore Sun
Times-Picayune (New Orleans)
Clarion-Ledger (Jackson, MS)
Birmingham News
News Journal (Wilmington, DE)
Post & Courier (Charleston, SC)

Newspapers published by Eastern Group Publications (Hispanic-owned bilingual)—Los Angeles

Eastside Sun
Northeast Sun
Mexican American Sun
Bell Gardens Sun
Commerce Comet
Montebello Comet
Vernon Sun

Hispanic media

San Francisco La Oferta Review
Chicago Lawndale News
La Voz de Houston

African-American/community papers

Cincinnati Herald
The Northern Kentucky Herald

The Dayton Defender
Black Chronicle (OK)
Skanner (Portland, OR and Seattle)
Milwaukee Courier
Arizona Informant
Little Rock Sun Community Newspaper
Denver Weekly News
Inner City News (CT)
Gary Crusader (IN)
Louisville Defender
Insight News (MN)
St. Louis American
Omaha Star
Call & Post (OH)

REFERENCES

- 1) Hall, Wayne. "Cigarette Century: the Rise, Fall and Deadly Persistence of the Product that Defined America." *Tobacco Control* vol. 16,5 (2007): 360. doi:10.1136/tc.2007.021311
- 2) Cole HM, Fiore MC. The war against tobacco: 50 years and counting. *JAMA*. 2014;311(2):1312
- 3) National Cancer Institute (U.S.). The role of the media in promoting and reducing tobacco use. Bethesda, Md.: National Cancer Institute, U.S. Dept. of Health and Human Services, National Institutes of Health; 2008. Available from: <http://purl.access.gpo.gov/GPO/LPS113790>.
- 4) The Health Consequences of Smoking-50 Years of Progress: A Report of the Surgeon General. Reports of the Surgeon General. Atlanta (GA)2014.
- 5) Smoking is down, but almost 38 million American adults still smoke [press release]. 2018.
- 6) Cohn J. Winning the War on Tobacco-and Public Cynicism, Too. *Milbank Q*. 2016;94(4): 704-7.
- 7) Allan M. B. *The Cigarette Century: the Rise, Fall and Deadly Persistence of the Product that Defined America*, Basic Books: New York, 2007; pp 600, ISBN 13 978-0-465-07047-3
- 8) Centers for Disease C. 1986 Surgeon General's report: the health consequences of involuntary smoking. *MMWR Morb Mortal Wkly Rep*. 1986;35(50):769-70.
- 9) U.S. Department of Health and Human Services, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. The health consequences of smoking: Nicotine addiction. 1988.
- 10) Trends in current cigarette smoking among high school students and adults, United States, 1965-2014. US Centers for Disease Control and Prevention [press release]. March 30, 2016.

- 11) U.S. v. Philip Morris: 1,683 Page Final Opinion; 449 F.Supp.2d 1; Public Health Law Center. (D.D.C. 2006) <https://www.publichealthlawcenter.org/sites/default/files/resources/doj-final-opinion.pdf>
- 12) Schoenberg T. Altria to appeal court order on cigarette ads, packing. Bloomberg. 2013. <https://www.bloomberg.com/news/articles/2013-01-25/altria-to-appeal-court-order-on-cigarette-ads-packaging>
- 13) Ibrahim J. The Tobacco Tug-of-War: Advertising and Counter-advertising Tobacco Products to Youth. *Pediatric Allergy, Immunology, and Pulmonology*. 2010;23:105-11.
- 14) Proctor R. *Golden holocaust: the origins of the cigarette catastrophe and the case for abolition*. Berkeley: University of California Press; 2010.
- 15) Brennan E, Gibson LA, Kybert-Momjian A, Liu J, Hornik RC. Promising Themes for Antismoking Campaigns Targeting Youth and Young Adults. *Tob Regul Sci*. 2017;3(1):29-46.
- 16) Schiavo R. *Health Communication: From Theory to Practice*. 2nd ed. San Francisco, CA: Jossey-Bass; 2014.
- 17) B.G. Southwell & Marco C. Yzer (2007) The Roles of Interpersonal Communication in Mass Media Campaigns, *Annals of the International Communication Association*, 31:1, 420-462, DOI: 10.1080/23808985.2007.11679072
- 18) Hornik, R. C. (Ed.). (2002). *Public health communication: Evidence for behavior change*. Lawrence Erlbaum Associates Publishers.

