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Ethnic and socioeconomic disparities in recalled exposure to and self-reported impact of tobacco marketing and promotions

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Abstract

The role of tobacco marketing in tobacco use, particularly among vulnerable ethnic and socioeconomic sub-populations is a regulatory priority of the U.S. Food and Drug Administration. There currently exist both ethnic and socioeconomic disparities in the use of tobacco products. Monitoring such inequalities in exposure to tobacco marketing is essential to inform tobacco regulatory policy that may reduce known tobacco-related health disparities. We use data from the Population Assessment of Tobacco and Health (PATH) Wave 1 youth survey to examine (1) recalled exposure to and liking of tobacco marketing for cigarettes, non-large cigars, and e-cigarettes, (2) self-reported exposure to specific tobacco marketing tactics, namely coupons, sweepstakes, and free samples, and (3) self-reported impact of tobacco marketing and promotions on product use. Findings indicate that African Americans and those of lower SES were more likely to recall having seen cigarette and non-large cigar ads. Reported exposure to coupons, sweepstakes and free samples also varied ethnically and socioeconomically. African Americans and those of lower SES were more likely than other respondents to report that marketing and promotions as played a role in their tobacco product use. Better understanding of communication inequalities and their influence on product use is needed to inform tobacco regulatory action that may reduce tobacco company efforts to target vulnerable groups. Tobacco education communication campaigns focusing on disproportionately affected groups could help counter the effects of targeted industry marketing.

There currently exist both ethnic and socioeconomic disparities in use of different tobacco products, with non-Hispanic white youth and those of lower socioeconomic status generally having higher rates of tobacco product use (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016; Singh, 2016), though rates differ across products. Tobacco marketing is a well-established predictor of youth tobacco use (National Cancer Institute, June 2008) and could contribute to tobacco use inequalities. As such, the role of tobacco marketing in

tobacco use initiation, particularly among vulnerable ethnic and socioeconomic sub-populations is a regulatory priority of the U.S. Food and Drug Administration (U.S. Food and Drug Administration, 2014). Broader research on communication inequalities has documented ethnic and socioeconomic disparities in both the quality and quantity of health-related communication, and indicates that such inequalities may contribute to population-level health disparities (Ishikawa, Kondo, Kawachi, & Viswanath, 2016). We use data from the Population Assessment of Tobacco and Health (PATH) study to examine ethnic and socioeconomic inequalities related to tobacco-related communications. Specifically, we examine ethnic and socioeconomic patterns in (1) recalled exposure to and liking of tobacco marketing for cigarettes, non-large cigars (i.e., cigarillos and filtered cigars), and e-cigarettes, (2) exposure to specific tobacco marketing tactics, namely coupons, sweepstakes, and free samples, and (3) self-reported impact of tobacco marketing and promotions on product use.

Background

National data reveal ethnic and socioeconomic differences in patterns of youth tobacco use. These include disparities in tobacco product use and brand preference, as well as disparities in the rate of decrease of tobacco use over time among subgroups (Barbeau, Leavy-Sperounis, & Balbach, 2004; Caraballo, Sharapova, & Asman, 2016; Delnevo, Giovenco, Ambrose, Corey, & Conway, 2015; Giovino & Gardiner, 2016; Johnston et al., 2016). Tobacco marketing contributes significantly to youth tobacco use (National Cancer Institute, June 2008). In line with communication inequality theory (Viswanath, Ramanadhan & Kontos, 2007; Viswanath & Emmons, 2006), it is possible that differences in exposure to tobacco marketing contribute to observed disparities in tobacco use.

Communication inequality theory posits that population-level disparities in health outcomes may be, in part, caused by communication inequalities (Viswanath et al., 2007). Communication inequalities are disparities "in the generation, manipulation, and distribution of information at the group level and differences in access to and ability to take advantage of information at the individual level" (Viswanath et al., 2007; Viswanath & Emmons, 2006). Moreover, structurally disadvantaged populations may not only be underexposed to positive health messages, but may be overexposed to negative health messages, such as tobacco marketing. These negative health messages may not only have a direct effect on health behavior, by encouraging individuals to use tobacco products, for instance, but may also, on balance, overwhelm any positive health messages. For example, it may be difficult for a single tobacco prevention message to compete with the myriad tobacco marketing materials an individual may encounter.

In other words, disparities in the quantity and quality of health communication experienced by different socioeconomic or ethnic groups may partially be responsible for socioeconomic or ethnic health disparities. Research has documented the existence of health communication inequalities among different socioeconomic or ethnic groups and illustrates the contribution of these inequalities to health disparities (Ishikawa, Kondo, Kawachi, & Viswanath, 2016).

