

The Indirect Influence of Tobacco Advertising on Smoking Susceptibility: A Case of Teenagers from Hispanic Communities

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Abstract

In the context of Hispanic teen smoking, this study examined the influence of pro-tobacco advertising and smoking warnings on teens from Hispanic communities. Analyzing data of two strata that had the highest percentage of urban (N = 1206) and non-urban (N = 385) Hispanic teenagers aged 13-17 from the 2012 National Youth Tobacco Survey, we found that pro-tobacco advertising indirectly influenced teens' smoking susceptibility through their perceived peer access to tobacco products, perceived peer smoking prevalence, attitudes toward smoking, and perceived danger of tobacco products. However, results showed no direct impact of smoking warnings on teens' smoking attitudes or on their perceptions of danger of tobacco products. Implications for policymakers and anti-smoking campaign designers were discussed.

Key Words: smoking susceptibility, pro-tobacco advertising, smoking warnings, teen, Hispanic communities

Introduction

Previous research provided mounting evidence of ethnic/racial disparities in the smoking rates (Kong, Camenga, Cavallo, Connell, Pflieger, & Krishnan-Sarin, 2012). Soneji, Ambrose, Lee, Sargent, and Tanski (2013) conducted a survey among 3,342 participants aged 15 - 23 through telephone interviews, and 2,541 respondents subsequently completed a web-based survey. Results revealed that racial/ethnic minority nonsmoking respondents were more likely to be exposed to direct-to-consumer tobacco marketing than nonsmoking whites, and that respondents exposed to direct-to-consumer tobacco marketing were more likely to smoke (Soneji et al., 2013). Since adolescence is a critical developmental stage during which teenagers initiate their tobacco use and progress to regular smoking, scholars are calling for culturally sensitive smoking interventions aimed at diverse, multi-ethnic youth (Al-Faouri, Weglicki, Rice, Kulwicki, Jamil, Baker, Al-Omran, & Dakroub, 2005; Kong et al., 2012).

According to Moreno (2014), there is an increasing number of teenagers in Florida smoking

hookah, a flavored tobacco product inhaled through an elaborate water pipe. Compared to non-Hispanic Whites (19%) and non-Hispanic Blacks (5%), Hispanic teens (22%) are more likely to try hookah and to continue using the flavored tobacco product (Moreno, 2014). In addition, according to the Centers for Disease Control and Prevention (CDC), hookah is not a safe alternative to cigarettes, and in fact, users of hookah may be exposing themselves to more toxins than individuals who light up an occasional cigarette (Moreno, 2014).

Soneji, Lewis, Tanski, and Sargent (2012) assessed how race/ethnicity modifies the relationship between exposure to movie smoking and smoking behavior among teenagers. Three thousand, six hundred and fifty-three teenagers aged 13-18 participated in a cross-sectional telephone survey, and results showed that the proportion having tried smoking was the highest for Hispanics (41%), compared to Blacks (32%) and Whites (38%) (Soneji et al., 2012). Moreover, while exposure to movie smoking was positively related to smoking behavior among Hispanics and Whites, movie smoking had no impact on Blacks (Soneji et al., 2012).

Since previous studies showed that Hispanic teenagers have become one of the highest at-risk groups, this study focuses on teenagers from urban and non-urban Hispanic communities. Our research aims are threefold: (1) to explore the relationship between exposure to pro-tobacco and (urban and non-urban) Hispanic teenagers' smoking susceptibility as well as the key mediators in this relationship; (2) to explore the relationship between exposure to anti-tobacco messages and (urban and non-urban) Hispanic teenagers' smoking susceptibility as well as the key mediators in this relationship; and (3) to provide practical implications for media campaign designers and policymakers targeting teenagers living in Hispanic communities.

Literature Review

In this section, we first reviewed literature on the Health Belief Model (HBM), from which we identified the key variables in this study. Then, we reviewed relevant literature on pro-tobacco advertising, perceived peer influence, and smoking warnings in order to develop a hypothesized model that includes all the identified key variables and explicates the role of pro-tobacco advertising and smoking warnings.

Health Belief Model and Media Mediated Smoking Belief Model

The Health Belief Model (HBM) was developed in the 1950s to explain people's responses to practical public health concerns and to explore ways of changing people's habitual unhealthy behaviors, such as smoking (Champion & Skinner, 2008). The HBM contains several primary concepts that predict whether people will take action to prevent or to control illness conditions; these concepts include *perceived susceptibility*, *perceived severity*, *perceived benefits*, *perceived barriers*, *cues to action*, and *self-efficacy* (Champion & Skinner, 2008). According to the HBM, perceived susceptibility refers to one's beliefs about the likelihood of getting a disease or condition. Perceived severity is defined as one's feelings about the seriousness of contracting an illness. The combination of perceived susceptibility and perceived severity is perceived threat. Perceived benefits refer to a person's beliefs regarding benefits from performing a behavior, such as reducing the disease threat, financial savings, or pleasing others. Perceived barriers are defined as one's beliefs regarding negative aspects of a particular action, such as impediments to undertaking recommended behaviors. Also noteworthy is the fact that perceived barriers are the most powerful single predictor across all studies and behaviors. Cues to action refer to cues that trigger actions, such as bodily events or media publicity. The last factor, self-efficacy is defined as one's

belief that one can successfully execute the behavior (Champion & Skinner, 2008).

