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Original article

E-Cigarette Marketing Exposure Is Associated With E-Cigarette Use Among US Youth

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A B S T R A C T

Purpose: E-cigarettes are currently the most commonly used tobacco product among US youth. However, unlike conventional cigarettes, e-cigarettes are not subject to marketing restrictions. This study investigates the association between exposure to e-cigarette marketing and susceptibility and use of e-cigarettes in youth.
Methods: Data were obtained from the 2014 National Youth Tobacco Survey. Participants were 22,007 US middle and high school students. Multivariate logistic regression models assessed the relationship between e-cigarette marketing (internet, print, retail, and TV/movies) and current and ever use as well as susceptibility to use e-cigarettes among never e-cigarette users.
Results: Exposure to each type of e-cigarette marketing was significantly associated with increased likelihood of ever and current use of e-cigarettes among middle and high school students. Exposure was also associated with susceptibility to use of e-cigarettes among current nonusers. In multivariate models, as the number of channels of e-cigarette marketing exposure increased, the likelihood of use and susceptibility also increased.
Conclusions: Findings highlight the significant associations between e-cigarette marketing and e-cigarette use among youth and the need for longitudinal research on these relationships.

IMPLICATIONS AND CONTRIBUTION

This study reveals an association between adolescent e-cigarette use and e-cigarette marketing exposure. Further revealed is an association between adolescent e-cigarette use susceptibility and exposure to e-cigarette marketing. Furthermore, each channel of advertising examined in this study is individually associated with a statistically significant increase in e-cigarette use and susceptibility.

Electronic cigarettes (e-cigarettes) are the most commonly used nicotine product among adolescents, outpacing conventional cigarettes [1]. E-cigarette use among high school students increased from 1.5% in 2011 to 13.4% in 2014 [1]. From 2013 to 2014, e-cigarette use tripled among middle school (1.1%–3.9%) and high school (4.5%–13.4%) students [1]. Although research is limited on the short- and long-term health consequences of e-cigarette use, exposure to nicotine and e-cigarette aerosols present several public health concerns. Preliminary studies have detected the presence of harmful chemicals [2] and carcinogens [3] in e-cigarette liquids and aerosols. Studies show that exposure to nicotine during adolescence negatively influences adolescent brain development [4] and is associated with attention and cognition deficits [5,6], mood dysfunctions [7], and increased propensity for risk taking [8]. Indirectly, studies have shown a link between e-cigarette use and use of combustible tobacco products, such as conventional cigarettes [9]. Furthermore, research suggests a temporal relationship, indicating use of e-cigarettes may act as the impetus for combustible tobacco use [10].

There is limited research on the impact of marketing on the use of e-cigarettes. However, tobacco advertising and point-of-sale marketing have been shown to cause tobacco use among

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youth and young adults [11] and increase positive perceptions of tobacco use among nonusers [12]. A study of adolescents who had never used e-cigarettes found a positive relationship between exposure to e-cigarette advertising and intentions to use e-cigarettes [13]. Another study, using data from 2011, found an association between tobacco marketing and other protobacco influences (e.g., seeing products used on TV/movie) and use of e-cigarettes among adolescents [14]. However, the prevalence of e-cigarette experimentation among the adolescents in the sample was relatively low (3.1%) and current use was not assessed. Rapid changes in industry marketing [15], product awareness [13], and use by adolescents [1] warrant ongoing research. It is vital to understand the relationship between marketing and e-cigarette use and susceptibility to use among adolescents, particularly as significant regulatory gaps remain as compared to conventional tobacco products. The Food and Drug Administration does not currently regulate the marketing or distribution of electronic cigarettes [16], and state laws have not kept up with the market changes. This lack of regulation has allowed this industry to launch marketing campaigns that appeal particularly to adolescents.

The United Kingdom is, currently, the only country in the world with comprehensive e-cigarette regulations, including restrictions on marketing [17]. Marketing restrictions to protect youth include banning advertisements likely to appeal to minors and those using people appearing to be under age 25 years to sell e-cigarettes. In addition, mediums with an adolescent audience of more than 25% cannot be used to advertise e-cigarettes, and e-cigarette advertisements cannot run adjacent to programs likely to appeal to adolescents. Many countries including Uruguay, Brazil, and Mexico have banned e-cigarettes entirely [18].