In the context of tobacco marketing, several well-documented disparities in exposure exist that are consistent with the broader literature on communication inequalities. Point-of-sale, storefront and outdoor tobacco marketing are all disproportionately concentrated in low-income and ethnic minority neighborhoods (Barbeau, Wolin, Naumova, & Balbach, 2005; Primack, Bost, Land, & Fine, 2007; Seidenberg, Caughey, Rees, & Connolly, 2010). Tobacco companies have a long history of actively targeting ethnic minority and low-income populations using tactics that include discounting strategies, coupons and other price promotions or incentives (Seidenberg et al., 2010). For example, in the mid-1970s, R J Reynolds began a short-lived program to deliver cigarette coupons to inner-city low-income African Americans and Latinos using the Food Stamp Program (Brown-Johnson, England, Glantz, & Ling, 2014). Recent research indicates that similar tactics are still in use: individuals with lower educational levels are more likely to receive cigarette coupons through the mail (Choi & Forster, 2014).

Tobacco companies have also created advertising campaigns that include materials that may appeal to ethnic and socioeconomic subgroups. Most notably, the tobacco industry has consistently targeted the African American community (Balbach, Gasior, & Barbeau, 2003; Garrett, Gardiner, Wright, & Pechacek, 2016a; Landrine et al., 2005). For instance, Kool's Kool Mixx campaign, targeted low-income African American communities through a campaign that tapped into African American hip-hop culture, featuring hip-hop themed packaging, mixed CDs, and other content and imagery relevant to hip-hop culture(Cruz, Wright, & Crawford, 2010; Garrett, Gardiner, Wright, & Pechacek, 2016; Hafez & Ling, 2006a). Tobacco companies have similarly targeted lower-income populations who identify as working class or "blue collar" by placing appealing marketing materials (e.g., that feature rugged activities, self-sufficiency) in channels favored by this group (e.g., sporting magazines, NASCAR races) (Brown-Johnson et al., 2014; National Cancer Institute, June 2008).

Objectives

The majority of work in this area has leveraged observational techniques and industry documents analysis to describe disparities in exposure to tobacco advertising. Limited work has investigated how individuals' – and in particular, adolescents' – self-reported exposure to, and impact of, tobacco marketing varies across ethnic and socioeconomic groups. Specifically, we examined (1) recalled exposure to and liking of tobacco marketing for cigarettes, non-large cigars (i.e., cigarillos and filtered cigars), and e-cigarettes, (2) self-reported exposure to specific tobacco marketing tactics, namely coupons, sweepstakes, and free samples, and (3) self-reported impact of tobacco marketing and promotions on product use.

> RQ1a: How do recalled exposure to and liking of (1) cigarettes, (2) non-large cigars, and (3) e-cigarettes vary by race?
>
> RQ1b: How do recalled exposure to and liking of (1) cigarettes, (2) non-large cigars, and (3) e-cigarettes vary by SES?

RQ2a: How does self-reported exposure to (1) tobacco coupons, (2) sweepstakes, and (3) free samples vary by race?

RQ2b: How does self-reported exposure to (1) tobacco coupons, (2) sweepstakes, and (3) free samples vary by SES?

RQ3a: How does self-reported impact of tobacco marketing and promotions on product use vary by race?

RQ3b: How does self-reported impact of tobacco marketing and promotions on product use vary by SES?

Methods

To address these aims, we used data from the Population Assessment of Tobacco and Health (PATH) Wave 1 youth study (Hyland et al., 2016). The PATH study is a longitudinal cohort study of U.S. youth and adults that seeks to provide evidence to inform and monitor FDA regulatory action related to tobacco products. The PATH youth survey contains several items related to tobacco marketing exposure that allow us to address the aims of this paper.

PATH Study Procedures

Wave 1 of the PATH study took place between 2013-14 and collected data from 13,651 U.S. youth age 12-17 and 32,320 adults using a stratified sampling design. One adult within each selected household completed a household screener. If a household contained up to two youth aged 12-17, both youth were sampled; if a household contained >2 youth aged 12-17, two youth were randomly selected to participate in the study. Additional details on the sampling procedure are available in Hyland et al. (Hyland et al., 2016) and in the PATH User Guide (http://www.icpsr.umich.edu/icpsrweb/NAHDAP/studies/36231). The survey was administered in the participant's household using ACASI in either English or Spanish, based on the participant's preference. Analyses for the current manuscript use the PATH youth sample. Because the PATH Public Use File does not contain data on ethnic group beyond this categorization, our analytic sample is restricted to non-Hispanic white (NHW), non-Hispanic black (NHB) and Hispanic youth with non-missing data for socioeconomic status (N = 12,307). Participant characteristics for sociodemographics and key variables are presented in Table 1.

Measures

Tobacco advertising and promotions are a regulatory topic of interest; as such, the PATH youth survey contains several items related to tobacco marketing exposure that allow us to address the aims of this paper. The full PATH questionnaire and codebook are available at http://www.icpsr.umich.edu/icpsrweb/NAHDAP/studies/36498. In our description of measures, we report PATH variable names in brackets.

