ORIGINAL INVESTIGATION

Hazards of New Media: Youth's Exposure to Tobacco Ads/Promotions

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ABSTRACT

Background: A gap in knowledge exists about the youth's exposure to protobacco campaigns via new electronic media outlets. In response, we use national data to delineate the associations between tobacco ads/promotions delivered through new media outlets (i.e., social network sites and text messages) and youth attitudes/beliefs about tobacco and intent to use (among youth who had not yet used tobacco).

Methods: Data were derived from the 2011 National Youth Tobacco Survey, a nationally representative sample of U.S. youth enrolled in both public and private schools ($N = 15,673$). Logistic regression models were used to examine associations between demographic characteristics and reported exposure to tobacco ads/promotions via social networking sites and text messages. Logistic regression models were also used to investigate associations between exposure tobacco ads/promotions and attitudes toward tobacco.

Results: We found that highly susceptible youth (i.e., minorities, very young youth, and youth who have not yet used tobacco) have observed tobacco ads/promotions on social networking sites and text messages. These youth are more likely to have favorable attitudes toward tobacco, including the intention to use tobacco among those who had not yet used tobacco.

Conclusions: Our findings underscore the need for policy strategies to more effectively monitor and regulate tobacco advertising via new media outlets.

INTRODUCTION

Tobacco ads/promotions via traditional media outlets (e.g., in-store advertising, magazines/newspapers, billboard ads, direct mail campaigns) are known to effectively elicit protobacco attitudes, increase tobacco use, and promote dual use and experimentation with new products (Bahreinifar, Sheon, & Ling, 2013; Biener & Siegel, 2000; Lovato, Watts, & Stead, 2011; Potts, Gillies, & Herbert, 1986). With regard to tobacco promotions via new electronic media outlets (e.g., Internet, social media sites, and text messaging), existing studies on tobacco marketing through new media outlets have primarily been descriptive. Most describe the prevalence and content of protobacco imagery on YouTube (Elkin, Thomson, & Wilson, 2010; Forsyth & Malone, 2010; Freeman & Chapman, 2009; Kim, Paek, & Lynn, 2010; Seidenberg, Rodgers, Rees, & Connolly, 2012), protobacco Web sites (Hong & Cody, 2002; Primack et al., 2012; Wackowski, Lewis, & Delnevo, 2011), and Facebook promotions (Freeman & Chapman, 2010), or relate the percent of youth/young adults

reporting exposure to Internet tobacco ads/promotions (Hrywna, Delnevo, & Lewis, 2007; Perez et al., 2012).

A recent report from the surgeon general states that research on the effects of Internet-based tobacco advertising is gravely needed (CDC, 2012). Therefore, we aim to fill these wide gaps in knowledge by leveraging existing national data to delineate the associations between tobacco ads/promotions via new electronic media outlets with youth attitudes and beliefs about tobacco and intent to use. We focus on tobacco ads/promotions delivered through social network sites and text messages, which are popular communication tools for youth. In addition, because youth tobacco users are more receptive to tobacco ads versus nontobacco users (Sargent, Gibson, & Heatherton, 2009) and increased tobacco advertising exposure is associated with more advanced stages of smoking (Wellman, Sugarman, DiFranza, & Winickoff, 2006), we additionally examine the tobacco advertising exposure and protobacco attitudes of youth who are current tobacco users.

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METHODS

Data Source and Respondents

The analyses presented in this study utilize existing data from the 2011 National Youth Tobacco Survey (NYTS), an evaluation tool developed by the Centers for Disease Control and Prevention (CDC) to estimate the tobacco-related attitudes/behaviors and exposure to tobacco ads/promotions of a national sample of 6th through 12th graders (ages 9 to ≥ 19 years old) enrolled in both public and private schools in the United States ($N = 18,866$). Participating students voluntarily and anonymously completed the self-administered, scan-able survey via pencil and paper. Minority students were oversampled. Data are available for public use at www.cdc.gov/tobacco/data_statistics/surveys/nyts/. Respondents under the age of 18 ($N = 17,045$) were eligible for our study. Furthermore, students aged 9–10 years old were excluded because so few students were among this age group ($n = 45$), and it was unknown why youth of this age were in the grades of interest (6–12th). Results were similar with and without this age group.