- 19) Centers for Disease Control and Prevention. Best Practices for Comprehensive Tobacco Control Programs—2014. Atlanta, GA: US Dept of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
- 20) *Best Practices User Guide: Health Communications in Tobacco Prevention and Control*. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2018.
- 21) Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *Lancet*. 2010;376(9748):1261-71.
- 22) Durkin S, Brennan E, Wakefield M. Mass media campaigns to promote smoking cessation among adults: an integrative review. *Tob Control*. 2012;21(2):127-38.
- 23) US Department of Health and Human Services. *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Atlanta, GA: US Dept of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2012.
- 24) Force CPST. Reducing Tobacco Use and Secondhand Smoke Exposure: Mass Reach Health Communication Interventions. CDC; 2013
- 25) Emery S, Kim Y, Choi Y, Szczyпка G, Wakefield M, Chaloupka F. The effects of smoking-related television advertising on smoking and intentions to quit among adults in the United States: 1999–2007. *American Journal of Public Health*. 2012;102(4):751-757.

- 26) Wakefield M, Bowe S, Durkin S, et al. Does tobacco-control mass media campaign exposure prevent relapse among recent quitters? *Nicotine & Tobacco Research*. 2013;15(2):385-392.
- 27) Social Norms and the Acceptability of Tobacco Use, Institute of Medicine (US) Committee on Preventing Nicotine Addiction in Children and Youths; Lynch BS, Bonnie RJ, editors. Washington (DC): National Academies Press (US); 1994.
- 28) Garrett BE, Dube SR, Babb S, McAfee T. Addressing the Social Determinants of Health to Reduce Tobacco-Related Disparities. *Nicotine Tob Res*. 2015;17(8):892-7.
- 29) Grosse SD. Assessing cost-effectiveness in healthcare: history of the \$50,000 per QALY threshold. *Expert Rev Pharmacoecon Outcomes Res*. 2008;8(2):165–78.
- 30) Lewis MJ, Ling PM. "Gone are the days of mass-media marketing plans and short term customer relationships": tobacco industry direct mail and database marketing strategies. *Tob Control*. 2016;25(4):430–436. doi:10.1136/tobaccocontrol-2015-052314
- 31) Kollath-Cattano CL, Abad-Vivero EN, Thrasher JF, Bansal-Travers M, O'Connor RJ, Krugman DM, et al. Adult smokers' responses to "corrective statements" regarding tobacco industry deception. *Am J Prev Med*. 2014;47(1):26-36.
- 32) Verkoeijen PPJL, Rikers RMJP, Schmidt HG. Detrimental Influence of Contextual Change on Spacing Effects in Free Recall. *Journal of Experimental Psychology Learning, Memory & Cognition* [Internet]. 2004 Jul [cited 2020 Mar 22];30(4):796–800. Available from: <http://search.ebscohost.com.ezp-prod1.hul.harvard.edu/login.aspx?direct=true&db=bsu&AN=13757924&site=ehost-live&scope=site>