Liking and recall of specific ads—The PATH youth study contained a module in which participants were shown ads for each of five tobacco product categories (cigarettes: 5 ads, smokeless: 5 ads, large cigars: 1 ad, non-large cigars: 4 ads, e-cigarettes: 5 ads). These ads were selected using a blocked randomized design from a pool of ads purchased from

Competitrack and Mintel between 2012-2013. These ads had originally appeared in print (e.g., magazine), web display (e.g., banner ads) or, for e-cigarettes, on TV (participants viewed screen shots). These ads approximately represent all tobacco ads run during this time period. For each ad, participants were asked whether they recalled having seen the ad in the past 12 months (Yes, No, Don't know) [R01_YX0181_01 through R01_YX0181_20] and whether they liked the ad (Yes, No, No opinion) [R01_YX0184_01 through R01_YX0184_20]. Those who responded 'Don't know' to the ad recall questions were coded as not having recalled the ad, and those who responded 'No opinion' were coded as not liking the ad. To account for negatively skewed distributions, we created summary variables for each product category indicating whether the participant had recalled any ad (0=did not recall any ad; 1=recalled at least 1 ad) and liked any ad (0=did not like any ads; 1=liked at least 1 ad) for each product.

Self-reported exposure to specific tobacco marketing tactics—We assess the types of tobacco marketing materials participants were exposed to using three individual questions. Participants were asked if, in the past 6 months, they had seen a tobacco sweepstakes ad (Yes, No) [R01_YX0475], obtained a tobacco discount coupon (Yes, No) [R01_YX0477], and obtained a free sample (Yes, No) [R01_YX0481].

Self-reported role of tobacco promotions and advertising in product use—Participants who had smoked more than 10 cigarettes in their lifetime, who had last smoked a cigarette in the past 30 days and who reported having a regular brand of cigarettes were asked whether "People in the media smoke this brand" was part of their decision to choose their regular brand of cigarettes (Yes, No) [R01_YC9116]. People who had used an e-cigarette in the past 30 days were asked whether "People in the media or other public figures use e-cigarettes" (Yes, No) [R01_YE1061] and "The advertising for e-cigarettes appeals to me" (Yes, No) [R01_YE1072] were reasons they used e-cigarettes. Those who had used cigarillos or filtered cigars in the past 30 days were asked whether they used the product because "People in the media or other public figures smoke [cigarillos/filtered cigars]" (Yes, No) [R01_YG1061CL; R01_YG1061FC] and "The advertising for [cigarillos/filtered cigars] appeals to me" (Yes, No) [R01_YG1072CL; R01_YG1072FC].

Ethnicity and socioeconomic status—The PATH youth study file contains two variables that we used to indicate participant ethnicity. We used a variable [R01R_Y_RACECAT3_IMP] indicating whether a person was white, black, or another race (including multiple races) and a variable indicating whether a participant was Hispanic [R01R_Y_HISP_IMP] to create a new variable denoting whether a person was non-Hispanic white (0), non-Hispanic black (1), or Hispanic (2). This variable was created using the imputed forms of the race/ethnicity indicators (details available in the PATH study user guide (http://www.icpsr.umich.edu/icpsrweb/NAHDAP/studies/36231). 1.37% (n=169) of observations for race were statistically imputed.

We used a variable indicating the highest grade or level of school completed by a participant's parent [R01R_Y_PM0001] as a proxy for socioeconomic status. This question was asked to the parent selected to participate in the PATH study. Data for this variable were reported by youth participants' parents, not the youth themselves. SES was represented in 4

categories: less than high school (0), high school degree (1), some college or associate's degree (2), and college degree or higher (3). Eighty-six participants were excluded from the analysis, as they did not provide data on this variable and the PATH dataset did not contain imputed values.

Data analysis

All analyses were conducted using data contained in the Public Use File (PUF) of the PATH Wave 1 youth survey. We employed the weighting and variance estimation procedures, with replicate weights calculated using Fay's variant of balanced repeated replication (Judkins, 1990), as described in the PATH user guide, which compensate for differential probability of selection and for sampling design factors. All analyses were conducted using Stata/MP 14.1. We use crosstabs with weighted rates and 95% confidence intervals to present levels of recalled exposure and response to tobacco marketing by ethnicity and SES. Chi-square tests were used to identify overall differences, and we compare confidence intervals to identify differences between specific groups. Results are presented by tobacco use status (ever use, n=2,691/never use, n=9,716). Participants were considered 'ever users' if they reported ever trying any of the tobacco products asked about in PATH (cigarettes, e-cigarettes, traditional cigars, non-large cigars (i.e, cigarillos or filtered cigars), smokeless tobacco, pipe, hookah). To account for false discovery rate across families of significance tests, we employ Benjamini-Hochberg corrections for $\alpha = .05$ (Benjamini & Hochberg, 1995).

