



## Trends in exposure to pro-tobacco advertisements over the Internet, in newspapers/magazines, and at retail stores among U.S. middle and high school students, 2000–2012



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### ABSTRACT

**Background.** Most tobacco use begins during youth. Thus, this study assessed the prevalence, trends, and correlates of pro-tobacco advertising among United States students in grades 6–12 during 2000–2012.

**Methods.** Data from the 2000–2012 National Youth Tobacco Survey were analyzed to assess self-reported exposure to pro-tobacco advertisements through three media: over the Internet, in newspapers/magazines, and at retail stores. Trends during 2000–2012 were assessed in a binary logistic regression model ( $P < 0.05$ ).

**Results.** Among all middle and high school students, the overall prevalence of exposure to Internet pro-tobacco advertisements increased from 22.3% to 43.0% during 2000–2012 ( $P < 0.001$  for linear trend). During the same period, declines were observed in the overall prevalence of exposure to pro-tobacco advertisements in newspapers/magazines (65.0% to 36.9%) and at retail stores (87.8% to 76.2%) ( $P < 0.001$  for all linear trends).

**Conclusion.** Exposure to pro-tobacco advertisements over the Internet increased significantly during 2000–2012 among United States middle and high school students, while a decline in exposure to advertisements in newspapers or magazines, and at retail stores occurred during the same period. However, over two-thirds of students still reported retail store exposure to pro-tobacco advertisements in 2012. Enhanced and sustained efforts would be beneficial to reduce even more exposure to all forms of pro-tobacco advertisements among youths.

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### Introduction

Tobacco use remains the leading preventable cause of death and disease in the United States, with nearly 443,000 deaths occurring annually from smoking-related diseases (U.S. Department of Health and Human Services, DHHS, 2012). Most tobacco use, including cigarette smoking, begins during youth. Among adults who become daily smokers, nearly all first use of cigarettes occurs by 18 years of age (88%), with 99% of first use by 26 years of age (U.S. DHHS, 2010).

The initiation and development of tobacco use among youths progress from forming attitudes and beliefs about tobacco, to experimenting with and maintaining the smoking behavior, to being addicted (U.S. DHHS, 2012). Tobacco promotional activities are important catalysts that can prompt smoking initiation among youth. Evidence indicates that tobacco companies have targeted youths with tobacco promotional

activities by highlighting themes that appeal to youth, such as independence and adventure seeking (U.S. DHHS, 2010). The 2012 U.S. Surgeon General's report concluded that exposure to pro-tobacco advertising and promotional activities causes the initiation and progression of tobacco use among youths (U.S. DHHS, 2012).

Despite the 1998 Master Settlement Agreement between the attorneys general of 46 U.S. states and the 4 largest U.S. tobacco companies prohibiting the tobacco industry from taking "any action, directly or indirectly, to target youth... in the advertising, promotion or marketing of tobacco products" (King and Siegel, 2001; U.S. Department of Justice, 1998), research suggests that the tobacco industry has increased advertising in the retail sector to circumvent the restrictions imposed by the agreement (Curry et al., 2011; Pierce and Gilpin, 2004).

In addition, the Internet presents an unprecedented opportunity through which the tobacco industry can deliver well-targeted messages to specific audiences, including youth. Among U.S. adolescents aged 12–17 years and young adults aged 18–29 years, an estimated 93% use the Internet (Pew Research Center, 2010). This is further compounded by the fact that monitoring and regulation of Internet marketing is still limited. For example, while federal law bars tobacco advertisements on any medium of electronic communication, the Federal Communications Commission does not currently regulate the Internet or Internet service providers (U.S. FCC, 2012).

*Abbreviations:* NYTS, National Youth Tobacco Survey.

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Because of the great potential that pro-tobacco advertisements over the Internet, in magazines/newspapers, and at retail stores have in reaching and influencing adolescents, reducing youth exposure to tobacco advertisements from these three sources is one of the targets of *Healthy People, 2020* (Healthy People 2020, 2013). Therefore, to assess recent trends in youth exposure to pro-tobacco advertisements from these media, and to monitor progress made in meeting the *Healthy People, 2020* objectives to reduce youth exposure to pro-tobacco advertisements, this study assessed the prevalence, trends, and correlates of pro-tobacco advertising over the Internet, in newspapers/magazines, and at retail stores among U.S. middle and high school students during 2000–2012, using data from the National Youth Tobacco Survey (NYTS).

## Methods

### Data source

The NYTS is a biennially repeated, anonymous, school-based national survey that collects information on key tobacco-related measures from middle school (grades 6–8) and high school (grades 9–12) students (Centers for Disease Control and Prevention, 2011; Starr et al., 2005). The NYTS research protocol was approved by the U.S. Office of Management and Budget; no ethics approval was sought for this study because only secondary data were used. We analyzed 7 consecutive waves of the NYTS, with total sample sizes ( $n$ ) and overall response rate (%) by year as follows: 2000 ( $n = 35,828$ ; 84.1%); 2002 ( $n = 26,149$ ; 74.2%); 2004 ( $n = 27,933$ ; 82.0%); 2006 ( $n = 27,038$ ; 80.2%); 2009 ( $n = 22,679$ ; 84.8%); 2011 ( $n = 18,866$ ; 72.7%); and 2012 ( $n = 24,658$ ; 73.6%).

