Addictive Behaviors 95 (2019) 189–196

Contents lists available at ScienceDirect

Addictive Behaviors

journal homepage: www.elsevier.com/locate/addictbeh

# Online tobacco marketing among US adolescent sexual, gender, racial, and ethnic minorities

Samir Soneji[a,b,*], Kristin E. Knutzen[b], Andy S.L. Tan[c,d], Meghan Bridgid Moran[e], JaeWon Yang[f], James Sargent[a,b], Kelvin Choi[g]

[a] Dartmouth-Hitchcock Norris Cotton Cancer Center, Geisel School of Medicine at Dartmouth, Lebanon, NH, United States of America
[b] The Dartmouth Institute for Health Policy & Clinical Practice, Geisel School of Medicine at Dartmouth, Hanover, NH, United States of America
[c] Division of Population Sciences, Dana-Farber Cancer Institute, United States of America
[d] Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health, Boston, MA, United States of America
[e] Department of Health, Behavior and Society, Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD, United States of America
[f] Warren Alpert Medical School of Brown University, Providence, RI, United States of America
[g] Division of Intramural Research, National Institute on Minority Health and Health Disparities, Bethesda, MD, United States of America

## HIGHLIGHTS

- Leading form of engagement with online tobacco marketing was watching videos about tobacco products.
- Sexual/gender and racial/ethnic minority adolescents face higher risk of engaging with online tobacco marketing compared to their straight and non-Hispanic white counterparts.
- This risk may worsen existing disparities in tobacco use among some of these populations.

## ABSTRACT

*Introduction:* The tobacco industry has previously targeted sexual/gender and racial/ethnic minorities with focused campaigns in traditional, offline marketing. We assess whether these populations report more engagement with online tobacco marketing compared with heterosexual and non-Hispanic white youth.

*Methods:* Data were from 8015 adolescents sampled between 2014 and 2015 in the nationally-representative Population Assessment for Tobacco and Health (PATH) Study. Engagement with online tobacco marketing within the past year was assessed through eight forms of engagement. A weighted logistic regression model was fit with engagement as outcome and socio-demographic and psychosocial characteristics, internet-related and substance use behavior, tobacco-related risk factors, tobacco use status, and prior engagement with online tobacco marketing as covariates.

*Results:* Accounting for other covariates including tobacco use status and prior engagement with online tobacco marketing, the odds of past-year engagement were higher for sexual minority males (aOR = 1.57; 95% CI: 1.05–2.35) compared to straight males and higher for sexual minority females (aOR = 1.45; 95% CI: 1.13–1.87) compared to straight females. The odds of past-year engagement were also higher for Hispanics (aOR = 1.31; 95% CI: 1.11–1.56) and non-Hispanic Blacks (aOR = 1.42; 95% CI: 1.14–1.77) compared to non-Hispanic Whites.

*Conclusions:* Sexual/gender and and racial/ethnic minority youth reported higher engagement with online tobacco marketing than their heterosexual and non-Hispanic white peers, respectively.

## 1. Introduction

The tobacco industry has long targeted sexual, gender, racial, and ethnic minority adolescents and adults with focused marketing, advertising campaigns, and economic support of minority advocacy organizations (Baig, Pepper, Morgan, et al., 2017; Dilley, Spigner, Boysun, et al., 2008; Hafez & Ling, 2006; Smith & Malone, 2003). This targeting has likely contributed to higher rates of specific tobacco product use among racial and ethnic minorities (e.g., mentholated cigarettes among non-Hispanic Black adolescents) and overall tobacco and e-cigarette use among sexual and gender minorities compared to their peers (Buchting, Emory, Null, et al., 2017; Villanti, Mowery, Delnevo, et al., 2016; Washington, 2002). For example, 29.8% of bisexual youth and 25.6% of gay and lesbian youth reported tobacco use

* Corresponding author at: The Dartmouth Institute for Health Policy and Clinical Practice, Dartmouth Geisel School of Medicine, One Medical Center Drive, Lebanon NH 03756, United States of America.
*E-mail address:* samir.soneji@dartmouth.edu (S. Soneji).

https://doi.org/10.1016/j.addbeh.2019.03.015
Received 28 November 2018; Received in revised form 20 March 2019; Accepted 21 March 2019
Available online 22 March 2019

within the past 30 days in 2013–2014 compared to 11.8% of straight youth. (Kasza, Ambrose, Conway, et al., 2017) Since the 1998 Master Settlement Agreement, the tobacco industry has shifted away from traditional marketing to internet-based marketing, in part, because the latter is less regulated (Lewis, Yulis, Delnevo, et al., 2004). Internet-based marketing allows tailored direct-to-consumer marketing that moves beyond passive exposure and instead facilitates engagement in promotional activities and interaction among potential customers (Freeman & Chapman, 2009; Richardson, Ganz, & Vallone, 2014).

As the level of engagement has increased substantially among all adolescents between 2013 and 2015 (Soneji et al., 2019), this rise may be especially problematic in minority populations if they are disproportionately affected as they have been with traditional, offline marketing. In addition to higher risk of exposure to traditional forms of tobacco marketing, sexual and gender minority (SGM) adults are more likely to be exposed to and interact with tobacco marketing on social media (Emory, Buchting, Trinidad, et al., 2019). Yet, it is not known if SGM youth, like SGM adults, and racial and ethnic minority youth also face higher risks of engaging with online tobacco marketing, such as signing up to receive e-mails or watching videos about tobacco products. Such engagement is problematic because it may increase the risk of tobacco use initiation, increase the frequency of tobacco use, and decrease the likelihood of tobacco use cessation (Soneji, Yang et al., 2018).

Our study addresses this knowledge gap by estimating the prevalence of engagement with online tobacco marketing within the past year among racial, ethnic, and sexual minority adolescents and transgender adolescents. If these minority populations—especially non-tobacco users—are more likely to engage in online tobacco marketing than their majority-group peers, existing disparities in tobacco use could widen. Our study also assesses other socio-demographic, psychosocial, and environmental risk factors for engagement with online tobacco marketing within the past year to identify additional vulnerable subpopulations. Knowledge of the risk factors for engagement with online tobacco marketing could help focus public health campaigns that counter its influence.

## 2. Methods

### 2.1. Data

The Population Assessment for Tobacco and Health (PATH) Study is a nationally representative, longitudinal cohort study conducted by the National Institute on Drug Abuse and the Food and Drug Administration's Center for Tobacco Products. Our analysis primarily utilized data from Wave 2 (2014–2015) of the PATH Study, Youth Interview, Restricted-Use File. Our analysis retrospectively linked engagement with online tobacco marketing measured at Wave 1 (2013–2014).