Previous studies have applied the HBM in smoking and developed ways to measure each construct in the HBM. For instance, smokers' perceived threat appraisals have been conceptualized as the perceived severity of the negative consequence of smoking and perceived susceptibility to these consequences (Latimer, Batanova, & Loukas, 2013; McDonald, O'Brien, Farr, & Haaga, 2010). An example of perceived threat is smokers' perceptions of health danger of tobacco use (perceived danger) (Latimer et al., 2013; McDonald et al., 2010). Examples of perceived benefits of smoking include that smoking helps one lose weight, look cool, look attractive or look mature, and the perceptions of these benefits help form the positive attitudes toward smoking (Arens, White, & Massengill, 2014). In addition, perceived ease of access to tobacco products is a measurement of perceived barrier to smoking (Gendall, Hoek, Marsh, Edwards, & Healey, 2014). Previous studies noted that access to tobacco is a prerequisite for teen smoking to occur and perceptions of easy access to tobacco products increase teens' tendency to smoke (Doubeni, Li, Fouayzi, & DiFranza, 2008; Unger, Yan, Shakib, Rohrbach, Chen, Qian, Chou, Shan, Zan, Zheng, & Johnson, 2002). In terms of cues to action, both pro-tobacco advertising and anti-tobacco messages can influence teens' smoking susceptibility (Gunther, Bolt, Borzekowski, Liehart, & Dillard, 2006).

On the basis of the HBM, we developed a model termed the *media mediated smoking belief model* (MMSBM). Similar to the HBM, the MMSBM incorporates pro-tobacco advertising and smoking warnings (cues to action), perceived access to tobacco products (perceived barrier of smoking), positive attitudes toward smoking (perceived benefits of smoking), perceived danger of tobacco products (perceived threat of smoking), and smoking susceptibility (the behavior). Different from the HBM, the MMSBM adds *perceived peer smoking behavior* as another key variable and proposes that both pro-tobacco advertising and smoking warnings can indirectly influence teenagers' smoking susceptibility via other key factors. In the following sections, we reviewed relevant literature on the key constructs included in the MMSBM and explained in detail how the model was built up.

Pro-Tobacco Advertising

Tobacco advertising fulfills two goals: first, to create images and fantasies to link smoking to social status, desirability, or pleasure; second, to counter the negative health implications associated to smoking (Vaknin, 2007). Throughout history, tobacco ads epitomized the image of the carefree smoker by

portraying smoking as an escape from daily problems (Schooler, Basil, & Altman, 1996; Vaknin, 2007). A classic example is the establishment of the Marlboro cowboy image, which successfully linked the brand to masculinity (Vaknin, 2007). When tobacco companies developed new markets and tried to target female smokers, they exploited the growing independence and emancipation of women by changing the traditional view that respectable women should not smoke (Vaknin, 2007). In addition to women, tobacco companies targeted ethnic minorities such as Hispanics, as seen in a rise in the number of cigar billboards in Latino and brands such as L&M Supers for the Hispanic market in the U.S. (Vaknin, 2007).

Grant, Hassan, Hastings, MacKintosh, & Eadie (2008) noted that audience' interpretation of the symbolic branding images can significantly influence their attitude formation (Grant et al., 2008). Since media (i.e. advertising) often associate smoking with favorable attributes or situations, young people will perceive that smoking is normal and acceptable (Watson, Clarkson, Donovan, & Giles-Corti, 2002). Therefore, we may assume that teens can be influenced by the attractive smoker image portrayed in tobacco ads and develop positive attitudes toward smoking. Moreover, Meier (1991) argued that strong pro-smoking attitudes are predictive of smoking behaviors. In other words, once teenagers internalize the favorable smoker image portrayed in tobacco ads and develop positive attitudes toward smoking, they will be motivated to smoke.

Apart from creating favorable smoker images to influence audience's smoking attitudes, tobacco advertising also needs to shift the focus away from the negative health implications attached to smoking (Vaknin, 2007). Watson and colleagues (2002) noted that the positive images of smoking in media have the potential to downplay the serious health consequences of smoking by portraying smoking in a way that young people can regard it as a normal part of everyday life. Therefore, we may assume that once teenagers absorb the favorable smoker image portrayed in tobacco ads and develop positive attitudes toward smoking, they will be less likely to perceive that tobacco products are dangerous. On the basis of previous literature on pro-tobacco advertising effect, we developed the following three hypotheses:

H1: Exposure to pro-tobacco ads will be positively related to teens' positive attitudes toward smoking.

H2: Teens who have more positive attitudes toward smoking will be more susceptible to smoking.

H3: Teens who have more positive attitudes toward smoking will perceive lower level of danger of tobacco products.

Although pro-tobacco advertising on broadcast media has long been banned, tobacco companies have found alternative ways to market their products to young audience, such as on magazines, in convenience stores, in movies, and online (Lee, Taylor, & McGetrick, 2004; Vaknin, 2007). Feighery, Rinis, Schleicher, Lee, & Halvorson (2001) noted that nearly 23 percent of the stores monitored had cigarettes placed within six inches of candies, which makes it easy for teens to notice the cigarettes. Moreover, through experiments, previous studies found youths who were exposed to tobacco ads in convenience stores were more likely to perceive that it would be easy for them to buy tobacco products from convenience stores than those who did not see tobacco ads in convenience stores (Kim, Nonnemaker, Loomis, Baig, Hill, Holloway, Farrelly, & Shafer, 2012; Wakefield, Germain, Durkin, & Henriksen, 2006). Therefore, on the basis of the previous literature, we may assume that for teens, the higher level of exposure to pro-tobacco ads, the more they will perceive that it would be easy for them to purchase tobacco products in a store. Moreover, teens may project their own situations onto their peers and assume that it would also be easy for their peers to purchase tobacco products in a store (Chia, 2008). Therefore, we constructed the following hypothesis:

H4: Exposure to pro-tobacco ads will be positively related to teens' perceived peer access to tobacco products in a store.

Perceived Peer Influence

Unger and Rohrbach (2002) noted that perceived access to cigarettes is a factor that can predict teens' estimates of their peers' smoking prevalence. If teenagers perceive that cigarettes are readily available to purchase through retail or social sources, they may also infer that their peers will have little difficulty obtaining cigarettes (Unger & Rohrbach, 2002). Consequently, they may believe that their peers will be likely to obtain and to experiment with cigarettes (Unger & Rohrbach, 2002). Given that Hispanics are one of the groups that exhibit the highest rates of perceived peer smoking prevalence (Davis, Nonnemaker, Asfaw, & Vallone, 2010) we developed the following hypothesis regarding teenagers from Hispanic communities:

H5: Teens' perceived peer access to tobacco products in a store is positively related to their perceived peer smoking prevalence.