- 33) Lewandowsky S, Ecker UK, Seifert CM, Schwarz N, Cook J. Misinformation and Its Correction: Continued Influence and Successful Debiasing. *Psychol Sci Public Interest*. 2012;13(3):106-31.
- 34) Schwarz N, Sanna LJ, Skurnik I, Yoon C. Metacognitive experiences and the intricacies of setting people straight: implications for debiasing and public information campaigns.
- 35) Tversky A, Kahneman D. Availability: a heuristic for judging frequency and probability. *Cognitive Psychol*. 1973;5:207–232. doi: 10.1016/0010-0285(73)90033-9.
- 36) Poland GA, Jacobson RM. The age-old struggle against the anti-vaccinationists. *N Engl J Med*. 2011;364(2):97-9.
- 37) Pierce JP, Distefan JM, Kaplan RM, Gilpin EA. The role of curiosity in smoking initiation. *Addict Behav*. 2005;30(4):685-96.
- 38) Nodora J, Hartman SJ, Strong DR, Messer K, Vera LE, White MM, et al. Curiosity predicts smoking experimentation independent of susceptibility in a US national sample. *Addict Behav*. 2014;39(12):1695-700.
- 39) U.S. Federal Trade Commission (FTC), Cigarette Report for 2018, available in 2019 <https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-cigarette-report-2018-smokeless-tobacco-report-2018/p114508cigarettereport2018.pdf>
- 40) Chido-Amajuoyi OG, Yu RK, Agaku I, Shete S. Exposure to Court-Ordered Tobacco Industry Antismoking Advertisements Among US Adults. *JAMA Netw Open*. 2019;2(7):e196935.
- 41) Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot*. 1997;12(1):38-48.

- 42) Bolton, L. E., Cohen, J. B., & Bloom, P. N. (2004). *The marketing of “get out of jail free cards”*: How remedies encourage risky consumption. Department of Marketing, University of Pennsylvania. Accessed 17 February 2004.
- 43) Song AV, Morrell HER, Cornell JL, Ramos ME, Biehl M, Kropp RY, et al. Perceptions of smoking-related risks and benefits as predictors of adolescent smoking initiation. *Am J Public Health*. 2009;99(3):487-92.
- 44) Weinstein N. Unrealistic optimism about future life events. *J Pers Soc Psychol* 1980;39(5):806–820
- 45) Weinstein N, Lachendro E. Egocentrism as a source of unrealistic optimism. *Pers Soc Psychol Bull* 1982;8(2):195–200
- 46) Richardson A, Ganz O, Stalgaitis C, Abrams D, Vallone D. Noncombustible tobacco product advertising: how companies are selling the new face of tobacco. *Nicotine Tob Res*. 2014;16(5):606-14.
- 47) Timberlake DS, Pechmann C, Tran SY, Au V. A content analysis of Camel Snus advertisements in print media. *Nicotine Tob Res*. 2011;13(6):431-9.
- 48) Morrison FP, Kukafka R, Johnson SB. Analyzing the structure and content of public health messages. *AMIA Annu Symp Proc*. 2005:540-4.
- 49) Federal Trade Commission Cigarette Report for 2016 Washington: Federal Trade Commission, 2018
- 50) Tobacco Companies Ordered to Place Statements about Products’ Dangers on Websites and Cigarette Packs [press release]. 2018.

- 51) The American Association for Public Opinion Research. 2016. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 9th edition. AAPOR.
- 52) (U.S.) NCI. Health Information National Trends Survey 5 (HINTS 5) Cycle 2 methodology report. <https://hints.cancer.gov/2018>.
- 53) Cantrell J., Vallone D.M., Thrasher J.F., Nagler R.H., Feirman S.P., Muenz L.R., He D.Y., Viswanath K. Impact of tobacco-related health warning labels across socioeconomic, race and ethnic groups: Results from a randomized web-based experiment. PLoS ONE. 2013;8:e52206. doi: 10.1371/journal.pone.0052206
- 54) Court-Ordered Corrective Statements Remedy: Implementation Details United States v. Philip Morris USA Inc., (2017).
- 55) Media and the Moral Mind: Routledge; First Edition, 2013, ISBN 9781138925571.
- 56) DiFranza JR, Rigotti NA, McNeill AD, Ockene JK, Savageau JA, St Cyr D, et al. Initial symptoms of nicotine dependence in adolescents. Tob Control. 2000;9(3):313-9.
- 57) Biener L, Albers AB. Young adults: vulnerable new targets of tobacco marketing. Am J Public Health. 2004;94(2):326-30.
- 58) Philip Morris discussion draft of sociopolitical strategy. Truth Tobacco Industry documents. University of California San Francisco Library and Center for Knowledge Management. 2002 Feb. <https://www.industrydocuments.ucsf.edu/tobacco/docs/#id=zsw0127>
- 59) Segmentation questionnaire RJR. 1990. Truth Tobacco Industry documents. University of California San Francisco Library and Center for Knowledge Management. 2002 Feb. <https://www.industrydocuments.ucsf.edu/tobacco/docs/#id=xjmg0100>