At Wave 2, the PATH study sampled 12,172 adolescents: 4157 younger adolescents (12–13 year olds) and 8015 older adolescents (14–17 year olds). The younger adolescents were excluded from the analysis because the PATH Study did not assess their sexual orientation or being transgender. Of the 8015 older adolescents, 8012 respondents were previously sampled in Wave 1 and 3 respondents were newly sampled in Wave 2. Those three respondents were excluded from the analysis because they did not have baseline Wave 1 data on engagement with online tobacco marketing. The final sample consisted of the 8012 14–17 year olds sampled in both Wave 1 and Wave 2. Among households that were screened at Wave 2, the overall weighted response rate was 87.3%. For further details about the PATH Study, see Hyland et al. (Hyland, Ambrose, Conway, et al., 2017). The PATH Study created population and replicate weights that adjusted for complex study design characteristics (e.g., oversampling at Wave 1) and nonresponse at Waves 1 and 2. Combined with the use of a probability sample, the weights enable analyses of the PATH Study data to produce robust estimates that are representative of the non-institutionalized, civilian U.S. population ≥ 12 years (Hyland et al., 2017).

### 2.2. Outcome

Engagement with online tobacco marketing within the past year at Wave 2 was based on eight forms of engagement assessed in PATH: [1] signing up for any email alerts about tobacco products, including e-cigarettes, in past year; [2] reading any articles online about tobacco products, including e-cigarettes, in past year; [3] watching a video online about tobacco products, including e-cigarettes, in past year; [4] liking or following Camel, Marlboro, Newport, Swisher Sweets, Blu, Fin, Vuse, NJOY on Facebook, Twitter or other social media sites; [5] sending a link or information about Camel, Marlboro, Newport, Swisher Sweets, Blu, Fin, Vuse, NJOY to others on Facebook, Twitter or other social media sites in past year; [6] playing an online game related to Camel, Marlboro, Newport, Swisher Sweets, Blu, Fin, Vuse, NJOY in past year [7] receiving any discount coupons or promotions for tobacco products or e-cigarettes by email, the internet, social networking sites, or a text message in past 30 days; and [8] receiving any information from a tobacco company, other than discount coupons or promotions, by email, the internet, social networking sites, or a text message in past 30 days. A respondent was considered to have engaged in online tobacco marketing within the past year if she or he responded affirmatively to at least one form of engagement.

### 2.3. Primary variables of interest

The primary variables of interest were race/ethnicity (Hispanic, non-Hispanic Black, non-Hispanic Other, and non-Hispanic White), sexual orientation, and being transgender. The PATH Study ascertained sex through the question “What is your sex”, to which respondents could answer “female” or “male” or not answer. The PATH Study ascertained sexual orientation through the question “Do you consider yourself to be straight, lesbian or gay, bisexual, or something else?”. The PATH Study ascertained being transgendered through the question “Do you consider yourself to be transgender?”. Respondents who answered “yes” to this question were considered transgender regardless of their response or non-response to the survey questions about sex and sexual orientation. Respondents who answered “lesbian or gay”, “bisexual”, or “something else” to the question about sexual orientation and “female” to the question about sex were categorized as sexual minority females. Similarly, respondents who answered “lesbian or gay”, “bisexual”, or “something else” to the question about sexual orientation and “male” to the question about sex were categorized as sexual minority males. Respondents who answered “straight” to the question about sexual orientation were categorized as straight females and males (based on their answer to the question about sex).

### 2.4. Covariates

Other socio-demographic characteristics of respondents included age and parental education. Psychosocial characteristics included mental health status, which was assessed by the level of internalizing (e.g., feeling very trapped, lonely, sad, blue, depressed, or hopless about the future in the past year) and externalizing (e.g., had a hard time playing attention at school, work, or home two or more times in the past year) problems based on the sum of four and five items of the Global Appraisal of Individual Needs-Short Screener, respectively. Internet-related behavior included the frequency of use of social networking sites and of regular use of smart phones. Substance use behavior included past 30-day binge alcohol drinking, past-year marijuana use, and past-year illicit and non-prescription drug use. Other potential risk factors for tobacco use included close contact with a smoker within the past week; living with anyone who currently used tobacco; receipt of tobacco discount coupons through the mail; receipt of tobacco-

related information through the mail; weekly income from a job, family, or allowance; and school performance. Respondents were categorized into the following tobacco use status: non-susceptible never tobacco user, susceptible never tobacco user, ever tobacco user but not within the past year, and ever tobacco user and within the past year. Susceptibility to tobacco use among respondents who had never used tobacco was based on respondent intention to use a tobacco product soon, willingness to try a product if offered by a friend, and curiosity about using a product. Finally, prior engagement with online tobacco marketing was based on six forms of engagement measured at Wave 1 including: [1] ever signing up for email alerts, reading articles, or watching videos about tobacco products; [2] ever liking or following tobacco brands on social media sites; [3] ever sending links or information about tobacco brands on social media sites; [4] ever playing online games about tobacco products; [5] ever receiving discount coupons or promotions for tobacco products electronically; and [6] ever receiving tobacco-related information about tobacco products electronically (see Appendix Table A.1 for details on all covariates).

### 2.5. Analyses

First, the weighted prevalence of characteristics was estimated among all respondents included in the study. Then, the weighted prevalence of engagement with online tobacco marketing within the past year was estimated by sexual orientation and being transgender and race/ethnicity. The weighted prevalence of individual forms of engagement was also estimated by sexual orientation, being transgender, and race/ethnicity. Spearman's rank correlation coefficient was calculated for the rank of individual forms of engagement between each pair of sub-populations (e.g., sexual minority females and sexual minority males). Next, weighted logistic regression models were fit to engagement with online tobacco marketing within the past year as the outcome and sexual orientation, being transgender, and race/ethnicity as the primary variables of interest. Covariates included other socio-demographic and psychosocial characteristics, internet-based and substance use behaviors, other potential risk factors for tobacco use, tobacco use status, and baseline engagement with online tobacco marketing at Wave 1. Sets of covariates were added sequentially to assess how they affected the association between the primary variables of interest and past-year engagement. Model 1 included sexual orientation, being transgender, and race/ethnicity. Model 2 added other socio-demographic characteristics. Model 3 additionally added psychosocial characteristics and internet-related behavior. Model 4 additionally added substance use behavior, other potential risk factors for tobacco use, and tobacco use status. Finally, model 5 additionally added ever engagement with online tobacco marketing at Wave 1. The sets of covariates were added sequentially because previous studies identified them as risk factors for exposure to tobacco marketing (Tessman, Caraballo, Corey, et al., 2014). The models were fit with straight males as the reference category to allow comparison between sexual minority males and straight males. The models were then fit with straight females as the reference category to allow comparison between sexual minority females and straight females.

All analyses were conducted in R (version 3.4.3; The Comprehensive R Archive Network) and utilized balanced repeated replication weights with Fay's correction (shrinkage factor set at 0.3) to account for sampling and non-response in the PATH Study. The Dartmouth College Committee for the Protection of Human Subjects determined that the regulatory definition of human subjects research (45 CFR 46.102[f]) did not apply to this study and, therefore, the study was exempted from institutional review board review.