Measures

Exposure to Tobacco Ads/Promotions via New Media

Recent exposure to ads/promotions via the new media venues of interest (social networking sites and text message) was assessed by two items: (a) “During the past 30 days, did you receive coupons from a tobacco company through...”; (b) “During the past 30 days, did you receive ads from a tobacco company through...” Participants could select one or more responses from the following choices: the mail, E-mail, the Internet, Facebook, MySpace, a text message. We combined responses for both Facebook and MySpace across the two questions (receipt of coupons and ads) to represent exposure to tobacco promotions via social networking sites. We also combined responses for text message across the two questions (receipt of coupons and ads) to represent exposure to tobacco promotions via text message. We chose to focus on the two social networking sites and text message because these are currently popular forms of communication among youth (68% report texting daily and 51% report checking their social networking sites daily; Rideout & Saphir, 2012). The response “the Internet” was not examined because we centered our analysis on newer digital forms of communication; the “Internet” is a more general term, has been in use longer than social media and text messaging, and does not provide specifics regarding where ads/coupons were seen.

Tobacco Attitudes/Beliefs

Perceptions of the social benefits of smoking were assessed by the items: “Do you think young people who smoke cigarettes have more friends?” and “Do you think smoking cigarettes makes young people look cool or fit in?” Responses for both items were dichotomized as Definitely/Probably yes versus Probably/Definitely not. Beliefs about the health hazards of tobacco use were assessed by the items: “How strongly do you agree with the statement ‘All tobacco products are dangerous?’” (responses dichotomized as Strongly agree vs. all others including Agree/Disagree/Strongly disagree) and “Do you think breathing smoke from other people’s cigarettes or other tobacco products is harmful?” (responses dichotomized

as Very/Somewhat harmful to one’s health vs. Not very harmful/Not harmful at all to one’s health). Intent to smoke among never-tobacco users was assessed by the items: “If one of your best friends were to offer you a cigarette, would you smoke it?” (responses dichotomized as Definitely/Probably yes vs. Probably/Definitely not) and “Do you think you will try a cigarette soon?” (Yes vs. No). Among current smokers, desire to quit was assessed by the item “Do you want to stop smoking cigarettes for good?” (Yes vs. No).

Covariates

Sex, age, race/ethnicity, weekly spending money (assessed by the item “During the past 30 days, how much money did you have each week to spend any way you wanted?”), current tobacco use (use of cigarettes, cigars/cigarillos/little cigars, chewing tobacco/snuff/dip, pipe, bidi, roll-your-own cigarettes, flavored cigarettes, clove cigars, flavored little cigars, hookah/waterpipe, snus, dissolvable products, e-cigarettes or other tobacco products in the past 30 days), and parental and school antitobacco efforts were included as covariates. Parental and school antitobacco efforts were assessed by the items: “During the past 12 months did your parents/guardian talk with you about not using any type of tobacco product?” and “During this school year were you taught in any of your classes about why you should not use tobacco products?” (Yes vs. No).

Statistical Analysis

Among youth age 11–18 years, logistic regression models were used to predict recent receipt of tobacco ads/promotions via Facebook/MySpace or text message as a function of sex, age, race/ethnicity, weekly spending money, ever tobacco use, and parental and school antitobacco efforts ($N = 15,673$ youth with no missing data on covariates). Next, we used logistic regression models to assess the associations between new media tobacco ad exposure described in Measures’ section and tobacco attitudes/beliefs among youth who never used tobacco and separately among youth who ever used tobacco (cigarettes, cigars/cigarillos/little cigars, chewing tobacco/snuff/dip, pipe, bidi, roll-your-own cigarettes, flavored cigarettes, clove cigars, flavored little cigars, hookah/waterpipe, snus, dissolvable products, e-cigarettes or other tobacco products), controlling for demographic covariates (model N s ranged from 9,664 to 10,137 among never-users, and 5,214 to 5,240 among ever-users, depending on the tobacco belief/attitude of interest). Models among ever-users also included current tobacco use as a covariate. Finally, we used logistic regression to assess the association between tobacco ad exposure via new media and desire to quit smoking among youth who currently smoked cigarettes, controlling for demographic covariates ($N = 1,178$ with complete data). All analyses were performed using SAS-callable SUDAAN version 11.0.0, a software program that uses Taylor series linearization to adjust for design effects of complex sample surveys. Sample weights were applied to all analyses.