Peer groups exert a significant influence on one's beliefs, attitudes, and behaviors (Gunther et al., 2006). One reason peer influence is so important in the context of smoking initiation is that teenagers are sensitive to the conformity pressures stemming from real and perceived social norms (Gibbons, Healweg-Larsen, & Gerrad, 1995). In addition, research indicates that dominant peer influences come not only from one's close friends but also from the more general perception of other, such as those in schools or from the larger same-age community (Aloise-Young, Graham, & Hansen, 1994; Milkie, 1999). Many teenagers believe cigarette smoking to be a normative behavior and their beliefs about peers' pro-tobacco attitudes and behaviors, regardless of the accuracy of those beliefs, may influence their pro-tobacco attitudes (Gunther et al., 2006). Moreover, some other studies indicated that teenagers' estimates of their peers' smoking prevalence can influence their own smoking behaviors, and teenagers who overestimate peer smoking prevalence are more likely to smoke (Reid, Manske, & Leatherdale, 2008; Unger & Rohrbach (2002). Therefore, on the basis of previous literature on teens' tendency to conform to social norms, we developed the following two hypotheses:

H6: Teens' perceived peer smoking prevalence will be positively related to their smoking susceptibility.

H7: Teen's perceived peer smoking prevalence will be positively related to their positive attitudes toward smoking.

Smoking Warnings

In 1970s, in response to a ban on cigarette advertising on radio and television, the tobacco industry agreed to put health warnings on all packets and to make reference to the health warnings in ads (Vaknin, 2007). The Family Smoking Prevention and Tobacco Control Act, signed by President Obama on June 22, 2009, grants the FDA the authority to regulate tobacco products, and further requires color graphics depicting the negative health consequences of smoking to be printed on tobacco products (O'Danovan, 2014). No later than two years after the date of enactment, graphic warning labels have covered fifty percent of the front and back of cigarette packaging, and thirty percent of the display panels of smokeless tobacco products (O'Donovan, 2014).

The main purpose of smoking warnings is to counteract the positive smoking outcome expectancies (Glock, Unz, & Kovas, 2012). Previous studies examined the effect of smoking warnings on teenagers' smoking attitudes and behaviors, and noted that smoking

warnings, especially graphic warnings, may increase teens' negative health beliefs about smoking and help prevent or reduce smoking among teenagers (Andrews, Nitemeyer, Kees, & Burton 2014; White, Webster, & Wakefield, 2008). Andrews and colleagues (2014) found that for teen smokers, graphic warnings affect fear, and fear influences negative health beliefs about smoking, which ultimately increases thoughts of quitting. Therefore, we may assume that once teens absorb the information portrayed in smoking warnings, they will be less likely to develop positive attitudes toward smoking. To assess the impact of the graphic health warning labels on cigarette packets on teens, White and colleagues (2008) conducted school-based surveys in the year prior to and approximately 6 months after the introduction of the graphic health warnings. Results indicated that graphic warning labels on cigarette packs are noticed by the majority of teenagers, increase teenagers' cognitive processing of anti-smoking messages, and have the potential to reduce smoking intentions (White et al., 2008).

To further explore how teenagers interpret graphic warning labels, McCool, Webb, Cameron, & Hoek (2012) conducted 12 focus group interviews with a sample of 80 students aged 14–16 years. Results revealed that graphic warning labels reduce the social appeal of smoking, help create a negative image of smokers, and increase perceptions of risks caused by cigarette smoking (McCool et al., 2012). Therefore, we may assume that once teens absorb the information portrayed in smoking warnings, they will be more likely to perceive that tobacco products are dangerous. Moreover, Aslam, Zaheer, Rao, & Shafique (2014) found that students (aged 13–15 years) who had knowledge of harmful effects of smoking are less likely to be susceptible to smoking. Therefore, on the basis of previous studies that explored the role of smoking warnings, we established the following three hypotheses:

H8: Exposure to smoking warnings will be negatively related to teens' positive attitudes toward smoking.

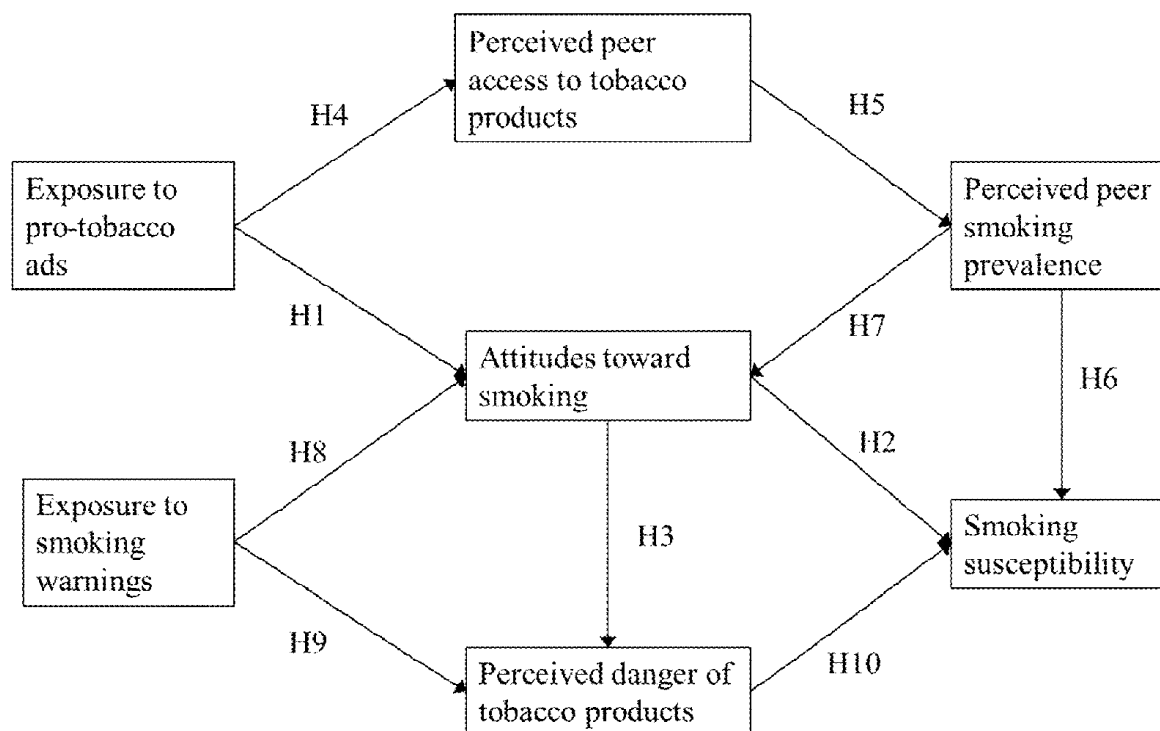
H9: Teens who have higher level of exposure to smoking warnings will perceive higher level of danger of tobacco products.