**Table 1**
Characteristics of PATH wave 2 study adolescent respondents, aged 14–17 years ($N$ = 8012)[a].

| | Weighted Prevalence (%) |
|---|---|
| Age | |
| 14 | 25.5 |
| 15 | 25.5 |
| 16 | 25.3 |
| 17 | 23.7 |
| Sexual orientation and being transgender | |
| Transgender | 1.0 |
| Sexual minority female | 6.6 |
| Sexual minority male | 2.4 |
| Straight female | 41.2 |
| Straight male | 48.8 |
| Race/ethnicity | |
| Non-Hispanic White | 55.0 |
| Hispanic | 22.5 |
| Non-Hispanic Black | 13.5 |
| Non-Hispanic other/multi-racial | 9.0 |
| School performance[b] | |
| Mostly as or school ungraded | 26.1 |
| As and Bs | 31.9 |
| Mostly Bs | 10.0 |
| Bs and Cs | 18.3 |
| Mostly Cs to mostly Fs | 13.6 |
| Weekly income | |
| None or < $1 | 30.1 |
| $1–$20 | 36.3 |
| $21–$50 | 13.6 |
| $51 or more | 19.9 |
| Other substance use | |
| 0 | 83.4 |
| 1 | 13.5 |
| 2 or more | 3.0 |
| Parental education | |
| Less than high school graduate | 16.5 |
| High school graduate or equivalent | 18.3 |
| At least some college | 65.2 |
| Internalizing problems | |
| Low | 38.1 |
| Moderate | 26.6 |
| High | 35.2 |
| Externalizing problems | |
| Low | 31.6 |
| Moderate | 24.8 |
| High | 43.6 |
| Social networking account use | |
| No social networking account | 5.6 |
| Monthly or less often | 6.2 |
| Weekly | 6.5 |
| Daily | 15.0 |
| Several times a day | 66.8 |
| Regularly used a smart phone | 75.9 |
| Tobacco use status | |
| Never, non-susceptible | 37.9 |
| Never, susceptible | 31.9 |
| Ever tobacco use, not past year | 8.0 |
| Past year tobacco use | 22.1 |
| Close contact with a smoker within the past week | 38.3 |
| Lived with tobacco user | 30.0 |
| Received tobacco discount coupon or promotion by mail | 1.6 |
| Received tobacco-related information by mail | 0.6 |
| Engagement with online tobacco marketing at wave 1 | 9.4 |

[a] Unweighted sample size counts cannot be reported per requirements of the PATH Restricted Use File.

[b] The number of adolescent respondents indicating school ungraded fell below reporting requirements for PATH Restricted Use File. Thus, this category was combined with Mostly As.

## 3. Results

### 3.1. Study population

The population was distributed approximately equally by age (Table 1). The population consisted of approximately 1.0% transgender adolescents, 6.6% sexual minority females, 2.4% sexual minority males, 41.2% straight females, and 48.8% straight males. By race/ethnicity, the population consisted of appropoximately 22.5% Hispanics, 13.5% non-Hispanic Blacks, 9.0% non-Hispanic other/multi-racial adolescents, and 55.0% non-Hispanic Whites. An estimated 81.8% used social networking sites at least once a day. An estimated 38.3% were in close contact with tobacco users with the past week, 30.0% lived with tobacco users, 1.6% received tobacco discount coupons through the mail, and 0.6% received other tobacco-related information through the mail. An estimated 37.9% were non-susceptible never tobacco users, 31.9% were susceptible never tobacco users, 8.0% were ever tobacco users but not within the past year, and 22.1% were tobacco users within the past year. Finally, an estimated 9.4% had engaged with online tobacco marketing at Wave 1 approximately one year earlier.

### 3.2. Prevalence of engagement with online tobacco marketing

An estimated 35.1% of transgender adolescents, 37.2% of sexual minority females, and 30.5% of sexual minority males engaged compared to 22.9% of straight females and 21.3% of straight males (Table 2). An estimated 23.4% of Hispanics and 26.2% of non-Hispanic Blacks engaged compared to 22.3% of non-Hispanic Whites. Across race/ethnicity, sexual orientiation, and being transgender, the leading form of engagement was watching videos online about tobacco products (Table 2). The relative ranking of other forms of engagement across these populations remained approximately consistent (Spearman's rank correlation between pairs of sub-populations ranged from 0.78 to 1.0).

Most adolescents who engaged did so with a single form of engagement, followed by two forms of engagement (Fig. 1). For example, among the estimated 22.9% of straight females who engaged, 72.4% engaged with a single form, 18.5% engaged with two forms, and 9.2% engaged with three or more forms. Among the 37.2% of sexual minority females who engaged, 65.6% engaged with a single form, 22.6% engaged with two forms, and 11.8% engaged with three or more forms. Among the 35.1% of transgender adolescents who engaged, 62.7% engaged with a single form, 13.0% engaged with two forms, and 24.3% engaged with three or more forms.

### 3.3. Multivariable analyses

In Model 1, which included only race/ethnicity, sexual orientation, and being transgender, the odds of engagement were higher for transgender adolescents (adjusted odds ratio [aOR] = 2.13; 95% confidence interval [CI]: 1.29–3.54) and sexual minority males (aOR = 1.64; 95% CI: 1.16–2.32) compared to straight males (Table 3) and higher for sexual minority females (aOR = 2.01; 95% CI: 1.63–2.48) compared to straight females (Appendix Table 2). The odds were also higher for non-Hispanic Blacks (aOR = 1.24; 95% CI: 1.05–1.48) compared to non-Hispanic Whites.

These associations decreased in magnitude when other socio-demographic, psychosocial, environmental characteristics; internet-related and substance use behaviors; other potential risk factors for tobacco use; tobacco use status; and ever engagement with online tobacco marketing were included. In the full model (Model 5), the adjusted odds of engagement were 1.57 (95% CI: 1.05–2.35) times higher for sexual

**Table 2**
Prevalence of engagement with online tobacco marketing within the past year. Overall and by specific forms, by sexual orientation, being transgender, and race/ethnicity (%)[a].