### Measures

#### Outcome measures

Three self-reported outcomes were measured: exposure to pro-tobacco advertisements over the Internet; in newspapers or magazines; and at retail stores. These outcomes were assessed with the following respective questions: “When you are using the Internet, how often do you see ads for tobacco products?”, “When you read newspapers or magazines, how often do you see ads or promotions for cigarettes and other tobacco products”, and “When you go to a convenience store, supermarket, or gas station, how often do you see ads for cigarettes and other tobacco products or items that have tobacco company names or pictures on them?” Categorical responses for each of the questions included: “never”, “rarely”, “sometimes”, “most of the time”, or “always”. In addition, students who were not exposed to the respective media were allowed to indicate so by selecting the appropriate option, i.e., “I do not use the Internet”, “I do not read newspapers or magazines”, or “I never go to a convenience store, supermarket, or gas station”.

#### Current smoking status and socio-demographic characteristics

Current cigarette smokers were defined as students who reported having smoked cigarettes on at least one day during the past 30 days. Socio-demographic characteristics assessed included gender (boy or girl), race/ethnicity (Hispanic, or non-Hispanic: white, black, or Asian), and school level (middle or high).

### Data analyses

For each of the outcome measures (i.e. exposure to pro-tobacco advertisements over the Internet, newspapers/magazines, or retail stores), trend analyses were performed using two different denominators to ensure a nuanced assessment of exposure to tobacco promotional activities among youths. The first analyses assessed trends among all students who completed the surveys in order to determine the overall prevalence of exposure to pro-tobacco advertisements from the respective media, as well as trends during 2000–2012. Hence, students who answered “never” or “rarely” to the respective questions, as well as those who indicated that they did not use the respective media, were all categorized together as being non-exposed, whereas responses of “sometimes”, “most of the time” or “always” were categorized together as being exposed to the respective pro-tobacco advertisements. The second analyses were performed to measure prevalence of exposure to pro-tobacco advertisements among susceptible students only (i.e., students who reported that they used the media of interest – the Internet, newspapers/magazines, or retail stores). Hence, for the latter analyses, students who answered, “I do not use the

Internet”, “I do not read newspapers or magazines”, or “I never go to a convenience store, supermarket, or gas station” were excluded from the analyses.

Differences in point estimates for each outcome of interest were assessed within and across survey years by smoking status, school level, gender, and racial/ethnic group using  $\chi^2$  statistics. Unadjusted annual percentage changes (APC) in prevalence of exposure to pro-tobacco advertisements during 2000–2012 were calculated using Joinpoint analyses. In addition, adjusted linear trends during 2000–2012 were assessed in a binary logistic regression model controlling for current smoking status, school level, gender, and race/ethnicity. For the regression analysis, orthogonal polynomials were developed to account for variations in time between survey years.

Finally, to assess predictors of exposure to pro-tobacco advertisements over the Internet, in newspapers/magazines and at retail stores, multivariate logistic regression analyses were performed and assessed for current smoking status, school level, gender, and race/ethnicity ( $P < 0.05$ ). All data were weighted and analyzed with Stata version 11 (StataCorp. 2009. College Station, TX) and Joinpoint Regression Program version 4.0.4 (National Cancer Institute, 2013).

## Results

### Temporal trends in exposure to pro-tobacco advertisements

#### Over the internet

Among all U.S. middle and high school students, the overall prevalence of exposure to Internet pro-tobacco advertisements increased from 22.3% in 2000 to 43.0% in 2012 (APC = 3.7;  $P < 0.01$  for linear trend) (Table 1, Fig. 1). Significant increases were also noted among both smokers (24.1% to 44.0%) and nonsmokers (21.6% to 42.9%); middle school (25.4% to 41.0%) and high school students (19.6% to 44.6%); as well as among both boys (22.5% to 39.4%) and girls (22.0% to 46.7%). Significant increases were also observed among all race/ethnicity groups, except among non-Hispanic Asians where no significant change was observed (Table 1).

Similar findings were observed when analyses were restricted to only students who reported using the Internet during each year, with increases in overall exposure to pro-tobacco advertisements observed during 2000–2012 (28.0% to 44.7%; APC = 2.5;  $P < 0.001$  for linear trend) Subpopulation trends during 2000–2012 were also similar to those observed among all U.S. middle and high school students (Table 1).

#### In newspapers/magazines

The overall prevalence of exposure to pro-tobacco advertisements in newspapers/magazines among all U.S. middle and high school students declined during 2000 to 2012 (65.0% to 36.9%; APC =  $-4.7$ ;  $P < 0.001$  for linear trend) (Table 2, Fig. 1). During 2000–2012, declines ( $P < 0.001$  for all linear trends) were observed among both current smokers (69.2% to 43.3%) and nonsmokers (64.4% to 36.3%); middle (59.0% to 32.2%) and high school students (70.1% to 40.6%); as well as among both girls (67.4% to 38.5%) and boys (62.6% to 35.4%). Significant declines were also observed among all race/ethnicity groups.

Similarly, among U.S. middle and high school students who reported reading newspapers or magazines, the overall prevalence of exposure to newspaper/magazine advertisements declined from 74.0% in 2000 to 46.4% in 2012 (APC =  $-3.8$ ;  $P < 0.001$  for linear trend). Significant declines ( $P < 0.001$  for all linear trends) were also observed among all subpopulation groups (Table 2).

#### In a retail store

The overall prevalence of exposure to pro-tobacco advertisements in a retail store among all U.S. middle and high school students declined during 2000 and 2012 (87.8% to 76.2%; APC =  $-1.0$ ;  $P < 0.001$  for linear trend) (Table 3, Fig. 1). Declines ( $P < 0.001$  for all linear trends) were also observed among both smokers (89.7% to 81.5%) and nonsmokers (88.0% to 75.8%); middle (86.0% to 71.1%) and high (89.5% to 80.1%) school students, girls (89.9% to 77.3%) and boys (85.8% to 75.1%), as well as among all race/ethnicity groups.

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