- 60) Brown JD, Bauman KE, Padgett CA. A validity problem in measuring exposure to mass media campaigns. *Health Educ Q.* 1990;17(3):299-306.
- 61) Lawrence SM, Jerry GL. Influence of a nationwide social marketing campaign on adolescent drug use. *Journal of Health Communication: International Perspectives* 2010;15(3):240-71.
- 62) Pechman C, Reibling ET. Planning an effective anti-smoking mass media campaign targeting adolescents. *Journal of Public Health Management Practice* 2000;6(3):80-94.
- 63) Zucker D, Hopkins RS, Sly DF, Urich J, Kershaw JM, Solari S. Florida's "truth" campaign: a countermarketing anti-tobacco media campaign. *Journal of Public Health Management* 2000;6(3):1-6.
- 64) Pechmann C, Zhao G, Goldberg ME, Reibling ET. What to convey in antismoking advertisements for adolescents: The use of protection motivation theory to identify effective message themes. *Journal of Marketing* 2003;67(2):1-18.
- 65) Witte K, Allen M. A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education Behavior* 2000;27(5):591-615.
- 66) Fishbein M. A consideration of beliefs and their role in attitude measurement. In: Fishbein M, ed. *Readings in attitude theory and measurement*. New York, NY: Wiley; 1967:257-266.
- 67) Ajzen I. The Theory of Planned Behavior. *Organ Behav Hum Decis Process.* 1991;50(2):179-211
- 68) Duke J.C., Alexander T.N., Zhao X., Delahanty J.C., Allen J.A., MacMonegle A.J., Farrelly M.C. Youth's awareness of and reactions to the real cost national tobacco public education campaign. *PLoS ONE.* 2015;10:e0144827. doi: 10.1371/journal.pone.0144827

- 69) Brennan E, Gibson L, Momjian A, Hornik RC. Identifying Potential Target Beliefs for a Youth-Focused Smoking Prevention Mass Media Campaign: Final Findings and Recommendations for 13-17 Year Old Non-smokers. CECCR Working Paper Series. Philadelphia: Penn's Center of Excellence in Cancer Communication Research, Annenberg School for Communication, University of Pennsylvania; 2013.
- 70) Brubach AL. The Case and Context for "The Real Cost" Campaign. *Am J Prev Med.* 2019;56(2 Suppl 1):S5-s8.
- 71) Emery SL, Szczypka G, Abril EP, Kim Y, Vera L. Are you Scared Yet?: Evaluating Fear Appeal Messages in Tweets about the Tips Campaign. *J Commun.* 2014;64:278-95.
- 72) Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Merritt RK. Validation of susceptibility as a predictor of which adolescents take up smoking in the United States. *Health Psychol.* 1996;15(5):355-61.
- 73) Cole SR, Hernán MA. Constructing inverse probability weights for marginal structural models. *Am J Epidemiol.* 2008;168(6):656–664. doi:10.1093/aje/kwn164
- 74) Huang L-L, Lazard AJ, Pepper JK, Noar SM, Ranney LM, Goldstein AO. Impact of The Real Cost Campaign on Adolescents' Recall, Attitudes, and Risk Perceptions about Tobacco Use: A National Study. *Int J Environ Res Public Health.* 2017;14(1):42.
- 75) Weinstein ND, Nicolich M. Correct and incorrect interpretations of correlations between risk perceptions and risk behaviors. *Health Psychol.* 1993;12(3):235–245. doi:10.1037//0278-6133.12.3.235
- 76) Ferrer R, Klein WM. Risk perceptions and health behavior. *Curr Opin Psychol.* 2015;5:85–89. doi:10.1016/j.copsyc.2015.03.012