| | ≥1 form of online engagement within past year Pt. Est. (95% CI) | Specific forms[b] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Signed up for email alerts about tobacco products Pt. est. (95% CI) | Read articles online about tobacco products Pt. est. (95% Ci) | Watched videos online about tobacco products Pt. est. (95% CI) | Liked or followed tobacco brand on social media Pt. est (95% CI) | Sent link about tobacco brand on social media Pt. est. (95% CI) | Played online game related to a tobacco brand Pt. est. (95% CI) | Received tobacco discount coupon electronically Pt. est. (95% CI) | Received tobacco-related information electronically Pt. est. (95% CI) |
| Race/ethnicity | | | | | | | | | |
| Hispanic | 23.4 (21.6, 25.2) | 7.6 (6.4, 8.7) | 10.3 (9.0, 11.7) | 14.3 (12.8, 15.8) | 7.0 (5.9, 8.0) | 3.3 (2.5, 4.0) | 3.2 (2.4, 4.0) | 3.0 (4.0, 3.0) | 1.6 (1.0, 2.1) |
| Non-Hispanic Black | 26.2 (23.3, 29.2) | 7.0 (5.1, 8.8) | 10.6 (8.5, 12.7) | 13.8 (11.4, 16.2) | 10.5 (8.5, 12.6) | 4.7 (3.2, 6.1) | 5.6 (4.1, 7.1) | 3.9 (7.1, 3.9) | 2.3 (1.2, 3.4) |
| Non-Hispanic other/multi-racial | 25.4 (21.7, 29.1) | 12.0 (9.1, 15.0) | 13.0 (10.1, 15.9) | 18.2 (14.8, 21.5) | 6.4 (4.6, 8.2) | 3.2 (1.7, 4.6) | 2.4 (1.2, 3.7) | 3.0 (3.7, 3.0) | 1.2 (0.3, 2.0) |
| Non-Hispanic White | 22.3 (21.0, 23.7) | 9.1 (8.2, 10.1) | 10.4 (9.4, 11.5) | 15.0 (13.8, 16.2) | 5.4 (4.7, 6.2) | 2.6 (2.1, 3.1) | 2.3 (1.8, 2.8) | 3.1 (2.8, 3.1) | 1.7 (1.3, 2.1) |
| Sexual orientation and being transgender | | | | | | | | | |
| Transgender | 35.1 (23.8, 46.5) | 10.4 (2.3, 18.6) | 10.9 (2.8, 19.0) | 21.4 (10.8, 31.9) | 11.3 (3.8, 18.8) | 9.3 (2.3, 16.4) | 9.9 (2.8, 17.0) | 8.0 (17.0, 8.0) | 7.7 (0.9, 14.6) |
| Sexual minority female | 37.2 (32.8, 41.6) | 10.2 (7.5, 13.0) | 17.5 (14.0, 21.0) | 22.3 (18.5, 26.1) | 14.9 (11.7, 18.1) | 7.7 (5.2, 10.1) | 4.6 (2.7, 6.4) | 4.4 (6.4, 4.4) | 2.1 (0.8, 3.4) |
| Sexual minority male | 30.5 (23.4, 37.6) | 14.7 (9.2, 20.3) | 15.5 (9.6, 21.4) | 22.8 (16.1, 29.4) | 5.1 (1.5, 8.6) | 2.4 (0.0, 4.7) | 4.7 (1.4, 8.0) | 2.5 (8.0, 2.5) | 1.8 (0.0, 3.6) |
| Straight female | 22.9 (21.3, 24.4) | 9.2 (8.1, 10.3) | 10.0 (8.9, 11.1) | 14.9 (13.6, 16.2) | 6.6 (5.7, 7.5) | 3.3 (2.6, 3.9) | 2.1 (1.6, 2.6) | 3.3 (2.6, 3.3) | 2.2 (1.6, 2.8) |
| Straight male | 21.3 (19.9, 22.7) | 7.9 (6.9, 8.8) | 9.9 (8.9, 11.0) | 13.5 (12.3, 14.7) | 5.3 (4.5, 6.0) | 2.2 (1.7, 2.7) | 3.2 (2.7, 3.8) | 2.8 (3.8, 2.8) | 1.1 (0.8, 1.5) |

Note: Pt. Est. = Point Estimate; CI = Confidence Interval.

[a] Unweighted sample size counts cannot be reported per requirements of the PATH Restricted Use File.

[b] Sum of prevalence of specific forms of engagement not equal to overall prevalence of engagement because individuals could engage with multiple forms within the past year.

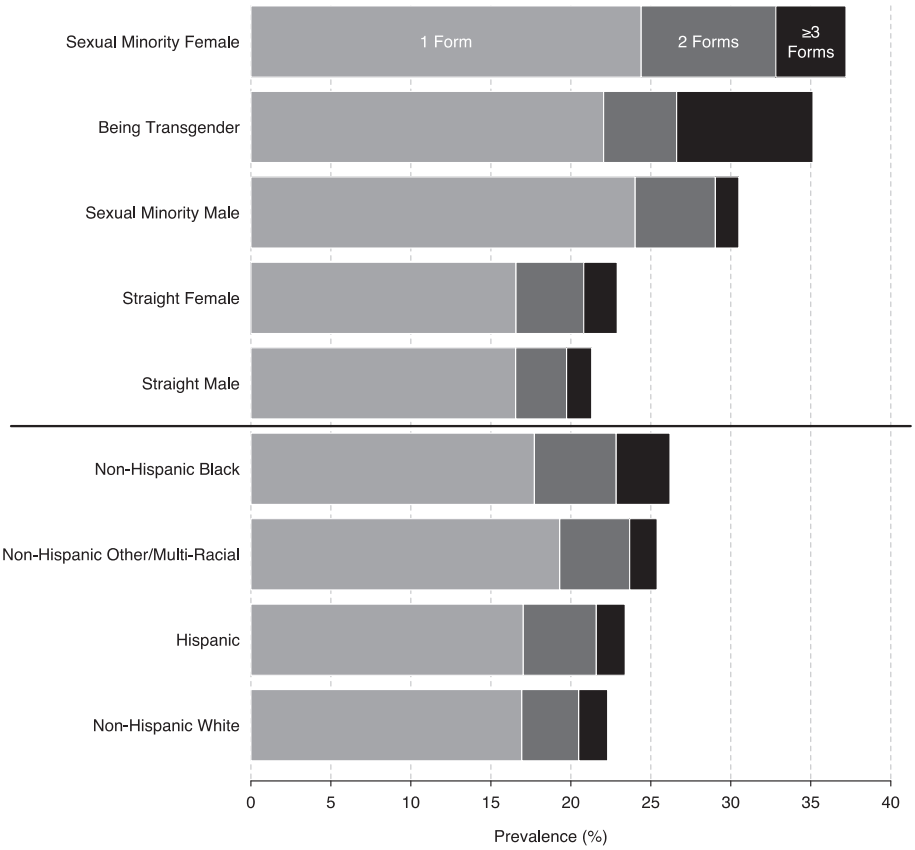


**Fig. 1.** Prevalence of engagement with online tobacco marketing within the past year and by number of forms of engagement among adolescents who engaged (2014–2015).
Note: See Appendix Table 3 for 95% confidence interval of prevalence values.

minority males compared to straight males and 1.45 (95% CI: 1.13–1.87) times higher for sexual minority females compared to straight females (Table 3 and Appendix Table 2). In the full model, the adjusted odds of engagement were higher for Hispanics (aOR = 1.31; 95% CI: 1.11–1.56) and non-Hispanic Blacks (aOR = 1.42; 95% CI: 1.14–1.77) compared to non-Hispanic Whites.

The adjusted odds of engagement within the past year were also higher for adolescents who used other substances compared to those who did not (e.g., aOR = 1.35; 95% CI: 1.09–1.67 for substance use score of 1), demonstrated high levels of internalizing (aOR = 1.41; 95% CI: 1.14–1.73) or externalizing (aOR = 1.53; 95% CI: 1.23–1.89) disorders compared to those with low levels, and were in close contact with a smoker within the past week (aOR = 1.60; 95% CI: 1.37–1.85) compared to those who were not (Table 3). Frequency of using social networking sites was not associated with significantly higher odds of engagement. Compared to non-susceptible never tobacco users, the adjusted odds of engagement were higher for susceptible never tobacco users (aOR = 1.74; 95% CI: 1.47–2.07) and past-year tobacco users (aOR = 2.02; 95% CI: 1.61–2.53). Finally, the adjusted odds of past-year engagement at Wave 2 were higher for respondents who had ever engaged at Wave 1 (aOR = 3.35; 95% CI: 2.72–4.11) compared to those who had never engaged at Wave 1.