H10: Teens who perceive higher level of danger of tobacco products will be less susceptible to smoking.

In sum, all the above hypotheses comprised the hypothesized media mediated smoking belief model (MMSBM) that predicts the indirect influence of pro-tobacco advertising and smoking warnings on teens'

smoking susceptibility via other key mediators (see Figure 1).

Figure 1 The Hypothesized Model



Methods

Data Source

We used data from the 2012 National Youth Tobacco Survey (NYTS) conducted by Center for Disease Control and Prevention (CDC). The NYTS is a school-based, cross-sectional survey that collects information on exposure to pro-and anti-tobacco influences among students enrolled in grades 6-12 (aged 9 to 19 plus) (CDC, 2012b). The 2012 NYTS employed a stratified three-stage cluster sample design to produce a nationally representative sample of middle school and high school students in the United States. Sample procedures were based on Primary Sampling Units (PSUs) and each PSU was defined as a county, a group of small counties, or part of a very large county. The PSUs were organized into 16 strata, based on urban/non-urban location and Black/Hispanic enrollment. A PSU was classified as “urban” if it is in one of the 54 largest metropolitan statistical areas in the United States; otherwise, the PSU was classified as “non-urban”. In addition, stratification was imposed by geography by sorting the PSU frame by state and by 5-digit ZIP code. If the percentage of Hispanic students in the PSU exceeded the percentage of Black students, then the

PSU was classified as “Hispanic”; otherwise, the PSU was classified as “Black”. Hispanic urban PSUs, Hispanic non-urban PSUs, Black urban PSUs, and Black non-urban PSUs were further classified into four density groupings respectively, depending upon the percentages of Hispanics/Blacks in the PSU (see Table 1).

At the first sampling stage, 100 PSUs were selected from the 16 strata. At the second sampling stage, schools were selected from each PSU. At the third sampling stage, students were selected from schools. The final sample consisted of 284 schools, and 24,658 students completed the survey via pencil and paper self-administered scannable questionnaire booklet. The overall participation rate was 73.6% (CDC, 2012b). Based on the research purpose, the final sample in this study only included teenager students aged 12 to 17 from stratum HU4 that had the highest percentage of urban Hispanics (N = 1206, percentage of Hispanics = 64.43%) and teenager students aged 12 to 17 from stratum HR4 that had the highest percentage of non-urban Hispanics (N = 385, percentage of Hispanics = 85.71%).

Table 1 2012 National Youth Tobacco Survey (NYTS) Stratum Definition

Predominant Minority	Urban/Non-urban	Density Group Number	Stratum Code	Student Population	Sample Size	Percentage of Predominant Minority
Black	Urban	1	BU1	2,633,051	2,409	12.42%
		2	BU2	2,050,303	1,761	40.94%
		3	BU3	825,252	693	36.94%
		4	BU4	331,731	530	62.45%
	Non-urban	1	BR1	3,854,233	3,163	11.13%
		2	BR2	1,817,124	1,159	26.06%
		3	BR3	1,374,191	1,553	46.23%
		4	BR4	468,702	257	65.37%
		1	HU1	3,236,277	2,713	24.81%
		2	HU2	1,876,056	1,593	32.08%
Hispanic	Urban	3	HU3	1,820,012	1,477	30.40%
		4	HU4*	1,712,989	1,444	62.40%
		1	HR1	3,789,654	3,663	14.82%
		2	HR2	1,128,116	797	53.45%
	Non-urban	3	HR3	864,675	1,006	66.90%
		4	HR4*	444,098	440	85.91%

Note: Data source from Center for Disease Control and Prevention. (2012b). 2012 NYTS methodology report. Retrieved from http://www.cdc.gov/TOBACCO/data_statistics/surveys/NYTS/index.htm

*Data used in this study

Measurements

Students' age and *stratum* were the filter categories. Students' age was measured through one question by asking respondents: "How old are you?" Responses to this question were measured on an 11-point scale, with 1 being 9 years old and 11 being 19 years old or older. Only those students aged 12 to 17 from stratum HR4 and stratum HU4 were included in the analysis.

Exposure to pro-tobacco ads was measured through five questions: "1) When you are using the Internet, how often do you see ads or promotions for cigarettes or other tobacco products? 2) When you read newspapers or magazines, how often do you see any ads or promotions for cigarettes or other tobacco products? 3) When you go to a convenience store, supermarket, or gas station, how often do you see any ads or promotions for cigarettes or other tobacco products? 4) During the past 30 days, how often do you see any ads or promotions for cigarettes or other tobacco products that were outdoors on a billboard or could be seen from outside a store? 5) When you watch TV or go to the movies, how often do you see actors and actresses using cigarettes or other tobacco products?"

Responses to these five questions followed the same 5-point scale, ranging from *never* to *always*. We averaged the answers to the five questions to construct the new composite variable of exposure to pro-tobacco ads, and the reliability of the five-item measurement achieved an acceptable level (HU4: Cronbach's $\alpha = .76$; HR4: Cronbach's $\alpha = .77$).