- 77) Sheeran P, Harris PR, Epton T. Does heightening risk appraisals change people's intentions and behavior? A meta-analysis of experimental studies. *Psychol Bull.* 2014;140(2):511–543. doi:10.1037/a0033065
- 78) U.S. Department of Health and Human Services. Tobacco Use Among U.S. Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 1998.
- 79) Chapman S, Wong WL, Smith W. Self-exempting beliefs about smoking and health: differences between smokers and ex-smokers. *Am J Public Health.* 1993;83(2):215–219. doi:10.2105/ajph.83.2.215
- 80) G. Loewenstein - The psychology of curiosity: a review and reinterpretation *Psychol Bull*, 116 (1) (1994), pp. 75-98
- 81) Brehm J W. A theory of psychological reactance. New York: Academic Press, 1966
- 82) Brehm S S, Brehm J W. Psychological reactance: a theory of freedom and control. New York: Academic Press, 198
- 83) Bala M, Strzeszynski L, Cahill K. Mass media interventions for smoking cessation in adults. *Cochrane Database Syst Rev.* 2008;1:CD004704
- 84) Wilson LM, Avila Tang E, Chander G, et al. Impact of tobacco control interventions on smoking initiation, cessation, and prevalence: a systematic review. *J Environ Public Health.* 2012;2012:961724

- 85) Li L, Borland R, Yong HH, et al. Predictors of smoking cessation among adult smokers in Malaysia and Thailand: findings from the International Tobacco Control Southeast Asia Survey. *Nicotine Tob Res.* 2010;12 Suppl(Suppl 1):S34–S44. doi:10.1093/ntr/ntq030
- 86) Nguyen N, Lisha NE, Neilands TB, Jordan JW, Ling PM. Differential Associations Between Anti-Tobacco Industry Attitudes and Intention to Quit Smoking Across Young Adult Peer Crowds. *Am J Health Promot.* 2019;33(6):876–885. doi:10.1177/0890117119829676
- 87) Richardson AK, Green M, Xiao H, Sokol N, Vallone D. Evidence for truth®: the young adult response to a youth-focused anti-smoking media campaign. *Am J Prev Med.* 2010;39(6):500–506. doi:10.1016/j.amepre.2010.08.007
- 88) Richardson AK, Green M, Xiao H, Sokol N, Vallone D. Evidence for truth®: the young adult response to a youth-focused anti-smoking media campaign. *Am J Prev Med.* 2010;39(6):500–506. doi:10.1016/j.amepre.2010.08.007
- 89) Ling PM, Neilands TB, Glantz SA. Young adult smoking behavior: a national survey. *Am J Prev Med.* 2009;36(5):389–394.e2. doi:10.1016/j.amepre.2009.01.028
- 90) Hammond D, Fong GT, Zanna MP, Thrasher JF, Borland R. Tobacco denormalization and industry beliefs among smokers from four countries. *Am J Prev Med.* 2006;31(3):225–232. doi:10.1016/j.amepre.2006.04.004
- 91) Dumas-Mallet E, Button KS, Boraud T, Gonon F, Munafò MR. Low statistical power in biomedical science: a review of three human research domains. *R Soc Open Sci.* 2017;4(2):160254. Published 2017 Feb 1. doi:10.1098/rsos.160254
- 92) Federal Trade Commission Cigarette Report for 2017. Washington, DC: Federal Trade Commission; 2018.