## 4. Discussion

Our cross-sectional study found SGM adolescents and racial and ethnic minority adolescents reported higher engagement with online tobacco marketing compared to their heterosexual and non-Hispanic white peers, respectively. These minority populations are already exposed to greater levels of tobacco marketing in traditional, offline marketing channels (e.g., ads in magazines) and such exposure has been shown to lead to adolescent tobacco use (National Cancer Institute, 2008). The increased risk of online engagement among these minority populations may also pose a public health concern. Engagement with online tobacco marketing, as with exposure to traditional tobacco marketing, is positively associated with tobacco use initiation and increased frequency of tobacco use and negatively associated with tobacco use cessation (Soneji et al., 2018).

The higher level of engagement with online tobacco marketing within the past year among sexual minority and transgender adolescents was not due to higher levels of tobacco use; our study found tobacco use status only partially accounted for this relationship. Instead, the higher level of engagement could be the result of targeting by the tobacco and e-cigarette industries (Dilley et al., 2008). A substantial body of evidence found the tobacco industry previously marketed to these populations through focused promotional campaigns, magazine advertisements, event sponsorship, and advocacy organizations funding (Iglesias-Rios & Parascandola, 2013; McCandless, Yerger, & Malone, 2012; Smith & Malone, 2003; Stevens, Carlson, & Hinman, 2004; Yerger & Malone, 2002). For example, a review of internal tobacco industry documents concluded the industry concentrated its marketing and promotion in geographic areas where sexual and gender minority youth gather (Washington, 2002). The tobacco and e-cigarette industries may now be employing similar tactics through targeted magazine advertisements that encourage consumers to engage with products online (Rutgers School of Public Health, 2018a). For example, a 2016 ad in The Advocate (a prominent LGBTQ magazine) portrayed a man in drag using a Blu e-cigarette with the caption “JUST YOU & blu” and featured the Blu's website address (Appendix Fig. A.1) (Rutgers School of Public Health, 2018b). These new marketing techniques may confer harm because adolescents who recall or like advertisements for tobacco products—including e-cigarettes—are at higher risk to begin tobacco

**Table 3**
Results from weighted multivariable logistic regression models of engagement with online tobacco marketing within the past year.

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 (Full Model) |
|---|---|---|---|---|---|
| | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) |
| Race/ethnicity (Ref: Non-Hispanic White) | | | | | |
| Hispanic | 1.08 (0.95, 1.23) | 1.13 (0.98, 1.31) | 1.21 (1.04, 1.41)* | 1.33 (1.13, 1.57)* | 1.31 (1.11, 1.56)* |
| Non-Hispanic Black | 1.24 (1.05, 1.48)* | 1.23 (1.02, 1.48)* | 1.33 (1.09, 1.62)* | 1.42 (1.15, 1.76)* | 1.42 (1.14, 1.77)* |
| Non-Hispanic other/multi-racial | 1.18 (0.96, 1.46) | 1.20 (0.97, 1.49) | 1.18 (0.94, 1.47) | 1.19 (0.93, 1.52) | 1.18 (0.92, 1.50) |
| Sexual orientation and being transgender (Ref: straight male) | | | | | |
| Transgender | 2.13 (1.29, 3.54) | 2.21 (1.30, 3.75)* | 1.81 (1.01, 3.25)* | 1.42 (0.74, 2.71) | 1.37 (0.72, 2.60) |
| Sexual minority female | 2.18 (1.78, 2.69)* | 2.19 (1.76, 2.71)* | 1.54 (1.22, 1.94)* | 1.29 (1.00, 1.65)* | 1.25 (0.97, 1.61) |
| Sexual minority male | 1.64 (1.16, 2.32)* | 1.66 (1.16, 2.37)* | 1.49 (1.02, 2.19)* | 1.57 (1.05, 2.33)* | 1.57 (1.05, 2.35)* |
| Straight female | 1.09 (0.96, 1.23) | 1.09 (0.96, 1.24) | 0.92 (0.80, 1.06) | 0.88 (0.75, 1.02) | 0.86 (0.74, 1.00) |
| Age (Ref: 14 years) | | | | | |
| 15 | – | 1.08 (0.91, 1.27) | 1.04 (0.88, 1.23) | 1.05 (0.87, 1.26) | 1.06 (0.88, 1.27) |
| 16 | – | 1.02 (0.86, 1.21) | 0.94 (0.79, 1.12) | 0.91 (0.75, 1.10) | 0.89 (0.74, 1.08) |
| 17 | – | 0.91 (0.77, 1.09) | 0.87 (0.72, 1.05) | 0.79 (0.65, 0.97) | 0.79 (0.64, 0.97) |
| School performance (Ref: mostly as or school ungraded)[a] | | | | | |
| As and Bs | – | 0.95 (0.80, 1.11) | 0.94 (0.80, 1.11) | 0.83 (0.70, 1.00) | 0.85 (0.71, 1.02) |
| Mostly Bs | – | 0.98 (0.79, 1.23) | 0.96 (0.76, 1.21) | 0.81 (0.63, 1.03) | 0.81 (0.63, 1.04) |
| Bs and Cs | – | 0.97 (0.80, 1.17) | 0.96 (0.79, 1.17) | 0.73 (0.59, 0.91) | 0.77 (0.62, 0.95) |
| Mostly Cs to mostly Fs | – | 1.22 (1.00, 1.49)* | 1.23 (1.00, 1.52)* | 0.89 (0.71, 1.12) | 0.90 (0.71, 1.14) |
| Weekly income (Ref: none or < $1) | | | | | |
| $1–$20 | – | 1.46 (1.26, 1.70)* | 1.30 (1.11, 1.52)* | 1.23 (1.04, 1.46)* | 1.25 (1.06, 1.48)* |
| $21–$50 | – | 1.58 (1.31, 1.92)* | 1.45 (1.19, 1.78)* | 1.31 (1.05, 1.62)* | 1.33 (1.07, 1.66)* |
| $51 or more | – | 1.60 (1.33, 1.91)* | 1.48 (1.22, 1.79)* | 1.21 (0.99, 1.49) | 1.25 (1.01, 1.54)* |
| Parental education (Ref: at least some college) | | | | | |
| Less than high school graduate | – | 1.15 (0.95,1.40) | 1.12 (0.91, 1.37) | 1.11 (0.89, 1.38) | 1.08 (0.87, 1.35) |
| High school graduate or equivalent | – | 1.15 (0.97,1.36) | 1.01 (0.84, 1.20) | 1.08 (0.89, 1.30) | 1.05 (0.86, 1.27) |
| Internalizing problems (Ref: low) | | | | | |
| Moderate | – | – | 1.23 (1.03, 1.48)* | 1.22 (1.01, 1.48)* | 1.22 (1.01, 1.49)* |
| High | – | – | 1.53 (1.27, 1.85)* | 1.44 (1.17, 1.76)* | 1.41 (1.14, 1.73)* |
| Externalizing problems (Ref: low) | | | | | |
| Moderate | – | – | 1.44 (1.18, 1.75)* | 1.33 (1.08, 1.64)* | 1.37 (1.11, 1.70)* |
| High | – | – | 1.91 (1.57, 2.31)* | 1.52 (1.23, 1.88)* | 1.53 (1.23, 1.89)* |
| Social networking account use (Ref: no social networking account) | | | | | |
| Monthly or less often | – | – | 1.26 (0.85, 1.88) | 1.42 (0.92, 2.20) | 1.43 (0.92, 2.24) |
| Weekly | – | – | 1.26 (0.85, 1.87) | 1.25 (0.82, 1.91) | 1.23 (0.80, 1.90) |
| Daily | – | – | 1.24 (0.87, 1.75) | 1.25 (0.85, 1.84) | 1.24 (0.84, 1.84) |
| Several times a day | – | – | 1.32 (0.96, 1.83) | 1.22 (0.86, 1.75) | 1.26 (0.88, 1.81) |
| Regularly used smart phone (Ref: no) | – | – | 1.12 (0.95, 1.31) | 1.09 (0.91, 1.29) | 1.10 (0.92, 1.31) |
| Other substance use (Ref: no) | | | | | |
| 1 | – | – | – | 1.33 (1.08, 1.64)* | 1.35 (1.09, 1.67)* |
| ≥2 | – | – | – | 1.69 (1.17, 2.44)* | 1.65 (1.14, 2.38)* |
| Close contact with a smoker within the past week (Ref: no) | – | – | – | 1.65 (1.43, 1.92)* | 1.60 (1.37, 1.85)* |
| Lives with tobacco user (Ref: no) | – | – | – | 1.03 (0.88, 1.19) | 1.03 (0.88, 1.20) |
| Received tobacco discount coupon or promotion by mail (Ref: no) | – | – | – | 3.00 (1.80, 4.98)* | 2.73 (1.58, 4.70)* |
| Received tobacco-related information by mail (Ref: no) | – | – | – | 4.92 (1.92, 12.63)* | 4.55 (1.79, 11.59)* |
| Tobacco use status (Ref: never, non-susceptible) | | | | | |
| Never, susceptible | – | – | – | 1.83 (1.54, 2.17)* | 1.74 (1.47, 2.07)* |
| Ever tobacco use, not past year | – | – | – | 1.45 (1.12, 1.89)* | 1.28 (0.98, 1.67) |
| Past year tobacco use | – | – | – | 2.21 (1.77, 2.76)* | 2.02 (1.61, 2.53)* |
| Engagement with online tobacco marketing at wave 1 (Ref: no) | – | – | – | – | 3.35 (2.72, 4.11)* |