Exposure to smoking warnings was measured through two questions: "During the past 30 days, how often did you see a warning label 1) on a cigarette pack? 2) on a smokeless tobacco product, such as chewing tobacco, snuff, dip, or snus?" Responses to these two questions followed the same 5-point scale, ranging from *never* to *always*. Answers to the two questions were averaged together to create the new composite variable of exposure to anti-smoking warnings, and the reliability of the two-item measurement achieved an acceptable level (HU4: $r = .57, p < .01$; HR4: $r = .54, p < .01$).

Perceived peer access to tobacco products was measured through one question: "How easy do you think it is for kids your age to buy tobacco products in a store?" The responses were reverse-coded so that 1 represents *not easy at all*, 2 represents *somewhat easy*, and 3 represents *easy*. The higher score a participant

had, the more likely one would perceive that it is easy for peers to get access to tobacco products.

Perceived peer smoking prevalence was measured through two questions: “Out of every 10 students in your grade at school, 1) how many do you think smoke cigarettes? 2) how many do you think use tobacco products other than cigarettes?” Responses to both questions ranged from “0” to “10”. We averaged answers to the two questions to construct the new composite variable of perceived peer smoking prevalence, and the reliability of the two-item measurement achieved an acceptable level (HU4: $r = .73, p < .01$; HR4: $r = .73, p < .01$).

Attitudes toward smoking were measured through two questions: “1) Do you think smoking cigarettes makes young people look cool or fit in? 2) Do you think young people who smoke cigarettes have more friends?” These questions were also used in Paek and Gunther’s (2007) study. Responses to these two questions followed a 4-point scale and were reverse-coded (1 = *definitely not*, 4 = *definitely yes*). Answers to the two questions were averaged together to construct the new composite variable of attitudes toward smoking, and the two-item measurement demonstrated good reliability (HU4: $r = .45, p < .01$; HR4: $r = .46, p < .01$). Higher score reflects a more positive attitude toward smoking.

Perceived danger of tobacco products was measured through one question: “How strongly do you agree with the statement ‘All tobacco products are dangerous?’” Responses were measured on a 4-point scale (1= *strongly agree*, 4 = *strongly disagree*). Higher score indicates lower level of danger one would perceive.

Smoking susceptibility was measured through four questions: “During the past 30 days, on how many days did you 1) smoke cigarettes? 2) smoke cigars, cigarillos, or little cigars? 3) use chewing tobacco, snuff, or dip? 4) smoke tobacco in a pipe?” Responses to

these four questions followed the same format: 1 represents 0 days, 2 represents 1 or 2 days, 3 represents 3 to 5 days, 4 represents 6 to 9 days, 5 represents 10 to 19 days, 6 represents 20 to 29 days, and 7 represents all 30 days. Answers to the four questions were averaged together to construct the new composite variable of smoking susceptibility, and the reliability of the four-item measurement achieved an acceptable level (HU4: Cronbach’s $\alpha = .78$; HR4: Cronbach’s $\alpha = .85$). Demographic variables examined in this study included age, gender, ethnicity (Hispanics versus non-Hispanics), and household smoking.

Data Analysis

To test the hypotheses and the hypothesized integrated model, we performed a multi-group path analysis across stratum HU4 and stratum HR4 using IBM AMOS 21. For every variable included in the model, we controlled for the demographic influence from age, gender, ethnicity, and household smoking by using the residual of the variable obtained from regressing the variable on the four demographic factors. We chose path analysis because this approach allows for the estimation of all parameters in a model simultaneously after controlling for all other factors and relationships in the model (Meyers, Gamst, & Guarino, 2006).

Results

First, the majority of HU4 and HR4 teen respondents have seen pro-tobacco ads on the Internet, on newspapers or magazines, in a store, on a billboard, or on TV or movies (see Table 2). Noticeably, teen respondents from stratum HU4 that had the highest percentage of urban Hispanics were more likely than those from stratum HR4 that had the highest percentage of non-urban Hispanics to see ads across different types of media platforms (see Table 2).

Table 2 Exposure to Pro-Tobacco Advertising

	HR4	HU4	t-test
Percentage of respondents who have never seen pro-tobacco ads on the Internet	26.80%	18.90%	3.32**
Percentage of respondents who have never seen pro-tobacco ads on newspapers or magazines	23.99%	15.98%	3.57**
Percentage of respondents who have never seen pro-tobacco ads in a convenience store, supermarket, or gas station	14.90%	8.73%	3.48**
Percentage of respondents who have never seen pro-tobacco ads on a billboard or outside a store	15.64%	11.31%	2.25*
Percentage of respondents who have never seen actors or actresses using tobacco products on TV or movies	10.81%	8.56%	1.34
<i>N</i>	385	1206	

Note: * $p < .05$ ** $p < .01$

Second, the majority of HU4 and HR4 teen respondents did not see a cigarette pack or a smokeless tobacco product during the past 30 days, and most teen respondents who saw a cigarette pack or a smokeless tobacco product also noticed a warning label. For teen respondents from stratum HU4, results indicated that the majority of them did not see a cigarette pack during the past 30 days (62.44%) and 23.32% of those who saw a cigarette pack did not see a warning label in either a picture or words format. Moreover, results revealed that the majority of HU4 teen respondents did not see a smokeless tobacco product during the past 30 days (74.71%) and 35.05% of those who saw a smokeless tobacco product did not see a warning label in either a picture or words format.

Similarly, for teen respondents from stratum HR4, t-test results showed that the majority of them did not see a cigarette pack during the past 30 days (63.38%) and 30.95% of those who saw a cigarette pack did not see a warning label in either a picture or words format. In addition, results revealed that the majority of HR4 teen respondents did not see a smokeless tobacco product during the past 30 days (74.55%) and 37.50% of those who saw a smokeless tobacco product did not see a warning label in either a picture or words format.