Results

Disparities in recalled exposure and liking

Table 2 reports patterns of recalled exposure and liking by ethnicity and SES. Among never users, African Americans and those of lower SES were more likely to recall having seen cigarette and non-large cigar ads. These disparities were most striking for non-large cigar ads, where African American never users recalled non-large cigar ads at over twice the rate of non-Hispanic whites and those in the lowest SES group recalled non-large cigar ads at nearly twice the rate of those in the highest SES group. Ever users had fairly equal rates of recalled exposure to cigarette and e-cigarette ads across ethnic groups and SES levels, but African Americans and those of lower SES were more likely to recall exposure to non-large cigar ads. African American ever users recalled non-large cigar ads at a rate 38% higher than non-Hispanic whites, while those in the lowest SES group recalled non-large cigar ads at nearly twice the rate of those in the highest SES group.

Analyses also found disparities in the specific types of marketing tactics youth of different ethnicities and SES levels reported being exposed to (see Table 3). Youth of lower SES levels are more likely to report having seen a tobacco sweepstakes ad, with youth in the lower 3 SES groups being over 20%, among never users, and 50%, among ever users, more likely to have seen a sweepstakes ad, compared to those in the highest SES group. Youth of lower SES were slightly more likely to have obtained a discount coupon; these patterns were consistent among both never and ever users. Non-Hispanic white users and non-users reported slightly higher exposure to tobacco sweepstakes ads than Hispanic youth. Non-Hispanic white users reported higher exposure to discount coupons, with a rate of reported

exposure over twice as high African American youth and over 50% higher than Hispanic youth. Never users of lower SES and African American users were slightly more likely to report receiving a free sample of a tobacco product.

Disparities also emerged in the self-reported effect of tobacco marketing and promotions on tobacco use, as illustrated in Table 4. African American youth were significantly more likely to report using e-cigarettes because the advertising appealed to them, and reported this as a reason for use at a rate over 2.5 times greater than Hispanic youth and 3 times greater than non-Hispanic white youth. Youth in the lowest SES group were more likely to report using e-cigarettes and non-large cigars because people in the media or other public figures used them at rates over twice that of those in the highest SES group.

Sensitivity analyses

To probe the robustness of the associations identified above and further examine associations between race and SES with the tobacco advertising variables, we conducted of logistic regression analyses for each outcome with race (reference group: non-Hispanic white), SES (reference group: college degree or more), gender (reference group: female) and age (reference group: 14-17 year olds) entered into the model. Results of these analyses follow the same pattern described above (see Tables 5 and 6 in online supplement).

We ran additional sensitivity checks for analyses involving the measures of recalled exposure to cigarette, non-large cigar and e-cigarette advertising. The module in the PATH survey contained a 'Don't Know' response which we initially coded as '0' (No recalled exposure). We re-ran analyses involving these measures with 'Don't Know' coded as '1' (Recalled exposure). This different coding did not alter our findings.

Discussion

This study identifies several important disparities related to self-reported exposure to and role of tobacco marketing. First, African Americans and individuals of lower socioeconomic status reported previous exposure to advertisements for cigarettes and non-large cigars at high rates compared to other groups. These findings correspond with observational research that found lower income communities and communities with larger African American populations to have higher levels of tobacco marketing (Barbeau et al., 2005; Lee, Henriksen, Rose, Moreland-Russell, & Ribisl, 2015; Primack et al., 2007; Seidenberg et al., 2010). This study offers an additional layer of evidentiary support regarding disparities in exposure to tobacco marketing by using a nationally representative sample of individually collected responses.

Of particular concern is the ethnic disparity in exposure to non-large cigar ads. Both African American ever uses and never users reported high rates of exposure to non-large cigar ads, with African American never smokers being approximately 2.5 times more likely than non-Hispanic whites to recall having seen a non-large cigar ad. Research has documented ethnic disparities in use of non-large cigars (Corey et al., 2014; Delnevo et al., 2015), as well as ethnic disparities in the prevalence of storefront ads for non-large cigars (Cantrell, Kreslake et al., 2013). The current study's findings suggest the same pattern of ethnic disparity is

reflected using self-reported measures of exposure to marketing of these products. Notably, recalled exposure to and liking of e-cigarette advertisements did not vary by ethnic group or SES level. Levels of recalled exposure to and liking of e-cigarette advertisements were higher than those for cigarettes or non-large cigars. The increasingly widespread marketing of e-cigarettes (Kornfield, Huang, Vera & Emery, 2015) could potentially contribute to higher levels of recalled exposure to these ads.

Moreover, self-reported exposure to specific types of tobacco marketing tactics varied across ethnic and sociodemographic lines. Incentives and cost-reducing tactics are key strategies tobacco companies use to recruit new users and keep current users from switching brands or quitting (Chaloupka, Cummings, Morley, & Horan, 2002; National Cancer Institute, June 2008). Higher tobacco product prices are associated with less purchase intent and product use (Hyland et al., 2005; Vijayaraghavan, Messer, White, & Pierce, 2013), so access to cost-reducing strategies can facilitate use by removing the barrier of high cost. The use of cost-reducing and incentivizing tactics can also undermine the effect of tobacco tax increases (Brock, Schillo, & Moilanen, 2015; Choi, Hennrikus, Forster, & St Claire, 2012). Thus, ethnic and socioeconomic disparities in exposure to these advertising tactics could result in differential impact of such tobacco control policies. There were also slight disparities in the rates at which youth reported receiving free samples of tobacco products, with African Americans and those of lower SES being more likely to report obtaining a free sample. While overall rates of free sample receipt were low, it is troubling that any person under the age of 18 be able to obtain a free sample of a tobacco product, and additional research is needed to understand how free samples were obtained. Relatedly, it is important for future work to better examine the validity of this measure to understand the extent to which youths' reports of obtaining free samples truly referred to those distributed by tobacco companies or tobacco retailers, as opposed to a tobacco product shared by a friend (e.g., a friend giving one a cigarette to try).