From 2011 to 2013, e-cigarette marketing expenditures increased nearly 10-fold, from $6.4 million to more than $60 million [15,19] in the United States. These figures account for print, television, radio, and digital advertising. Over this same period, there has been a corresponding growth in initiation, current use, and product awareness of e-cigarettes among youth [1]. This is not surprising, given prior experience with cigarette advertising and cigarette use among young people.

The 2012 Report of the Surgeon General on Preventing Tobacco Use Among Youth and Young Adults documents the causal relationship between advertising and promotion for cigarettes and initiation of cigarette smoking among young populations. Recent reports document that e-cigarette marketing reaches the vast majority of young populations. The Centers for Disease Control and Prevention estimated that almost seven in 10 middle school and high school students are reached by e-cigarette marketing [20] and the truth initiative found that 84% of young people ages 13–21 years are aware of e-cigarette advertising [21]. However, it is still unknown whether consistent associations exist between exposure to e-cigarette marketing and susceptibility to and use of e-cigarettes among youth.

Study aims and hypothesis

This study aims to determine the association between exposure to e-cigarette marketing through several channels (internet, print, retail, and TV/movies) and e-cigarette use and susceptibility to use in a nationally representative sample of middle school and high school students. We hypothesize that exposure to e-cigarette marketing will be positively associated with ever use, current use, and susceptibility to e-cigarette use among young people. We further hypothesize that the magnitude of the relationship will increase with each additional marketing channel to which a young person is exposed. This study is the first to examine exposure to e-cigarette marketing, specifically, and its relationship to e-cigarette use and susceptibility to use e-cigarettes among youth in a nationally representative sample.

Methods

Study sample and population

Data were obtained from the 2014 National Youth Tobacco Survey; a stratified, three-stage cluster sample design to produce a nationally representative sample of middle school and high school students in the United States. These data were collected from 207 schools with a sample size of 22,007.

Procedure

National Youth Tobacco Survey sampling procedures are probabilistic and conducted without replacement at all stages and entail selection of primary sampling units within each stratum, schools within each selected primary sampling unit, and classes within each selected school. Participation by schools and students are voluntary and student responses remain anonymous. The procedure is described in detail elsewhere [22].

The university's committee for the protection of human subjects determined that the present study was exempt from institutional review board review.

Measures

E-cigarette use. Ever use of e-cigarettes (experimentation) and use in the past 30 days (current use) were outcome variables in the analysis. Ever use of e-cigarettes was assessed by the questions "Have you ever tried an electronic cigarette or e-cigarette such as Blu, 21st Century Smoke or NJOY?" Those that responded "yes" (coded as 1) were considered to have had experimented with e-cigarettes; everyone else were considered a nonuser (coded as 0). Current use status of e-cigarettes was assessed by "During the past 30 days, on how many days did you use electronic cigarettes or e-cigarettes such as Blu, 21st Century Smoke or NJOY?" with those responding with anything other than "0" considered to be a current user of e-cigarettes (coded as 1).

Susceptibility to e-cigarette use. This measure used three items, similar to cigarette susceptibility criteria established by Pierce et al. [23] and was coded as a binary variable (susceptible = 1/not susceptible = 0). Questions used to measure susceptibility among students who reported they had never used an e-cigarette were: "Do you think you will try an electronic cigarette or e-cigarette soon?", "Have you ever been curious about using an electronic cigarette or e-cigarette such as Blu, 21st Century Smoke, or NJOY?" and "If one of your best friends were to offer you an electronic cigarette or e-cigarette, would you use it?" Responses for these questions included "definitely yes," "probably yes," "probably not," and "definitely not." If the given response for any of these three questions was anything other than "definitely not" (coded as 0), the respondent was categorized as susceptible to using e-cigarettes (coded as 1) [23,25].