Note: aOR = adjusted odds ratio; CI = confidence interval; Ref = reference.

[a] The number of adolescent respondents indicating school ungraded fell below reporting requirements for PATH Restricted Use File. Thus, this category was combined with Mostly As.

* $p < .05$.

use (Pierce, Sargent, Portnoy, et al., 2018). Sexual and gender minorities may not necessarily perceive targeting as negative; rather targeting may confer external legitimacy and acknowledgement of economic power for some individuals in these populations (Smith, Thomson, Offen, et al., 2008).

In addition to possible targeting by the tobacco and e-cigarette industries, the level of engagement with online tobacco marketing may be higher for sexual minority and transgender adolescents for several other reasons. First, a higher proportion of the peer groups of SGM youth are already tobacco users compared to straight youth (Hatzenbuehler, McLaughlin, & Xuan, 2015). Compared to straight adolescents, lesbian, gay, and bisexual (LGB) adolescents were more than twice as likely to have smoked a whole cigarette before age 13 (12.8% for LGB versus 5.8% for straight) and currently smoke (19.2% for LGB versus 9.8% for straight) (Kann, Olsen, & McManus, 2016). Second, SGM youth may also be more at risk for engagement with online tobacco marketing than straight youth because of their greater overall use of social media (Seidenberg, Jo, Ribisl, et al., 2017). Third, the in-person

discrimination and stigma that many SGM adolescents experience may contribute to higher levels and more frequent use of social networking sites, which enable youth to build supportive communities online (Craig & McInroy, 2014; Craig, McInroy, McCready, et al., 2015). However, greater social connectedness through the internet may also increase vulnerability to exposure to online tobacco marketing if their virtual peers share tobacco-related content or if tobacco marketing promotes engagement with their virtual peers (Emery, Vera, Huang, et al., 2014; Emory et al., 2019).

Racial and ethnic minority youth may be more likely to engage with online tobacco marketing because they are more familiar with tobacco products through greater exposure to traditional forms of marketing than non-Hispanic White youth (Trinidad, Pierce, Sargent, et al., 2017). Minority youth experience greater exposure to tobacco advertising at the point of sale (Ribisl, D'Angelo, Feld, et al., 2017). Tobacco retail outlet density has been shown to increase as the proportion Black residents increases within a census tract, and Black and Hispanic adolescents have been shown to be more likely to live within a half mile of a tobacco outlet (Lee, Sun, Schleicher, et al., 2017; Schleicher, Johnson, Fortmann, et al., 2016). Moreover, these youth are more likely to report that tobacco advertising played a role in their decision to use a tobacco product (Moran, Heley, Pierce, et al., 2017). Targeted marketing on the part of the tobacco industry has exacerbated these effects. After the 1998 Master Settlement Agreement, tobacco companies increasingly concentrated their magazine advertisement spending on mentholated brands, such as Lorillard's Newport brand (now a brand of RJ Reynolds, a subsidiary of British American Tobacco), which are popular among Black youth (Alpert, Koh, & Connolly, 2008). Additionally, the tobacco industry has long sponsored minority-focused musical and cultural events that prominently featured brand placement (e.g., hip-hop focused Swisher Sweets Artist Project, which includes live music concerts held in convience stores) (Hafez & Ling, 2006). Finally, discrimination-based stress may lead racial and ethnic minorities to seek supportive virtual communities online, which could unintentionally lead to greater engagement with online tobacco marketing through the same processes as described for sexual and gender minorities.

Racial, ethnic, sexual, and gender minority adolescents experience higher levels of mental health distress than their white and straight peers (McLaughlin, Hilt, & Nolen-Hoeksema, 2007; Mustanski, Garofalo, & Emerson, 2010). Our results suggest adolescents experiencing moderate and high levels of mental health distress may be more likely to engage with online tobacco marketing than those experiencing low levels of distress. This increased risk of engagement is problematic for several reasons. First, adolescents with behavioral and emotional disorders are already more likely to initiate tobacco use than adolescents without these disorders (Crone & Reijneveld, 2007). Higher levels of engagement with online tobacco marketing—which is associated with an increased risk of tobacco use initiation and decreased likelihood of tobacco use cessation—could widen disparities in tobacco use among adolescents with behavioral and emotional disorders (Soneji et al., 2018). Second, the tobacco industry previously targeted individuals with serious mental illness to develop brand affinity and bolster sales (e.g., distributing tobacco-brand blankets to homeless shelters and soup kitchens) (Apollonio & Malone, 2005; Hirshbein, 2012). Future research could assess why adolescents experiencing mental health distress are more likely to engage with online tobacco marketing, which would help develop effective counter-marketing strategies.