RESULTS

Overall, 11.0% ($n = 1,882$) of youth reported recently receiving ads/promotions from tobacco companies via Facebook/MySpace (9.1% among youth who never used tobacco, and

Table 2. Tobacco Attitudes by Ever Use of Tobacco

Believe or strongly agree that...	Never-used tobacco (<i>N</i> = 10,154) ^a	Ever-used tobacco (<i>N</i> = 5,519) ^a	<i>p</i> value
	<i>n</i> (weighted %)	<i>n</i> (weighted %)	
People who smoke have more friends	1,730 (14.9)	1,604 (29.5)	<.001
Smoking makes young people look cool/fit in	603 (5.5)	937 (18.0)	<.001
All tobacco products are dangerous ^b	7,209 (76.0)	2,337 (43.9)	<.001
Secondhand smoke is harmful	9,220 (95.4)	4,507 (85.8)	<.001
Would smoke if a friend offered a cigarette ^c	202 (1.7)	—	—
Plan to try a cigarette soon ^c	164 (1.5)	—	—
Want to quit for good ^d	—	496 (40.9)	—

Note. ^aDenominators vary due to missing data for some of the attitude items.

^b“Strongly agree” vs. all others.

^cExamined among never-tobacco users only.

^dExamined among current smokers only (*N* = 1,178).

14.7% among youth who ever used tobacco, chi-square Wald 55.0, $p < .001$), and 4.0% ($n = 727$) via text message (2.8% among never-tobacco users, and 6.5% among ever-users, chi-square Wald 52.6, $p < .001$). Receipt of tobacco ads/promotions via new media by demographic variables are shown in Table 1. In multivariable models, minority race/ethnicity status (vs. White), younger age, and ever use of tobacco were associated with reports of receiving promotions via Facebook/MySpace. Similar results were found for receiving promotions via text message, with the addition of >\$50 in weekly spending money positively associated with receiving promotions via text message.

Table 2 presents the prevalence of attitudes/beliefs about tobacco among never-tobacco users and ever-tobacco users. A greater proportion of ever-tobacco users than never-tobacco users believed that smoking makes you look cool and that people who smoke have more friends (both $p < .001$). A lower proportion of ever-tobacco users strongly agreed that all tobacco products are dangerous and believed that breathing other people's cigarette smoke is harmful (both $p < .001$). Among never-tobacco users, 1.7% said they would smoke if their friend offered a cigarette and 1.5% said they would try a cigarette soon. Among current smokers, 40.9% wanted to quit for good.

In multivariable models among youth who never used tobacco (Table 3), tobacco promotion exposure via Facebook/MySpace was associated with an increased likelihood of believing that smoking makes people look cool and that people who smoke have more friends. Tobacco promotion exposure via both Facebook/MySpace and text message was associated with willingness to smoke if a friend offered. Exposure to tobacco ads via new media was associated with a decreased likelihood of believing that all tobacco products are dangerous and that breathing others' cigarette smoke is harmful (significant findings for both text message and Facebook/MySpace). The association between exposure to tobacco ads via Facebook/MySpace and intent to try cigarettes soon trended toward significance (adjusted odds ratio [AOR] = 1.9, 95% CI = 0.99–3.6), but text message was not significant (AOR = 1.9, 95% CI = 0.6–6.5; data not shown in table for brevity). Among never-tobacco users, females were less likely to have protobacco attitudes, 11- to 13-year-olds were more likely to believe tobacco products are dangerous, and 14- to 15-year-olds were more likely to have some protobacco attitudes, including willingness to smoke if a friend offered a cigarette. Minorities

were more likely than Whites to have protobacco attitudes, and youth who received antitobacco efforts, particularly at school, were less likely to have protobacco attitudes.

The magnitude of the associations between tobacco promotion exposure and perceived social benefits of smoking (cigarettes make you look cool, people who smoke have more friends) appeared to be slightly higher among youth who had tried tobacco (Table 4). Among ever-users, new media tobacco ads/promotions were also associated with decreased likelihood of believing that breathing others' cigarette smoke is harmful (and trended toward decreased likelihood of belief that all tobacco products are dangerous). Results were similar when restricting analyses to those who currently used tobacco. Current smokers who reported receiving tobacco ads/promotions via new media appeared to have a decreased desire to quit smoking, but this did not reach statistical significance. Females and youth who received antitobacco messages from parents/schools were less likely to have protobacco attitudes. Younger age and current tobacco use was associated with protobacco attitudes. Minorities were more likely than Whites to believe that smokers have more friends, but Blacks were also more likely than Whites to believe that tobacco products are dangerous.

