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Tracking Young Adults' Attitudes toward Tobacco Marketing Using Ecological Momentary Assessment (EMA)

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Abstract

Background—Decades of research demonstrate the pernicious effects of targeted cigarette marketing on young people. Now, with tobacco marketing shifting toward greater incorporation of alternative products, it is critical to identify current attitudes toward the new landscape of tobacco advertisements.

Objectives—The purpose of this study was to understand the present landscape of tobacco marketing to which young adults are exposed, and to assess how they respond to it.

Method—During 2015–2016, we used ecological momentary assessment (EMA), in which 44 young adults (aged 18–28) carried smartphones equipped with a survey app. Seventy-seven percent were ever-users of tobacco and 29.5% were intermittent users of tobacco (someday users of cigarettes and/or those who used another tobacco product >5 times within the past year). For ten days, participants were prompted at three random times/day to complete a brief survey about their exposures and responses to tobacco-related advertising. Analyses used t-test and multilevel modeling.

Results—Intermittent users reported greater exposure than non-intermittent users to tobacco advertising. Further, both intermittent and ever-users reported more positive attitudes toward the tobacco advertising. Of the tobacco advertisements reported, 22% were for products unregulated by the FDA at the time of data collection.

Conclusions/Importance—These findings indicate that young adults, and especially young adults who use tobacco, are exposed to a fair amount of tobacco advertising on a weekly basis. As

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the tobacco users in our sample were largely experimental and occasional users, these marketing exposures could put young adults at risk for progression toward regular use.

For decades, tobacco marketing has targeted young people, with the intention of acquiring new users (Cummings et al., 2002; Hafez & Ling, 2005; Sepe, Ling, & Glantz, 2002). These industry efforts have their desired effect: exposure to cigarette advertisements distorts young people's perceptions about the availability and popularity of tobacco (Henriksen, Flora, Feighery, & Fortmann, 2002; Wakefield, Germain, Durkin, & Henriksen, 2006), increases curiosity about its use (Portnoy, Wu, Tworek, Chen, & Borek, 2014), increases intentions to use (Setodji, Martino, Scharf, & Shadel, 2014; Shadel, Martino, Setodji, & Scharf, 2013), and increases the likelihood of smoking initiation (DiFranza et al., 2006; Henriksen, Schleicher, Feighery, & Fortmann, 2010; Paynter & Edwards, 2009). In fact, tobacco marketing appears to encourage progression along the tobacco uptake trajectory—from never smoking, to experimentation, to regular smoking (Shadel, Martino, Setodji, & Scharf, 2012; Timberlake, 2016; Wellman, Sugarman, DiFranza, & Winickoff, 2006). Likely contributing to this effect, there is evidence that cigarette experimenters report more exposures than non-users to advertising (Peters et al., 2006), and greater liking of tobacco advertisements (Unger, Johnson, & Rohrbach, 1995).

Yet the landscape of tobacco marketing has changed. While cigarettes continue to be the main source of tobacco use among adults in the United States (Agaku et al., 2014), numerous alternative products have entered the market. The processes by which marketing influences use of these alternative tobacco products—including e-cigarettes, smokeless tobacco (SLT), and cigarillos—is largely unknown. Furthermore, although a recent “deeming rule” has extended the Food and Drug Administration (FDA) authority to regulate alternative tobacco products, for many years these products were not subject to any FDA oversight (FDA, 2016). Thus, it is critical to study the mechanisms for how advertising promotes positive cognitions towards these products, especially as their use continues to climb (Berg et al., 2015; Delnevo et al., 2014; Delnevo, Giovenco, Ambrose, Corey, & Conway, 2015; King, Patel, Nguyen, & Dube, 2014; McMillen, Gottlieb, Shaefer, Winickoff, & Klein, 2015).

The purpose of this study was to understand the present landscape of tobacco marketing to which young adults are exposed, and to assess how they respond to it. To answer these questions, we used ecological momentary assessment (EMA) methodology, whereby participants carried smartphones equipped with a survey app and completed several prompted surveys throughout the day. In these brief surveys, participants reported about their recent exposures and responses to tobacco-related advertising. We hypothesized that: (1) Young adult tobacco users would report greater exposure than nonusers to tobacco advertising; and (2) Young adult tobacco users would have more positive attitudes toward advertising.