Third, the majority of HU4 (64.84%) and HR4 (64.94%) teen respondents reported never having tried smoking (those who answered "no" across all the four smoking susceptibility questions), which is in line with results from previous research on teenager smoking (Gunther et al., 2006). Averagely speaking, teen respondents from stratum HU4 estimated that 3.94 out of 10 students in their grade at school smoke cigarettes ($SD = 3.18$) and that 3.72 out of 10 students in their grade at school use tobacco products other than cigarettes ($SD = 3.30$). Results from one-sample t-test revealed that there was neither significant difference between the estimated smoking rate for cigarettes (39.4%) and the actual smoking rate (35.06%) ($t(df =$

1205) = 1.71, $p > .05$) nor significant difference between the estimated smoking rate for tobacco products other than cigarettes (37.2%) and the actual smoking rate (35.06%) ($t(df = 1205) = .83, p > .05$).

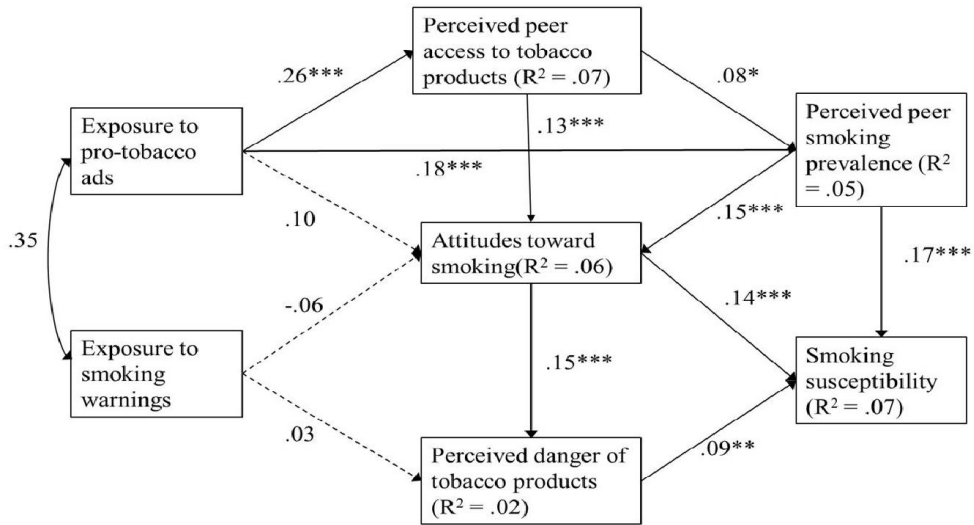
Similarly, respondents from stratum HR4 averagely estimated that 4.68 out of 10 students in their grade at school smoke cigarettes ($SD = 3.42$) and that 3.80 out of 10 students in their grade at school use tobacco products other than cigarettes ($SD = 3.37$). Results from one-sample t-test revealed that the estimated smoking rate for cigarettes (46.8%) was higher than the actual smoking rate (35.06%) ($t(df = 384) = 2.57, p < .05$); however, there was no significant difference between the estimated smoking rate for tobacco products other than cigarettes (38%) and the actual smoking rate (35.06%) ($t(df = 384) = .68, p > .05$).

Hypotheses Testing

We performed multi-group path analysis to construct models for comparison across the two strata (HU4 and HR4) (Meyers et al., 2006). The AMOS results showed that chi-square was non-significant ($\chi^2 = 23.60$, $df = 16$, $p = .10$), and other indices (RMSEA = .02, NFI = .94, CFI = .98, IFI = .98) suggested an overall good model fit across the two strata, meaning that the two strata fit very well with the hypothesized model and can be statistically compared (Meyers et al., 2006; Paek & Gunther, 2007).

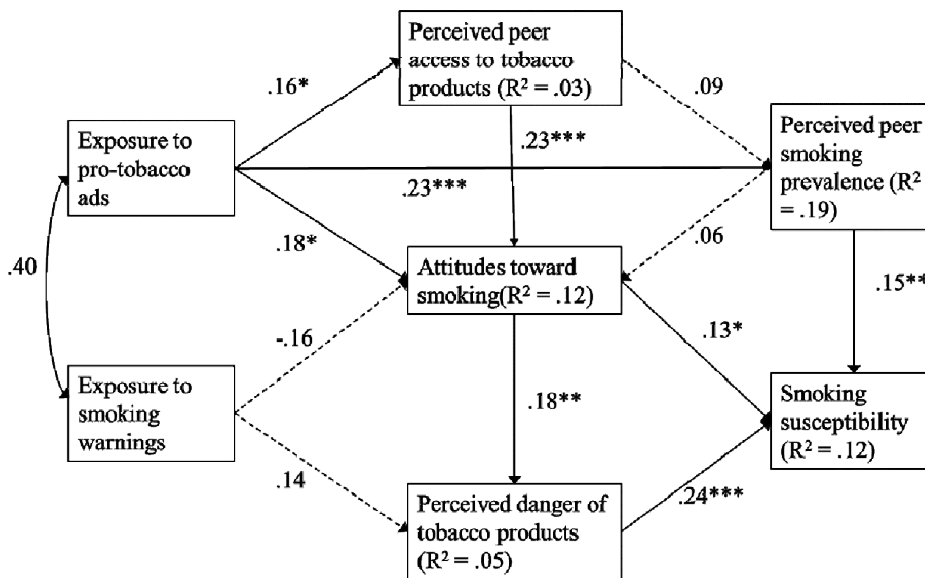
For both HU4 and HR4 teen respondents, results provided support for the indirect relationship between teens' exposure to pro-tobacco ads and their smoking susceptibility (see Figure 2 & Figure 3). Hypothesis 1, which posited a positive relationship between teens' exposure to pro-tobacco ads and their positive attitudes toward smoking, was supported by data from stratum HR4 ($B = .18, p < .05$) but was not supported by data from stratum HU4 ($B = .10, p > .05$). Therefore, H1 received partial support.