Because e-cigarettes are often perceived as less harmful than other tobacco products (Cho, Shin, & Moon, 2011; Pearson, Richardson, Niaura, Vallone, & Abrams, 2012) and are marketed online (Yamin, Bitton, & Bates, 2010), we also ran all analyses excluding youth who had only ever used e-cigarettes. However, this group was very small ($n = 25$) and excluding them did not influence results.

DISCUSSION

Studies of tobacco advertisements via traditional outlets indicate that repeated exposure to protobacco advertising increases risky attitudes about tobacco and intent to use (Altman, Levine, Coeytaux, Slade, & Jaffe, 1996; Arnett & Terhanian, 1998; DiFranza et al., 2006; Potts et al., 1986). However, relatively little is known about the magnitude and impact of tobacco ads/promotions presence via new media outlets. Because tobacco companies now have unprecedented opportunities to exploit new and unregulated electronic media venues (Duke et al., 2009; Freeman, 2012; O'Keeffe & Clarke-Pearson, 2011), we

Table 3. Associations Between Exposure to New Media Tobacco Ads/Promotions and Tobacco Attitudes/Beliefs, Among Youth Who Never Used Tobacco

	Smokers have more friends		Smoking makes young people look cool/fit it		Tobacco products are dangerous		Secondhand smoke is harmful		Would smoke if a friend offered a cigarette	
	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI
Tobacco ads via...										
Text message	–	1.3, 0.95–1.7	–	1.6, 0.9–2.7	–	0.7, 0.5–0.95	–	–	–	3.0, 1.4–6.4
Facebook/MySpace	1.3, 1.03–1.6	–	1.6, 1.1–2.2	–	0.8, 0.6–0.9	–	0.4, 0.3–0.7	–	1.9, 1.2–3.0	–
Sex										
Male	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Female	1.0, 0.9–1.2	1.0, 0.9–1.2	0.7, 0.6–0.8	0.7, 0.6–0.8	1.2, 1.1–1.4	1.2, 1.1–1.4	1.8, 1.4–2.3	1.7, 1.4–2.2	1.3, 0.9–2.1	1.4, 0.9–2.1
Age										
11–13 years	1.0, 0.8–1.2	1.0, 0.8–1.2	0.9, 0.6–1.2	0.9, 0.6–1.2	1.3, 1.03–1.5	1.3, 1.03–1.5	0.9, 0.6–1.3	0.8, 0.6–1.2	1.2, 0.6–2.4	1.2, 0.6–2.3
14–15 years	1.3, 1.01–1.6	1.3, 1.02–1.7	1.1, 0.8–1.4	1.1, 0.8–1.4	0.9, 0.7–1.1	0.9, 0.7–1.1	0.7, 0.5–0.9	0.6, 0.5–0.9	1.7, 1.1–2.7	1.8, 1.1–2.8
16–17 years	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Race/ethnicity										
White	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Black	2.3, 1.8–3.0	2.4, 1.8–3.1	1.7, 1.3–2.2	1.7, 1.3–2.3	0.8, 0.7–0.99	0.8, 0.7–0.99	0.6, 0.4–0.95	0.6, 0.4–0.9	0.7, 0.4–1.2	0.7, 0.4–1.2
Hispanic	2.2, 1.7–2.8	2.2, 1.8–2.8	1.6, 1.3–2.0	1.6, 1.2–2.0	0.7, 0.6–0.8	0.7, 0.6–0.8	0.6, 0.4–0.98	0.6, 0.4–1.0	2.3, 1.6–3.5	2.3, 1.5–3.5
Other	1.5, 1.03–2.3	1.5, 1.03–2.3	1.4, 0.9–2.3	1.4, 0.9–2.3	0.9, 0.7–1.3	0.9, 0.7–1.3	1.5, 0.7–3.4	1.5, 0.7–3.3	1.1, 0.4–2.6	1.0, 0.4–2.5
Weekly spending money										
\$0	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
\$1–10	1.3, 0.9–1.8	1.3, 0.9–1.8	1.1, 0.8–1.6	1.1, 0.8–1.6	0.7, 0.6–0.9	0.7, 0.6–0.9	1.1, 0.6–2.0	1.1, 0.6–2.0	1.9, 0.9–4.0	1.9, 0.9–4.0
\$11–20	1.1, 0.8–1.4	1.1, 0.8–1.4	1.0, 0.8–1.4	1.0, 0.8–1.4	0.9, 0.6–1.2	0.9, 0.6–1.2	1.1, 0.6–1.8	1.1, 0.6–1.7	0.9, 0.4–2.1	0.9, 0.4–2.2
\$21–50	1.1, 0.7–1.7	1.1, 0.8–1.7	1.4, 0.9–2.1	1.4, 0.9–2.1	0.6, 0.5–0.7	0.6, 0.5–0.7	1.2, 0.9–1.8	1.2, 0.8–1.8	2.5, 1.1–5.6	2.6, 1.2–5.7
>\$50	1.0, 0.7–1.3	1.0, 0.7–1.3	1.1, 0.7–1.9	1.0, 0.7–1.9	0.8, 0.6–0.97	0.8, 0.6–0.97	0.9, 0.6–1.5	0.9, 0.6–1.5	2.3, 0.9–6.0	2.3, 0.9–5.7
Antitobacco efforts										
From parents ^a	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Yes	1.2, 0.9–1.4	1.2, 0.9–1.4	1.0, 0.8–1.4	1.0, 0.8–1.4	1.3, 1.2–1.5	1.4, 1.2–1.5	1.3, 0.99–1.6	1.3, 0.98–1.6	1.0, 0.7–1.6	1.0, 0.7–1.6
From school ^b	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Yes	0.8, 0.7–0.97	0.8, 0.7–0.97	0.8, 0.6–0.9	0.8, 0.6–0.9	1.5, 1.3–1.8	1.5, 1.3–1.8	1.7, 1.3–2.2	1.7, 1.3–2.2	0.6, 0.4–0.8	0.6, 0.4–0.8