No ethnic or socioeconomic differences in liking tobacco ads were seen. Because liking was summarized for all brands within one product category, this may obscure brand-specific differences in liking. It is well-documented that, historically, tobacco companies have targeted brands towards specific ethnic groups (National Cancer Institute, June 2008). For example, menthol brands such as Newport and Kool have specifically targeted the African American community (Cruz, Wright, & Crawford, 2010; Gardiner, 2004; Hafez & Ling, 2006; Sutton & Robinson, 2004); based on this, it would not be surprising if African Americans were more likely to report liking these brands. The current study's analyses do not address this issue, and it would be worthwhile for future analyses to examine whether any disparities in liking tobacco marketing exist at the brand level.

Our findings illuminate disparities in the self-reported role of such marketing as well. Over 50% of African American e-cigarette users reported using the product because the advertising appealed to them, compared to approximately 20% of non-Hispanic white and Hispanic e-cigarette users. Similarly, those in the lowest socioeconomic bracket reported using e-cigarettes or non-large cigars because people in the media or public figures used them at higher rates. Literature on communication inequalities argues that not only exposure, but also the effect of healthy or unhealthy messages varies based on ethnicity and SES. Not

only are African Americans and those of lower SES more likely to report being exposed to tobacco marketing, but they are also more likely to report that the advertising played a role in their decision to use a product. It must be noted, however, that it is not clear to what extent a participant's self-reported reason for using a product corresponds to the actual reason for product use. Humans often have difficulty accurately identifying their motivations for behavior. For example, reporting of one's motivations may be susceptible to the availability heuristic (Tversky & Kahnemann, 1973), in which the reported motivation is the one that comes most readily to mind. Thus, to the extent that certain racial or socioeconomic groups are overexposed to tobacco marketing, they may be more likely to report such marketing as having an influence over their use. The disparities the current study found in the reported role of tobacco marketing in product use would benefit from further exploration. Namely, causal research designs will be useful to better understand the extent to which tobacco marketing differentially impacts tobacco use across ethnic and socioeconomic groups.

Finally, it is worth noting that youth across all ethnic and SES groups reported being exposed to tobacco marketing. Tobacco marketing is a key predictor of youth tobacco use (National Cancer Institute, June 2008), thus indicating that these youth are at higher risk for future tobacco product use than their non-exposed peers. We would expect this risk to be particularly pronounced among African Americans and those of lower SES who reported the highest rate of exposure to tobacco marketing. Thus, while efforts to protect all youth against the effects of tobacco marketing are warranted, efforts could be targeted to the most exposed groups.

The current study extends existing research on disparities in exposure to tobacco marketing in several ways. First, this study is the first to examine population-level disparities in recalled exposure to and liking of marketing for different tobacco products among adolescents. Moreover, this work extends existing research by providing an in-depth analysis of self-reported exposure to specific tobacco marketing tactics, and in the self-reported role tobacco marketing and promotions play in use decisions. These findings indicate the potential need for tobacco marketing regulations to prevent tobacco companies from targeting marketing towards vulnerable communities, particularly if further causal research corroborates the current study's findings. Given FDA's regulatory authority over an expanse of tobacco products, these regulations could potentially apply to multiple tobacco products, as warranted. Restricting the use of discount coupons, sweepstakes and free samples would be an important step in this regard, as would restricting or banning tobacco marketing at the point-of-sale. There is also a need for tobacco education communication campaigns focusing on these groups, which could help counter the effects of industry marketing. Current FDA Center for Tobacco Products efforts, including the FRESH EMPIRE campaign (Moran, Walker, Alexander, Jordan, & Wagner, 2017), target such vulnerable youth and can potentially contribute to reductions in tobacco use disparities. FDA could additionally introduce warning labels that more clearly communicate the true risk of tobacco product use to youth. Moreover, it will be critical to ensure that communities that are disproportionately affected by tobacco marketing have the tobacco control resources available to combat the effects of such marketing, which could potentially stunt the impact of tobacco advertising on youth tobacco use behavior.