In 2015 and 2016, the FDA launched two public education campaigns that focused on youth who identified with hip-hop culture—a large proportion of whom are racial and ethnic minorities—and SGM youth (Fresh Empire Research & Evaluation, 2018; US Food & Drug Administration, 2019). The campaigns promote tobacco-free lifestyles and communicating the negative health consequences and addictive nature of cigarette smoking. If the campaigns prove effective among these youth populations, they could expand and increase awareness about targeting by the tobacco and e-cigarette industries, both through offline and online marketing channels.

Political, civil rights, and advocacy organizations could potentially reduce the level of engagement with online tobacco marketing among youth by publicly disclosing previous relationships with the tobacco industry and divesting from such relationships in the future. Such disclosures and divestures could eliminate conflicts of interest, both perceived and actual, and lead organizations to act in more socially responsible ways (Lowenstein, Sunstein, & Golman, 2014). Civic rights and advocacy organizations have been instrumental in countering tobacco marketing focused on minorities (e.g., Philadephia-based tobacco control group the Uptown Coalition efforts against RJ Reynold's African-American targeted Uptown brand cigarettes) (Balbach, Gasior, & Barbeau, 2003). Future tobacco regulation that actively engages with advocacy organizations—and does so early in the regulation-crafting process—may aid in the production of effective policies (Shelley, Ogedegbe, & Elbel, 2014). A combination of federal regulation and grass-root public health campaigns could reduce youth engagement with online tobacco marketing; our study suggests such a reduction could reduce the level of and disparities in tobacco use initation, especially among SGM youth.

Several limitations of this study are noted. First, our study may have underestimated the prevalence of gender minorities because the PATH study only asked respondents if they considered themselves transgender and did not ask about other gender minority categories (e.g., genderqueer). Also, some respondents may have interpreted the question “What is your sex?” as biological sex, sex assigned at birth, or gender. Second, our study may conservatively estimate the level of engagement within the past year because three of the PATH Study items used to measure engagement in Wave 2 asked about engagement with only seven specific tobacco brands: three cigarette brands (Camel, Marlboro, and Newport), one cigar brand (Swisher), and three e-cigarette brand (Blu, Fin, and NJOY). While these brands represent a large share of the cigarette, cigar, and e-cigarette markets nationally, the prevalence of use for other brands not assessed in the PATH Study (e.g., JUUL) may be high among youth. Third, the PATH Study did not assesss participants' level of perceived discrimination, which could interact with exposure to tobacco marketing and increase the risk of tobacco use (Rose, Mayo, Ganz, et al., 2018). Fourth, the PATH Study may not have been sufficiently powered to ascertain statistically significant differences in the odds of engagement among SGM adolescents because of their relatively small number in the study. However, the point estimates across models in the stepwise regression all suggest increased odds of engagement among SGM adolescents. Finally, several factors may have affected youth tobacco use patterns since the time of data collection (2014–2015) including the types of available tobacco products and new brands of e-cigarettes. Similarly, new social networking sites have grown in prominence and online marketing continues to evolve, both of which could have contributed to the temporal increase in the level of engagement with online tobacco marketing among adolescents (Smith & Anderson, 2018; Soneji et al., 2019).

## 5. Conclusions

In conclusion, sexual, gender, racial, and ethnic minority adolescents are at higher risk of engaging with online tobacco marketing than their majority-group peers. This risk may worsen existing disparities in tobacco use among some of these populations. More rigorous and comprehensive federal regulation of tobacco marketing could help reduce adolescents' opportunity to engage in online tobacco marketing. Advocacy organizations could also reduce engagement among minority youth by no longer accepting economic support from the tobacco industry. Finally, current and future public health education campaigns, especially focused on high-risk adolescents, could help counter online tobacco marketing.

## Funding source information

Dr. Moran's effort is supported by NIDA and FDA Center for Tobacco Products (CTP). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH or the Food and Drug Administration. Dr. Tan's effort is supported by the NCI and FDA CTP (R03 CA212544). Dr. Choi's effort is supported by the Division of Intramural Research, the National Institute on Minority Health and Health Disparities. None of these agencies had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.addbeh.2019.03.015.

## References

Alpert, H. R., Koh, H. K., & Connolly, G. N. (2008). After the master settlement agreement: Targeting and exposure of youth to magazine tobacco advertising. *Health Affairs Project Hope, 27*, w503–w512.

Apollonio, D. E., & Malone, R. E. (2005). Marketing to the marginalised: Tobacco industry targeting of the homeless and mentally ill. *Tobacco Control, 14*, 409–415.

Baig, S. A., Pepper, J. K., Morgan, J. C., et al. (2017). Social identity and support for counteracting tobacco company marketing that targets vulnerable populations. *Social Science & Medicine, 182*, 136–141.

Balbach, E. D., Gasior, R. J., & Barbeau, E. M. (2003). R.J. Reynolds' targeting of African Americans: 1988-2000. *American Journal of Public Health, 93*, 822–827.

Buchting, F. O., Emory, K. T., Null, S., et al. (2017). Transgender use of cigarettes, cigars, and E-cigarettes in a national study. *American Journal of Preventive Medicine, 53*, e1–e7.

Craig, S. L., & McInroy, L. (2014). You can form a part of yourself online: The influence of new media on identity development and coming out for LGBTQ youth. *Journal of Gay & Lesbian Mental Health, 18*, 95–109.

Craig, S. L., McInroy, L., McCready, L. T., et al. (2015). Media: A catalyst for resilience in lesbian, gay, bisexual, transgender, and queer youth. *Journal of LGBT Youth, 12*, 254–275.

Crone, M. R., & Reijneveld, S. A. (2007). The association of behavioural and emotional problems with tobacco use in adolescence. *Addictive Behaviors, 32*, 1692–1698.

Dilley, J. A., Spigner, C., Boysun, M. J., et al. (2008). Does tobacco industry marketing excessively impact lesbian, gay and bisexual communities? *Tobacco Control, 17*, 385–390.

Emery, S. L., Vera, L., Huang, J., et al. (2014). Wanna know about vaping? Patterns of message exposure, seeking and sharing information about e-cigarettes across media platforms. *Tobacco Control, 23*, iii17–25.

Emory, K., Buchting, F. O., Trinidad, D. R., et al. (2019). Lesbian, gay, bisexual, and transgender (LGBT) view it differently than non-LGBT: Exposure to tobacco-related couponing, E-cigarette advertisements, and anti-tobacco messages on social and traditional media. *Nicotine & Tobacco Research, 21*(4), 513–522 (n.d.).

Freeman, B., & Chapman, S. (2009). Open source marketing: Camel cigarette brand marketing in the "Web 2.0" world. *Tobacco Control, 18*, 212–217.

Fresh Empire Research & Evaluation (2018). *U.S. food and drug administration*.

Hafez, N., & Ling, P. M. (2006). Finding the Kool Mixx: How Brown & Williamson used music marketing to sell cigarettes. *Tobacco Control, 15*, 359–366.

Hatzenbuehler, M. L., McLaughlin, K. A., & Xuan, Z. (2015). Social networks and sexual orientation disparities in tobacco and alcohol use. *Journal of Studies on Alcohol and Drugs, 76*, 117–126.

Hirshbein, L. (2012). Scientific research and corporate influence: Smoking, mental illness, and the tobacco industry. *Journal of the History of Medicine and Allied Sciences, 67*, 374–397.