Note. AOR = adjusted odds ratio; CI = confidence interval.

^aParents/guardian talked with participant about not using any type of tobacco product in past 12 months.

^bParticipant taught in any class in school, during this school year, about why they should not use tobacco products.

Table 4. Associations Between Exposure to New Media Tobacco Ads/Promotions and Tobacco Attitudes/Beliefs, Among Youth Who Ever Used Tobacco

	Smokers have more friends		Smoking makes young people look cool/fit it		Tobacco products are dangerous		Secondhand smoke is harmful		Intent to quit ^a	
	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI	AOR, 95% CI
Tobacco ads via...										
Text message	–	1.9, 1.4–2.5	–	2.0, 1.5–2.9	–	0.8, 0.6–1.0	–	0.4, 0.3–0.6	–	0.7, 0.4–1.2
Facebook/MySpace	1.8, 1.5–2.2	–	1.8, 1.3–2.5	–	0.9, 0.7–1.1	–	0.5, 0.4–0.7	–	0.7, 0.5–1.1	–
Sex										
Male	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.9, 0.8–1.0	0.9, 0.8–1.1	0.7, 0.5–0.8	0.7, 0.5–0.8	1.2, 1.1–1.4	1.2, 1.1–1.4	1.7, 1.4–2.2	1.7, 1.4–2.2	1.2, 0.8–1.6	1.2, 0.8–1.6
Age										
11–13 years	1.6, 1.1–2.2	1.6, 1.1–2.3	1.8, 1.4–2.5	1.9, 1.4–2.6	0.8, 0.6–1.2	0.8, 0.6–1.2	0.6, 0.4–0.8	0.6, 0.4–0.8	0.7, 0.5–1.2	0.7, 0.5–1.1
14–15 years	1.3, 0.99–1.6	1.3, 1.0–1.6	1.3, 1.0–1.7	1.3, 1.1–1.7	0.8, 0.7–0.9	0.8, 0.7–0.9	0.8, 0.6–1.0	0.8, 0.6–1.0	0.7, 0.5–1.0	0.7, 0.5–1.0
16–17 years	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Race/ethnicity										
White	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Black	1.7, 1.3–2.2	1.7, 1.4–2.2	1.1, 0.8–1.4	1.1, 0.8–1.4	1.6, 1.3–2.0	1.6, 1.3–2.0	1.1, 0.7–1.6	1.0, 0.7–1.6	1.2, 0.6–2.3	1.2, 0.6–2.2
Hispanic	1.8, 1.5–2.1	1.8, 1.5–2.2	1.2, 0.95–1.5	1.2, 0.98–1.5	1.0, 0.8–1.2	1.0, 0.8–1.2	0.8, 0.7–1.0	0.8, 0.7–1.0	1.0, 0.8–1.4	1.0, 0.7–1.4
Other	1.7, 1.2–2.4	1.7, 1.2–2.5	1.0, 0.6–1.7	1.0, 0.6–1.7	1.5, 1.02–2.2	1.5, 1.03–2.2	1.4, 0.9–2.1	1.4, 0.9–2.1	1.0, 0.4–2.3	1.0, 0.4–2.2