Limitations

Several limitations inform the interpretation of our findings. As is the case with any secondary data analysis, the current analysis is constrained by the variables and data available to us. This is borne out in several ways. First, the variable we use to represent socioeconomic status (parent's education level) is a common and relatively stable indicator of SES (Shavers, 2007), but is nonetheless a proxy measure for what is a complex construct that may include factors such as income, wealth, and occupational status (Braveman et al., 2005). Only the parent completing the survey reported their level of education, so this measure may not capture households for whom two parents have disparate educational levels (e.g., one parent with a high school degree and one with a graduate degree). Additionally, although income level and educational level are correlated, this measure may not capture households with high income and low parental educational levels, or low income and high parental educational levels. Second, we were unable to characterize the ethnicity of participants other than those who were non-Hispanic white, non-Hispanic black and Hispanic. Because these participants potentially represented many diverse groups with diverse patterns of tobacco use, we opted to exclude them from analysis: we felt that presenting data for this group would be uninformative at best, and reductive at worst. We were also unable to address differences among ethnic sub-groups: for example, previous work has found that tobacco use among Hispanics varies by country of heritage or birth (Caraballo, Yee, Gfroerer, Mirza, 2008; Kaplan, Bangdiwala, Barnhart, et al., 2014). Our work would be extended by future analyses that examine tobacco marketing disparities using finer-grained measures of ethnicity and socioeconomic status. Finally, the PATH study module in which participants were asked whether they recalled seeing, and whether they liked tobacco ads did not contain any foil (fake) ads. Thus, we were unable to adjust analyses for false recognition, and the measure may be susceptible to over-recognition bias (Niederdeppe, 2014). However, research has shown that recognition rates for an ad are strongly correlated with GRPs for that ad (Southwell, Barmada, Hornik, & Maklan, 2002). Moreover, the module provided participants with a 'Don't know' response option, which can reduce false recognition rates (Slater, 2004; Southwell et al., 2002). We used a conservative approach and coded 'Don't know' responses as not having seen the ad, and our sensitivity checks performed with 'Don't know' coded as having seen the ad ('1'), did not change our findings.

The current study describes ethnic and socioeconomic disparities related to tobacco marketing among never and ever tobacco users, but it would also be valuable for further research to examine how ethnicity and SES interact with each other, and with other sociodemographics such as gender, to produce disparities in tobacco marketing exposure and liking. For example, some research has found that tobacco use among certain ethnic groups varies by gender (Caraballo, et al., 2008, 2016; Kaplan et al., 2014). Examining conditional effects of race and SES across other sociodemographic factors would be an ideal extension of the findings presented in the current paper.

Strengths of the current study include the nationally representative nature of the PATH study, and the inclusion of measures of exposure to different types of tobacco marketing tactics (coupons, sweepstakes and samples) and self-reported impact of marketing. Additionally,

PATH is a longitudinal study, and the release of future waves of data will enable us to detect causal patterns of whether and how tobacco marketing disparities contribute to population-level tobacco use disparities.

Conclusions

The purpose of this paper was to describe disparities related to self-reported tobacco marketing exposure, liking, and response. It is well-documented that exposure to tobacco marketing contributes to tobacco use initiation and addiction; literature on communication inequalities points to disparities in both exposure and response to such types of marketing as a key contributor to population-level health disparities. This study documents communication inequalities related to tobacco marketing. Not only are African Americans and individuals of lower socioeconomic status more likely to report being exposed to certain types of tobacco marketing, they are also more likely to report being affected by it. Comprehensive tobacco control policies and educational campaigns will be instrumental towards eliminating such disparities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Sample descriptive characteristics

	Unweighted N	Unweighted %	Weighted % (95% CI)
Race (N=12,307)			
African American	1,843	14.98	15.27(15.17-15.36)
Hispanic	3,878	31.51	24.45(24.38-24.53)
NHW	6,586	53.51	60.28(60.19-60.37)
SES (N=12,307)			
LT High School	2,670	21.69	18.74(17.49-20.05)
High School degree or equivalent	2,356	19.14	18.41(17.37-19.5)
Some college or assoc. degree	3,941	32.02	32.39(30.94-33.88)
College degree or more	3,340	27.14	30.46(28.35-32.66)
Gender (N=12,307)			
Female	5,946	48.31	48.25(47.86-48.64)
Male	6,361	51.69	51.75(51.36-52.14)
Age (N=12,307)			
12-14	6,294	51.14	50.42(50.36-50.48)
15-17	6,013	48.86	49.58(49.52-49.64)
Tobacco use			
Ever used any product (N=12,307)	2,591	21.05	21.44(20.45-22.47)
Ever used cigarettes (N=12,307)	1,646	13.37	13.64(12.77-14.56)
Ever used e-cigarettes (N=12,307)	1,292	10.5	11.97(11.22-12.77)
Ever used non-large cigars (N=12,307)	930	7.56	12.04(11.22-12.91)
Liking and recall of tobacco ads			
Recalled cigarette ad (N=12,307)	2,803	22.78	22.4(21.57-23.25)
Liked cigarette ad (N=12,307)	397	3.23	3.25(2.94-3.6)
Recalled e-cigarette ad (N=12,307)	3,890	31.61	31.35(30.33-32.39)
Liked e-cigarette ad (N=12,307)	623	5.06	5.09(4.63-5.58)
Recalled non-large cigar ad (N=12,307)	1,291	10.49	10.12(9.52-10.75)
Liked non-large cigar ad (N=12,307)	322	2.62	2.56(2.27-2.88)
Exposure to tobacco marketing tactics			
Seen a sweepstakes ad (N=12,260)	3,125	25.39	25.31(24.23-26.41)
Obtained a discount coupon (N=12,225)	939	7.63	7.72(7.19-8.29)
Obtained a free sample (N=12,279)	95	0.77	0.74(0.61-0.9)
Self-reported role of tobacco advertising on use			
Cigarettes: People in the media smoke this brand (N=289)	39	13.49	13.46(9.52-18.68)
E-cigarettes: People in media/public figures use (N=370)	140	37.84	36.27(31.71-41.1)
E-cigarettes: The advertising appeals to me (N=369)	76	20.6	19.28(15.56-23.65)
Non-large cigars: People in media/public figures use product (N=279)	81	29.03	26.29(21.7-31.47)
Non-large cigars: The advertising appeals to me (N=279)	38	13.62	12.13(8.95-16.23)