METHODS

Study Overview

EMA refers to the real-time collection of data from people in their natural environments. The method is well suited to examining intermittent occurrences, such as use of tobacco and alcohol (Piasecki et al., 2012; Roberts, Bidwell, Colby, & Gwaltney, 2015) and marketing exposure (Kirchner et al., 2013), and overcomes many of the limitations inherent in traditional survey or interview methods by reducing recall error and increasing external validity (Shiffman et al., 2007). For the present study, participants used a smartphone app, PiLR EMA (MEI Research, Edina, MN, USA), that was refined specifically for this study. As described further in the procedures section, for ten days participants received a prompt at three random times each day, which directed them to complete a brief (1–2 minute) survey on the app.

Participants and Recruitment

Recruitment occurred through flyers around the campus area, and through announcements with University-related classes and listserves. Advertisements provided a phone number and website link, so that people interested in participating could take a brief screener (over the phone or online). Eligibility requirements were: aged 18–28 years; currently residing in Franklin County (where The Ohio State University's Columbus campus is located); and no vision impairments that would affect the ability to respond to app-based surveys. In addition, enrollment was monitored to have a sample that was relatively balanced on gender and tobacco-use history (more non-users and females completed the screener, so invitations to participate were sent to all users and a random selection of non-using males). Fifty young adults participated in the study. Data were excluded from those who had low compliance (<50% assigned surveys completed) and/or substantial technical problems with the app (n=6), yielding a sample of 44 for analyses.

Procedure

All study methods were approved by The Ohio State University IRB. Prior to beginning the EMA-portion of the study, participants completed a group-based, in-person baseline session that included training on how to use the EMA device and baseline assessments of several constructs (all participants who completed baseline assessment took part in the EMA). The compensation structure was also explained at this time: Participants received \$45 for baseline; \$1.00 for completing at least 1 EMA survey/day; \$10.00 for completing 70% of all EMA surveys; and \$15.00 for completing 90% of all EMA surveys (totaling a maximum of \$80).

The 10-day EMA reporting period always began on a Friday morning and ended on a Sunday night. During this time, participants were prompted to complete 3 surveys/day, in response to a phone prompt (similar to a text message notification) that alerted them at random times between 10am and 10pm a new survey was available. Surveys remained available for a 1-hour window. After completion of the EMA portion, participants met with research staff to complete a brief, end-of-study survey and receive compensation.

Measures

Baseline assessment used the Smoking Uptake Continuum (Choi, Gilpin, Farkas, & Pierce, 2001), including the items: “Have you ever tried or experimented with cigarette smoking, even a few puffs?” (yes, no) and “Do you now smoke cigarettes every day, some days, or not at all?” (*every day, some days, not at all*). Participants were also asked how many times in the past 12 months they’d used other tobacco products, including e-cigarettes, cigarillos, and SLT (1=*never*, 5=*more than 10 times*). Age, gender, race/ethnicity, education, social class, and alcohol use were also assessed at baseline. Additionally, both the baseline and end-of-study surveys asked participants “In your daily life, how much do you notice advertisements for tobacco products?” (1=*not at all*, 7=*very much*).

For the EMA surveys, participants answered questions about exposure to advertising since the last survey, including the product category (tobacco, alcohol, soda, snack food, or fast food), location (e.g., convenience store, the internet), type of product (e.g., cigarettes vs. SLT), and how much they enjoyed, liked, and found appealing the advertisement (1=*not at all*, 5=*very*). These last three items served as our measure of attitude toward tobacco advertising (Kelly, Slater, & Karan, 2002). Participants also reported any recent tobacco or alcohol use. Those reporting not seeing any tobacco advertisements received filler questions, to ensure equal survey lengths across circumstances.

Analyses

We first ran descriptive statistics to examine EMA reporting and characterize the sample. Participants were classified as ever users (*yes, no*; Choi et al., 2001) if they reported in their baseline assessments ever trying cigarettes and/or having used another type of tobacco product within the past 12 months. There were no daily cigarette smokers in the sample. In line with previous work (Shiffman et al., 2012) participants were coded for being intermittent users. They were classified as intermittent users (*yes, no*) if they reported someday use of cigarettes and/or having used another type of tobacco product more than 5 times within the past 12 months. This latter cut-off was established to accommodate the patterns of hookah users, for whom use is more intermittent than for cigarette smokers (Maziak, Ward, Afifi Soweid, & Eissenberg, 2005). A paired sample t-test was conducted to determine whether there was a pre-post EMA difference in how much participants noticed advertisements for tobacco products.