Hyland, A., Ambrose, B. K., Conway, K. P., et al. (2017). Design and methods of the Population Assessment of Tobacco and Health (PATH) Study. *Tobacco Control, 26*, 371–378.

Iglesias-Rios, L., & Parascandola, M. (2013). A historical review of R.J. Reynolds' strategies for marketing tobacco to Hispanics in the United States. *American Journal of Public Health, 103*, e15–e27.

Kann, L., Olsen, E. O., McManus, T., et al. (2016). Sexual identity, sex of sexual contacts, and health-related behaviors among students in grades 9–12, United States and selected sites, 2015. *Morb Mortal Wkly Rep Surveill Summ Wash DC 2002. 65. Morb Mortal Wkly Rep Surveill Summ Wash DC 2002* (pp. 1–202).

Kasza, K. A., Ambrose, B. K., Conway, K. P., et al. (2017). Tobacco-product use by adults and youths in the United States in 2013 and 2014. *The New England Journal of Medicine, 376*, 342–353.

Lee, J. G. L., Sun, D. L., Schleicher, N. M., et al. (2017). Inequalities in tobacco outlet density by race, ethnicity and socioeconomic status, 2012, USA: Results from the ASPiRE study. *Journal of Epidemiology and Community Health, 71*, 487–492.

Lewis, M. J., Yulis, S. G., Delnevo, C., et al. (2004). Tobacco industry direct marketing after the Master Settlement Agreement. *Health Promotion Practice, 5*, 75S–83S.

Lowenstein, G., Sunstein, C. R., & Golman, R. (2014). Disclosure: Psychology changes everything. *Annual Review of Economics, 6*, 391–419.

McCandless, P. M., Yerger, V. B., & Malone, R. E. (2012). Quid pro quo: Tobacco companies and the Black press. *American Journal of Public Health, 102*, 739–750.

McLaughlin, K. A., Hilt, L. M., & Nolen-Hoeksema, S. (2007). Racial/ethnic differences in internalizing and externalizing symptoms in adolescents. *Journal of Abnormal Child Psychology, 35*, 801–816.

Moran, M. B., Heley, K., Pierce, J. P., et al. (2017). Ethnic and socioeconomic disparities in recalled exposure to and self-reported impact of tobacco marketing and promotions. *Health Communication,* 1–10.

Mustanski, B. S., Garofalo, R., & Emerson, E. M. (2010). Mental health disorders, psychological distress, and suicidality in a diverse sample of lesbian, gay, bisexual, and transgender youths. *American Journal of Public Health, 100*, 2426–2432.

National Cancer Institute (2008). *The role of the media in promoting and reducing tobacco use.* Bethesda.

Pierce, J. P., Sargent, J. D., Portnoy, D. B., et al. (2018). Association between receptivity to tobacco advertising and progression to tobacco use in youth and young adults in the PATH Study. *JAMA Pediatrics, 172*(5), 444–445.

Ribisl, K. M., D'Angelo, H., Feld, A. L., et al. (2017). Disparities in tobacco marketing and product availability at the point of sale: Results of a national study. *Preventive Medicine, 105*, 381–388.

Richardson, A., Ganz, O., & Vallone, D. (2014). The cigar ambassador: How Snoop Dogg uses Instagram to promote tobacco use. *Tobacco Control, 23*, 79–80.

Rose, S. W., Mayo, A., Ganz, O., et al. (2018). Perceived racial/ethnic discrimination, marketing, and substance use among young adults. *Journal of Ethnicity in Substance Abuse,* 1–20.

*Rutgers School of Public Health. Take pride in your flavor (Camel Snus). (2018).* Available at: https://www.trinketsandtrash.org/detail.php?artifactid=7173&page=1 (AccessedApril 24, 2018) .

*Rutgers School of Public Health. Just you & blu. (2018).* Retrieved from https://www.trinketsandtrash.org/detail.php?artifactid=11181&page=1 AccessedApril 4, 2018.

Schleicher, N. C., Johnson, T. O., Fortmann, S. P., et al. (2016). Tobacco outlet density near home and school: Associations with smoking and norms among US teens. *Preventive Medicine, 91*, 287–293.

Seidenberg, A. B., Jo, C. L., Ribisl, K. M., et al. (2017). A national study of social media, television, radio, and internet usage of adults by sexual orientation and smoking status: Implications for campaign design. *International Journal of Environmental Research and Public Health, 14*.

Shelley, D., Ogedegbe, G., & Elbel, B. (2014). Same strategy different industry: Corporate influence on public policy. *American Journal of Public Health, 104*, e9–11.

Smith, A., & Anderson, M. (2018). *Social media use 2018.* Washington DC: Pew Research Center.

Smith, E. A., & Malone, R. E. (2003). The outing of Philip Morris: Advertising tobacco to gay men. *American Journal of Public Health, 93*, 988–993.

Smith, E. A., Thomson, K., Offen, N., et al. (2008). "If you know you exist, It's Just marketing poison": Meanings of tobacco industry targeting in the lesbian, gay, bisexual, and transgender community. *American Journal of Public Health, 98*, 996–1003.

Soneji, S., Moran, M. B., Tan, A. S. L., et al. (2019). Engagement with online tobacco marketing among US adolescents: 2013–2014 to 2014–2015. *Nicotine & Tobacco Research.* https://doi.org/10.1093/ntr/nty086 (Forthcoming).

Soneji, S., Yang, J., Knutzen, K. E., et al. (2018). Online tobacco marketing and subsequent tobacco use. *Pediatrics, 141*(2), https://doi.org/10.1542/peds.2017-2927 (e20172927).

Stevens, P., Carlson, L. M., & Hinman, J. M. (2004). An analysis of tobacco industry marketing to lesbian, gay, bisexual, and transgender (LGBT) populations: Strategies for mainstream tobacco control and prevention. *Health Promotion Practice, 5*, 129S–134S.

Tessman, G. K., Caraballo, R. S., Corey, C. G., et al. (2014). Exposure to tobacco coupons among U.S. middle and high school students. *American Journal of Preventive Medicine, 47*, S61–S68.

Trinidad, D. R., Pierce, J. P., Sargent, J. D., et al. (2017). Susceptibility to tobacco product use among youth in wave 1 of the population assessment of tobacco and health (PATH) study. *Preventive Medicine, 101*, 8–14.

US Food & Drug Administration (2019). This free life campaign. Retrieved from https://www.fda.gov/TobaccoProducts/PublicHealthEducation/PublicEducationCampaigns/ThisFreeLifeCampaign/default.htm, Accessed date: 29 January 2019.

Villanti, A. C., Mowery, P. D., Delnevo, C. D., et al. (2016). Changes in the prevalence and correlates of menthol cigarette use in the USA, 2004–2014. *Tobacco Control, 25*, ii14–20.

Washington, H. A. (2002). Burning love: Big tobacco takes aim at LGBT youths. *American Journal of Public Health, 92*, 1086–1095.

Yerger, V. B., & Malone, R. E. (2002). African American leadership groups: Smoking with the enemy. *Tobacco Control, 11*, 336–345.