Table 2

Recall and liking of tobacco ads by ethnicity and SES: weighted rates and 95% confidence intervals[a]/[b]

	NHW	AA	Hispanic	p	LT High School	HS Grad	Some college	College deg. or higher	p
Never users (N=9,716)									
Cigarettes									
Recall	0.1976 [.1847,.2113]	0.2643 [.2421,.2878]	0.2008 [.1858,.2166]	**<.0001**	0.22 [.2024,.2387]	0.226 [.2052,.2482]	0.2221 [.2045,.2408]	0.181 [.1666,.1963]	**0.0003**
Liking	0.0228 [.0193,.0271]	0.0308 [.0227,.0418]	0.0221 [.0181,.0271]	0.1487	0.021 [.0158,.0277]	0.0211 [.0149,.0297]	0.0209 [.0169,.0257]	0.0301 [.0246,.0368]	0.0416
Non-large cigars									
Recall	0.0608 [.0532,.0695]	0.1505 [.132,.1711]	0.0831 [.0735,.0938]	**<.0001**	0.104 [.0931,.116]	0.0847 [.0722,.0992]	0.0908 [.0797,.1033]	0.0552 [.0473,.0643]	**<.0001**
Liking	0.0131 [.0104,.0165]	0.0212 [.0139,.0322]	0.0153 [.0111,.0209]	0.1086	0.0131 [.0088,.0193]	0.0145 [.0096,.0217]	0.0151 [.0109,.0209]	0.016 [.0120,.0214]	0.8847
E-cigarettes									
Recall	0.2905 [.2759,.3056]	0.3107 [.2823,.3407]	0.3054 [.2883,.3230]	0.2501	0.2897 [.2708,.3093]	0.2958 [.2739,.3186]	0.3156 [.2972,.3345]	0.2848 [.2657,.3048]	0.0566
Liking	0.0325 [.0274,.0386]	0.0517 [.0425,.0629]	0.0371 [.0295,.0465]	**0.0029**	0.0328 [.0255,.0421]	0.0343 [.0267,.0440]	0.0377 [.0303,.0469]	0.0392 [.0319,.0481]	0.6717
Ever users (N=2,591)									
Cigarettes									
Recall	0.2796 [.2575,.3028]	0.3182 [.2807,.3582]	0.2548 [.2217,.2910]	0.0869	0.2718 [.2434,.3022]	0.3003 [.2646,.3385]	0.3011 [.2695,.3347]	0.2311 [.1942,.2726]	0.0216
Liking	0.0658 [.0541,.0798]	0.0893 [.0598,.1314]	0.0452 [.033,.0616]	0.0415	0.0648 [.0492,.0849]	0.0582 [.0433,.0779]	0.0647 [.0505,.0826]	0.0677 [.0486,.0936]	0.9011
Non-large cigars									
Recall	0.1588 [.1391,.1808]	0.2219 [.1831,.2663]	0.1994 [.1711,.2312]	**0.0052**	0.2071 [.1736,.2453]	0.212 [.1815,.2462]	0.1805 [.1576,.2059]	0.1095 [.0844,.1409]	**<.0001**
Liking	0.0558 [.0451,.0688]	0.0946 [.0676,.1308]	0.072 [.0560,.0923]	0.0159	0.0896 [.0694,.1148]	0.061 [.0466,.0796]	0.0592 [.0444,.0785]	0.0539 [.0379,.0759]	0.0491
E-cigarettes									

Never users (N=9,716)

	NHW	AA	Hispanic	p	LT High School	HS Grad	Some college	College deg. or higher	p
Recall	0.3709	0.342	0.394	0.3460	0.3622	0.3684	0.3791	0.3759	0.9309
	[.3439,.3986]	[.2878,.4007]	[.3544,.4351]		[.3183,.4085]	[.3285,.4103]	[.3426,.417]	[.3338,.4199]	
Liking	0.0997	0.0882	0.1187	0.2340	0.1065	0.0757	0.1166	0.1035	0.1306
	[.0846,.1172]	[.0634,.1216]	[.0991,.1416]		[.085,.1328]	[.0579,.0986]	[.0935,.1445]	[.0787,.1350]	

(a) Cells represent rates of each sub-group; percentages can be obtained by multiplying by 100

(b) Significant results using Benjamini-Hochberg corrected p<.0146 are bolded.