Figure 2 Path Analysis for the Hypothesized Model (stratum HU4, N = 1,206)



Notes: For every variable included in the model, we controlled for the influence from age, gender, ethnicity, and household smoking of the teenage respondents. The coefficients are standardized. R-square values are reported in parentheses. * $p < .05$ ** $p < .01$ *** $p < .001$

Figure 3 Path Analysis for the Hypothesized Model (stratum HR4, N = 385)



Notes: For every variable included in the model, we controlled for the influence from age, gender, ethnicity, and household smoking of the teenage respondents. The coefficients are standardized. R-square values are reported in parentheses. * $p < .05$ ** $p < .01$ *** $p < .001$

Moreover, for both HU4 and HR4 teen respondents, results revealed that teens who had more positive attitudes toward smoking were more susceptible to smoking (H2 was supported; HU4: $B = .14, p < .001$; HR4: $B = .13, p < .05$) and perceived lower level of danger of tobacco products (H3 received support; HU4: $B = .15, p < .001$; HR4: $B = .18, p < .01$).

In addition, for both HU4 ($B = .26, p < .001$) and HR4 teen respondents ($B = .16, p < .05$), results indicated that teens who had higher level of exposure to pro-tobacco ads were more likely to perceive that it would be easy for their peers to purchase tobacco products in a store, providing support for H4.

Hypothesis 5, which predicted that there will be a positive relationship between teens' perceived peer access to tobacco products in a store and their perceived peer smoking prevalence, received support among teen respondents from stratum HU4 ($B = .08, p < .05$); yet, among teen respondents from stratum HR4, the relationship was not significant ($B = .09, p > .05$). Therefore, H5 was partially supported.

Further, for both HU4 ($B = .17, p < .001$) and HR4 teen respondents ($B = .15, p < .01$), those who were more likely to perceive that smoking is prevalent among their peers were more susceptible to smoking, providing support for H6.

Hypothesis 7, which posited that there will be a positive relationship between teens' perceived peer smoking prevalence and their positive attitudes toward smoking, received support among teen respondents from stratum HU4 ($B = .15, p < .001$); however, the relationship was insignificant among teen respondents from stratum HR4 ($B = .06, p > .05$). Therefore, H7 received partial support.

Regarding the direct impact of smoking warnings, results indicated that for both HU4 and HR4 teen respondents, there was neither relationship between teens' exposure to smoking warnings and their positive attitudes toward smoking (H8 was not supported; HU4: $B = -.06, p > .05$; HR4: $B = -.16, p > .05$) nor relationship between teens' exposure to smoking warnings and their perceived danger of tobacco products (H9 was not supported; HU4: $B = .03, p > .05$; HR4: $B = .14, p > .05$).

Nevertheless, for both HU4 ($B = .09, p < .01$) and HR4 teen respondents ($B = .24, p < .001$), results from the path analysis showed that teens who perceived higher level of danger of tobacco products were less susceptible to smoking, providing support for H10.

Besides the established hypotheses, results from path analysis revealed that for both HU4 and HR4 teen respondents, those who had higher level of exposure to pro-tobacco ads were more likely to perceive smoking is prevalent among their peers (HU4:

$B = .18, p < .001$; HR4: $B = .23, p < .001$), and that those who were more likely to perceive that it would be easy for their peers to purchase tobacco products in a store had more positive attitudes toward smoking (HU4: $B = .13, p < .001$; HR4: $B = .23, p < .001$). Overall, the model in Figure 2 accounted for 7% of the variance in teens' smoking susceptibility while the one in Figure 3 accounted for 12% of the variance in teens' smoking susceptibility (see Figure 2 & Figure 3).

Discussion

Neither data from stratum HU4 nor data from stratum HR4 provided support for the role of smoking warnings in producing negative smoking attitudes and increasing teens' perceived danger of tobacco products. However, data from both stratum HR4 and stratum HU4 provided empirical support for indirect pro-tobacco advertising influence on teens' smoking susceptibility.

Apart from the relationships predicted by the hypotheses, we also found two more positive relationships in this study. First, there was a positive relationship between teens' exposure to pro-tobacco ads and their perceived peer smoking prevalence in both Figure 2 and Figure 3, and this result was consistent with findings from Burton, Graham, Johnson, Uutela, Vartiainen, and Palmer's (2011) study and Gunther and colleagues' (2006) research. Gunther and colleagues (2006) termed the relationship an exemplar effect – media content establishes favorable smoker images (i.e. attractive and youthful smokers) for teen audience and these images serve as cues to imply a high prevalence of peer smoking. Second, there was a positive relationship between teens' perceived peer access to tobacco products and their positive attitudes toward smoking. It is possible that once teens perceive that it would be easy for their peers to purchase tobacco products in a store, they would believe that smoking is acceptable among their peers, which, in turn, influences their attitudes toward smoking.

For teenagers from urban Hispanic communities, we found that teens' perceived peer access to tobacco products (perceived barrier of smoking), teens' perceived peer smoking prevalence (perceived peer smoking behavior), teens' positive attitudes toward smoking (perceived benefits of smoking), and teens' perceived danger of tobacco products (perceived threat of smoking) were the key mediators in the relationship between teens' exposure to pro-tobacco ads (cues to action) and their smoking susceptibility (smoking behavior). Noticeably, there was no direct relationship between urban Hispanic teens' exposure to pro-tobacco ads and their positive attitudes toward smoking (H1 was not supported for HU4). It is possible that this relationship was fully mediated by

teens' perceived peer access to tobacco products and their perceived peer smoking prevalence (see Figure 2).

For teenagers from non-urban Hispanic communities, we also found that teens' perceived peer access to tobacco products (perceived barrier of smoking), teens' perceived peer smoking prevalence (perceived peer smoking behavior), teens' positive attitudes toward smoking (perceived benefits of smoking), and teen's perceived danger of tobacco products (perceived threat of smoking) were the key mediators in the relationship between teens' exposure to pro-tobacco ads (cues to action) and their smoking susceptibility (smoking behavior). Unlike the urban setting, the relationship between non-urban teens' exposure to pro-tobacco ads and their positive attitudes toward smoking was partially mediated by their perceived peer access to tobacco products (see Figure 3). Noticeably, for non-urban Hispanic teens, there was no direct relationship between perceived peer access to tobacco products and perceived peer smoking prevalence (H5 was not supported). This result was inconsistent with finding from previous study that once teens perceive that cigarettes are available to their peers, their peers will be likely to experiment with cigarettes (Unger & Rohrbach, 2002).