Weekly spending money										
\$0	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
\$1–10	1.0, 0.7–1.5	1.0, 0.7–1.5	1.0, 0.7–1.4	1.0, 0.7–1.4	0.9, 0.7–1.2	0.9, 0.7–1.2	1.1, 0.6–1.8	1.0, 0.6–1.8	1.1, 0.6–2.4	1.1, 0.6–2.3
\$11–20	0.9, 0.7–1.2	0.9, 0.7–1.2	0.8, 0.6–1.2	0.8, 0.6–1.2	1.0, 0.7–1.2	1.0, 0.7–1.2	1.5, 0.9–2.4	1.4, 0.9–2.4	1.1, 0.6–2.1	1.1, 0.6–2.0
\$21–50	0.8, 0.6–1.1	0.8, 0.6–1.1	0.9, 0.6–1.2	0.9, 0.6–1.2	0.9, 0.7–1.2	0.9, 0.7–1.2	1.5, 0.9–2.4	1.5, 0.9–2.4	1.0, 0.5–2.0	1.0, 0.5–2.0
>\$50	0.9, 0.7–1.2	0.9, 0.7–1.2	1.0, 0.7–1.4	1.0, 0.7–1.4	1.0, 0.7–1.4	1.0, 0.7–1.4	1.1, 0.7–1.6	1.1, 0.7–1.7	1.0, 0.5–2.0	1.0, 0.5–2.0
Current tobacco user ^b	1.7, 1.5–2.0	1.7, 1.5–2.0	2.6, 2.1–3.1	2.6, 2.1–3.2	0.5, 0.4–0.5	0.5, 0.4–0.5	0.4, 0.3–0.5	0.4, 0.3–0.5	–	–
Antitobacco efforts										
From parents ^c										
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Yes	1.0, 0.8–1.1	1.0, 0.8–1.1	0.8, 0.6–0.9	0.8, 0.6–0.95	1.2, 1.1–1.4	1.2, 1.1–1.4	1.5, 1.1–1.9	1.5, 1.1–1.9	1.6, 1.2–2.1	1.6, 1.2–2.1
From school ^d										
No	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Yes	1.0, 0.8–1.2	1.0, 0.8–1.2	1.2, 0.97–1.4	1.2, 0.97–1.4	1.2, 1.03–1.4	1.2, 1.03–1.4	1.3, 1.02–1.7	1.3, 1.02–1.7	1.5, 1.1–2.0	1.5, 1.1–2.0

Note. AOR = adjusted odds ratio; CI = confidence interval.

^aAmong current smokers only ($N = 1,178$).

^bUsed tobacco in last 30 days.

^cParents/guardian talked with participant about not using any type of tobacco product in past 12 months.

^dParticipant taught in any class in school, during this school year, about why they should not use tobacco products.

used a large, nationally representative sample of youth to measure their tobacco advertising exposure in the past 30 days as a snapshot of the ad exposure that is occurring on a longer time-frame. As speculated, we found that tobacco ads/promotions exposure via new media outlets is associated with favorable attitudes toward tobacco.