Table 3

Exposure to tobacco marketing strategies by ethnicity and SES: weighted rates and 95% confidence intervals[a][b]

	NHW	AA	Hispanic	p	LT High School	HS Grad	Some college	College degree or higher	p
Never users (N=9,716)									
Seen a tobacco sweepstakes ad	0.254	0.2386	0.2157	**0.0062**	0.2556	0.2712	0.2537	0.2074	**<.0001**
	[.2375,.2711]	[.2152,.2638]	[.199,.2333]		[.2352,.2773]	[.2494,.2942]	[.2370,.2711]	[.1906,.2252]	
Obtained a discount coupon	0.0591	0.0651	0.0495	0.1407	0.0633	0.0653	0.0657	0.0424	**0.0002**
	[.0529,.066]	[.0521,.0811]	[.0408,.0599]		[.0529,.0757]	[.0546,.078]	[.0571,.0755]	[.0355,.0507]	
Obtained a free sample	0.0017	0.006	0.004	**0.0255**	0.0058	0.0045	0.0014	0.0019	**0.0274**
	[8.1e-04,.0035]	[.0028,.0128]	[.0023,.0069]		[.003,.0112]	[.0022,.0092]	[6.4e-04,.0032]	[7.5e-04,.0049]	
Ever users (N=2,591)									
Seen a tobacco sweepstakes ad	0.3142	0.2783	0.2448	**0.0072**	0.3248	0.3089	0.3204	0.2083	**<.0001**
	[.2874,.3424]	[.2333,.3283]	[.2118,.2812]		[.288,.3638]	[.2700,.3507]	[.2905,.3520]	[.1727,.2489]	
Obtained a discount coupon	0.1752	0.0836	0.1134	**<.0001**	0.1607	0.1811	0.1545	0.1487	**0.0031**
	[.1558,.1963]	[.0583,.1187]	[.0911,.1403]		[.1292,.198]	[.1463,.222]	[.132,.1799]	[.1341,.1645]	
Obtained a free sample	0.0239	0.0137	0.0287	0.3573	0.0293	0.0329	0.0184	0.0237	0.1433
	[.0165,.0346]	[.0063,.0298]	[.0186,.0443]		[.0185,.0461]	[.0212,.0505]	[.0124,.0272]	[.0187,.0300]	

[a] Cells represent rates of each sub-group; percentages can be obtained by multiplying by 100

[b] Significant results using Benjamini-Hochberg corrected p<.0375

Table 4

Self-reported reasons for tobacco use by ethnicity and SES, Ever users: weighted rates and 95% confidence intervals[a][b]

	NHW	AA	Hispanic	p	LT High School	HS Grad	Some college	College degree or higher	p
Used product because the advertising appeals to me									
E-cigarette	0.1547	0.5107	0.1921	**<.0001**	0.2992	0.1665	0.2199	0.1928	0.0256
(N=369)	[.1127,.2087]	[.3201,.6983]	[.1210,.2911]		[.1928,.4327]	[.1004,.2633]	[.1564,.3001]	[.1556,.2365]	
Non-large cigar	0.0986	0.1272	0.1724	0.2653	0.1418	0.1064	0.1659	0.1213	0.1303
(N=279)	[.0606,.1564]	[.0633,.2392]	[.106,.2678]		[.0773,.2458]	[.0496,.2136]	[.1065,.2493]	[.0895,.1623]	
Used product because people in the media or other public figures use them									
Regular brand of cigarettes	0.1113	0.3416	0.1563	0.0210	0.1683	0.155	0.1308	0.0732	0.5396
(N=289)	[.0695,.1735]	[.1601,.5853]	[.0776,.2898]		[.0947,.2813]	[.0847,.2667]	[.0732,.2227]	[.0185,.2483]	
E-cigarettes	0.3364	0.472	0.414	0.1811	0.523	0.4085	0.3378	0.2555	**0.0061**
(N=370)	[.2828,.3945]	[.3103,.6398]	[.3085,.5281]		[.4021,.6413]	[.3029,.5232]	[.2583,.4275]	[.1802,.3488]	
Non-large cigar	0.2063	0.3513	0.3245	0.0342	0.4252	0.2432	0.2412	0.1587	**0.0084**
(N=279)	[.1527,.2727]	[.244,.4762]	[.2277,.4389]		[.3062,.5536]	[.1545,.3610]	[.1659,.3369]	[.0855,.2758]	

[a] Cells represent rates of each sub-group; percentages can be obtained by multiplying by 100

[b] Significant results using Benjamini-Hochberg corrected p<.015 are bolded.