- 93) *Federal Trade Commission Cigarette Report for 2013*. Washington, DC: Federal Trade Commission; 2016.
- 94) Biener L, Albers AB. Young adults: vulnerable new targets of tobacco marketing. *Am J Public Health*. 2004;94(2):326-30.
- 95) Master Settlement Agreement (1998), <http://www.naag.org/assets/redesign/files/msa-tobacco/MSA.pdf>
- 96) Papaleontiou L, Agaku IT, Filippidis FT. Effects of Exposure to Tobacco and Electronic Cigarette Advertisements on Tobacco Use: An Analysis of the 2015 National Youth Tobacco Survey. *J Adolesc Health*. 2020;66(1):64–71. doi:10.1016/j.jadohealth.2019.05.022
- 97) Lewis MJ, Ling PM. "Gone are the days of mass-media marketing plans and short term customer relationships": tobacco industry direct mail and database marketing strategies. *Tob Control*. 2016;25(4):430–436. doi:10.1136/tobaccocontrol-2015-052314
- 98) Huang J, Kornfield R, Szczypka G, Emery SL. A cross-sectional examination of marketing of electronic cigarettes on Twitter. *Tob Control*. 2014;23 Suppl 3(Suppl 3):iii26–iii30. doi:10.1136/tobaccocontrol-2014-051551
- 99) Tye JB, Warner KE, Glantz SA. Tobacco advertising and consumption: evidence of a causal relationship. *J Public Health Policy*. 1987;8(4):492–508.
- 100) Cummings KM, Morley CP, Horan JK, Steger C, Leavell NR. Marketing to America's youth: evidence from corporate documents. *Tobacco Control*. 2002;11(Suppl 1):i5–i17.
- 101) Xu X, Bishop EE, Kennedy SM, Simpson SA, Pechacek TF. Annual healthcare spending attributable to cigarette smoking: an update. *Am J Prev Med*. 2015;48(3):326-33.
- 102) CPI Inflation Calculator <https://data.bls.gov/cgi-bin/cpicalc.pl>
- 103) NCI JoinPoint Software <https://surveillance.cancer.gov/joinpoint/>

- 104) Kuhn L, Davidson LL, Durkin MS. Use of Poisson regression and time series analysis for detecting changes over time in rates of child injury following a prevention program. *Am J Epidemiol* 1994;140:943–55
- 105) UNITED STATES SECURITIES AND EXCHANGE COMMISSION Washington, D.C. 20549 FORM 10-K X ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934 For the fiscal year ended December 31, 2016
<http://services.corporate-ir.net/SEC.Enhanced/SecCapsule.aspx?c=80855&fid=14852383>
- 106) King C, Siegel M. The Master Settlement Agreement with the Tobacco Industry and Cigarette Advertising in Magazines. *New England Journal of Medicine*. 2001;345(7):504-11.
- 107) **U.S. RACKETEERING VERDICT: BIG TOBACCO GUILTY AS CHARGED**
<https://www.tobaccofreekids.org/what-we-do/industry-watch/doj>
- 108) Digital vs Traditional Media – A Global Trend
<https://www.livewiremarkets.com/wires/digital-vs-traditional-media-a-global-trend>
- 109) Traditional vs. Digital Advertising: What's Best for Your Business
<https://thisisarray.com/traditional-vs-digital-advertising/>
- 110) While you were streaming :Tobacco use sees a renormalization in on-demand digital content, diluting progress in broadcast and theaters. [truthinitiative.org](https://truthinitiative.org/sites/default/files/media/files/2019/03/Smoking-in-Streaming-Final-Report.pdf)
<https://truthinitiative.org/sites/default/files/media/files/2019/03/Smoking-in-Streaming-Final-Report.pdf>
- 111) **TRENDS IN TOBACCO INDUSTRY MARKETING**
<https://www.tobaccofreekids.org/assets/factsheets/0156.pdf>
- 112) S.Aldukhail I.Agaku Recall of Tobacco Corrective-statements advertisements and Effects on Health Information-seeking Behavior among Adults - United States 2018