There are risky Internet behaviors that could help to explain increased tobacco ad/promotion exposure for some of the youth. For example, youth are more likely to receive inappropriate solicitations online and view images intended for adults only when they download illicit content and/or post personal information that could be construed as “provocative” on social network sites (Noll, Shenk, Barnes, & Haralson, 2013; Wells & Mitchell, 2008). In addition, youth may share computers or other technological devices with adults who have searched for tobacco products online and are being tracked online for targeted placement of tobacco-related advertisements (Christiansen, 2011). While these findings cannot be applied to all youth, we nevertheless speculate that exposure to tobacco advertisements via new media outlets might be increased for those youth that do engage in risky online behaviors and/or share computers with adults who search for tobacco-related content online. It is also possible that youth who more actively search for tobacco product information or have interest in tobacco could experience more tobacco ad exposure, which in turn might increase their tobacco involvement; yet, no known study has examined these associations and future studies in this area are needed. E-cigarettes and other noncombustible tobacco products are advertised online and could explain, at least in part, the decreased belief that “all tobacco products are dangerous” since these products tend to be perceived as less harmful than traditional cigarettes (Cho, Shin, & Moon, 2011; Pearson, Richardson, Niaura, Vallone, & Abrams, 2012). Nevertheless, future studies are needed to better understand volume of tobacco advertising to underage youth and how to regulate advertising content and restrict youths’ exposure to tobacco ads via new media outlets. It is equally important to determine the mechanisms by which tobacco retailers are marketing their products to youth if they are, in fact, targeting advertisements toward youth via new media outlets. If they are engaging in this improper activity, then tobacco companies must be more closely monitored and penalized. Until a sound set of regulations is in place governing online tobacco advertising, it is important for parents to query youth on their exposure to protobacco advertisements, more actively monitor their online behaviors, and/or install blocking and filtering software.

The findings of this study were limited by several factors. The NYTS is cross-sectional, preventing the determination of causal relationships. The NYTS is a school-based survey; data from high school dropouts or adolescents schooled at home are excluded. We also rely on participants’ self-report for all data, which contain some unknown level of reporting error. For instance, there is a possibility for error in recalling the media channel in which tobacco ads appear, especially given the high likelihood for youth to interact with multiple communication outlets frequently and often simultaneously. Most teens currently use the Internet (95%) occasionally (at minimum) and 78% of teens now have a cell phone (Madden, Lenhart, Duggan, Cortesi, & Urs, 2013); nevertheless, a lack of individual-level data on hours spent online and whether or not teen owns a cell phone is an additional limitation of

the present study. There are also a number of limitations with the NYTS questionnaire that are worth mentioning. First, the NYTS data are from 2011; therefore, newest tobacco products that emerged after the survey date were not included in the questionnaire. Second, exposure to tobacco advertising/promotions via all new media outlets was not queried in the NYTS (e.g., Twitter, Instagram, Tumblr, Pinterest, YouTube, LinkedIn, Google Plus+, or Tagged were excluded from the NYTS); thus, it is quite likely that the present day new media landscape was not fully captured in our study. NYTS did not measure if advertising/promotions were seen on a computer, smart phone, and/or other technological device and we are, therefore, unable to compare variations in exposure across new media technologies. Third, the NYTS asks youth to select all that apply from Facebook, MySpace, and/or Internet for advertisement exposure, which are not mutually exclusive categories. Additionally, youths’ exposure due to tobacco ads could potentially be due to their own or someone else’s (who is sharing the computer) web searching history and this could influence whether they endorsed receipt of an ad/promotion. Last, we do not have data on how the tobacco ads were transmitted and/or if advertisements and promotions came directly from tobacco companies. For instance, there is the possibility that some online tobacco advertising exposure is due to protobacco content pushed through affiliate marketers who typically earn commissions for promoting a product by placing advertisements on private Web sites. It can be a challenge to track these tactics and uncover the extent of a tobacco company’s direct involvement in such marketing strategies.

Despite these limitations, our results stress the need for continued research and surveillance on the tobacco marketing campaigns that have penetrated new, unregulated electronic media venues. We found that minority youth, very young youth, and youth who have not yet used tobacco have observed tobacco ads/promotions on social networking sites and text messages. These youth are more likely to have favorable attitudes toward tobacco. Given the influence of tobacco ads/promotions on youth tobacco use uptake (Lovato et al., 2011), increased efforts to restrict youth exposure to tobacco ads/promotions through these new media outlets are critical.

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DECLARATION OF INTERESTS

LJB is listed as an inventor on Issued U.S. Patent 8,080,371, “Markers for Addiction,” covering the use of certain SNPs in determining the diagnosis, prognosis, and treatment of addiction.

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