Also, there was no direct relationship between perceived peer smoking prevalence and non-urban Hispanic teens' own attitudes toward smoking (H7 was not supported). This result was inconsistent with social norms theory that posits young people are likely to conform to their perceptions of how peers think and act (Perkins & Berkowitz, 1986).

The above results revealed the powerful indirect influence of pro-tobacco ads on both urban and non-urban teens' smoking susceptibility. Notably, teens from urban Hispanic communities are more likely to get exposed to pro-tobacco ads than those from non-urban Hispanic communities. This disparity in exposure to pro-tobacco ads may be explained by the point-of-sale in convenience stores and by billboards near schools in urban areas (Gebauer & Laska, 2011; Luke, Ribisi, Smith, & Sorg, 2011; Wakefield, Germain, Durkin, & Henriksen, 2006). Although the tobacco industry has challenged new FDA rules restricting outdoor tobacco advertising near schools and playgrounds on the basis of First Amendment, the results from this study may be resonant with the calls for federal restrictions on tobacco advertising near schools to target urban teenagers (Luke et al., 2011; Stanford University Medical Center, 2010).

On the other hand, in this study, we found no direct impact of smoking warnings on teens' smoking attitudes and their perceived danger of tobacco products (H8 and H9 were not supported for both urban and non-urban Hispanic teens). Although the results are

disappointing, they are consistent with some previous literature that found little or no direct influence of anti-smoking messages on teens' smoking-related beliefs and behaviors (Murray, Prokhorov, & Harty, 1994; Popham, Potter, Hetrick, Muthen, Duerr, & Johnson, 1994). It is possible that anti-smoking messages are ineffective or that anti-smoking messages may indirectly influence teens' smoking attitudes, their perceived danger of tobacco products, and smoking susceptibility via other possible factors.

It is noted that for teens from both urban and non-urban Hispanic communities, their perceived peer access to tobacco products is the most important mediator in the relationship between their exposure to pro-tobacco ads and their smoking susceptibility, as it can directly or indirectly influence other mediators (see Figure 2 and Figure 3). This result has both policy and campaign design implications. First, we may need more federal restrictions on teens' real access to tobacco products in a retail store, which may help correct their misperception. Second, community-based anti-smoking campaigns are in need. These campaigns may need to be implemented in both urban and non-urban Hispanic communities and should be aimed at correcting the misperception that it would be easy for teenagers to purchase tobacco products in a store.

Besides their perceived peer access to tobacco products, teens' perceived peer smoking prevalence and their positive attitudes toward smoking are also significant mediators in the relationship between their exposure to pro-tobacco ads and their smoking susceptibility. However, as showed in this study, anti-smoking messages may not influence teens' smoking attitudes directly, and we may look for some other factors that can directly or indirectly influence teens' smoking attitudes. In terms of teens' perceived peer smoking prevalence, since teens from non-urban Hispanic communities tend to overestimate the smoking rate for cigarettes among their peers, we may need more community-based anti-smoking campaigns for non-urban Hispanic areas that can focus on correcting the tendency to overestimate smoking prevalence. Moreover, some researchers have argued that overestimation of smoking prevalence is influenced by the increased charm attached to the act of smoking in movies and television (Dalton, Sargent, Beach, Titus-Ernstoff, Gibson, Ahrens, Tickle, & Heatherton, 2003; Golstein, Sobel, & Newman, 1999). Therefore, we may need more stringent restrictions on the portrayal of smoking in movies and television programs targeting teenagers.

Limitations and Direction for Future Study

Although the findings from our study are

significant and provide implications for policy making and anti-smoking campaign designing, there are still several limitations. First, since we focused on teens from Hispanic communities in this study, future studies may test the proposed model in other ethnic minority communities.

Second, the survey used only one question to measure two key variables (perceived peer access to tobacco products and perceived danger of tobacco products), which may reduce the validity of the measurement. Future studies may consider using multiple items to measure those variables.

Third, even though most of the hypotheses in this study were supported, the exogenous variables accounted for little variance in the endogenous variable in the hypothesized model presented in Figure 2. Regarding the low variance accounted by the mediators, we have the following suggestions for future studies: first, all the demographic influence has been controlled in the hypothesized model and when the demographic influence is added to the model, more variance may be accounted; second, more mediators, such as self-efficacy, teens' cognitive processing of pro- and anti-smoking information, and teens' level of fear of getting smoking-related diseases, may need to be added to the model.

Fourth, the models presented in Figure 2 and Figure 3 may indicate causal direction; yet, data from cross-sectional survey can only provide indication on

correlation. Noticeably, wording in those four questions regarding smoking susceptibility (i.e., during the past 30 days, on how many days did you...?) may let some assume the smoking susceptibility as an antecedent rather than a dependent variable.

In addition, another hypothesis centers on the casual influence of preexisting attitudes on teens' self-reported exposure to pro-tobacco ads. We tested these possibilities in a post hoc analysis by fitting the model that reverses the casual path between teens' positive attitudes toward smoking and their smoking susceptibility, and the casual path between teens' exposure to pro-tobacco ads and their positive attitudes toward smoking. The new model did not produce a good fit across the two strata (HU4 and HR4) ($\chi^2 = 110.56$, $df = 22$, $p < .001$; RMSEA = .05, NFI = .71, CFI = .72, IFI = .75) (Meyers et al., 2006).

Future research needs to conduct panel studies to clarify the casual directions more clearly. Finally, since the study used secondary data and adopted quantitative methods to analyze the influence of pro- and anti-tobacco media information, the mechanism behind teens' cognitive processing of this information was not touched upon. Future studies may combine both qualitative and quantitative methods to explore further how teens interpret tobacco-related information in media and how their interpretations affect their attitudes and behaviors.

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