For Hypothesis 1 (users would report greater exposure than nonusers to tobacco advertising), we began by summing, within participants, the number of instances where a tobacco advertisement exposure was reported. This value was next divided by the total number of surveys completed by a participant, to obtain a value for the percentage of surveys where a tobacco advertisement was reported. Independent samples t-tests were then used to compare how the percentage of times reporting a tobacco advertisement differed based on ever-use and intermittent-use status.

For Hypothesis 2 (users would have more positive attitudes than nonusers toward tobacco advertising), each of the three tobacco attitude items (enjoy, like, and appealing) was averaged, within participants, over the 10-day period. These three item averages were then

aggregated, within participants, to form a single “average attitude” score (Chronbach’s $\alpha=.92$) exclusively for *t*-test analyses. The same process was repeated for alcohol and soda advertisements (Chronbach’s $\alpha=.94$, and $.88$, respectively). Independent samples *t*-tests were used to compare how average attitudes toward tobacco advertising differed based on ever-use and intermittent-use status. To validate the pattern, we also compared how average attitudes toward alcohol advertising differed based on binge drinking status (past-10-day consumption of 4/5 drinks on one occasion for males/females (Center for Disease Control (CDC), 2016).

Next, because of the structure of the data, where surveys were nested within person, we tested Hypothesis 2 using multilevel modeling (MLM; also called hierarchical linear modeling; Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). MLM provides estimates of the variability within each person (Level 1) and between individuals (Level 2) across occasions. These models are ideal for event-level data because they allow for missing data and varying numbers of observations within individuals. All MLMs were estimated in Mplus version 7 (Muthén, L. K., & Muthén, B. O., 1998) using maximum likelihood estimation. The specific type of model run is sometimes referred to as a *means-as-outcomes model* (Geiser, 2012; Luke, 2004); in this type of model, differences in the cluster means are explained by Level 2 predictors. For all models, attitude was the dependent variable and we included tobacco use (ever or intermittent) as a fixed Level 2 variable.

RESULTS

The average age of this sample ($N=44$) was 21.8 years ($SD=2.4$; range 18–28); Forty-seven percent of the sample was male, 66% were non-Hispanic White, and 77% were currently enrolled in or had completed an undergraduate degree; 30.2% reported their current social class as lower-middle class, and 41.9% as middle-class. This sample was slightly more White and had higher socioeconomic status compared to the overall population of Franklin County (United States Census Bureau, 2016). 77.3% of the sample was classified as ever-users, and 22.7% as never-users; 29.5% were classified as intermittent users, and 70.5% as non-intermittent users. The most common product ever used was hookah (52.3%), followed by cigarettes (50%), cigarillos (27.3%), cigars (25%), and e-cigarettes (18.2%). Less than 10% of the sample had ever used smokeless tobacco or pipes. Ever-use of more than one tobacco product was reported by 52.3%.

Participants completed an average of 22.5 surveys (75% compliance). Seven of the young adults reported using a tobacco product once during the EMA period and six reported using more than once (from five to 25 times). On average, participants reported seeing a tobacco advertisement 1.9 times during the 10-day period (9% of reports; Table 1). The most common locations where tobacco advertisements were reported were grocery stores, bars, and on the internet. Cigarettes were the most commonly reported type of tobacco advertised (58%), followed by SLT (15%); 22% of reported tobacco advertisements were for e-cigarettes or cigars, products unregulated by the FDA at the time of data collection (a final 5% of advertisements were reported as “don’t remember” for type of product). There was no significant difference pre- vs. post-EMA in how much participants noticed advertisements

for tobacco products, $t(43)=-.26$, $p=.80$. Thus, there was no evidence that the act of being in the study caused hyper-vigilance for tobacco marketing.

There was no difference between ever- and never-users on the percentage of times a tobacco advertisement was reported ($p=.23$). However, intermittent users had a significantly higher percentage of times reporting a tobacco ad, compared to non-intermittent users (13% vs. 7%), $t(42)=-2.14$, $p=.038$. Use during the 10-day EMA period was correlated with a higher percentage of times reporting a tobacco advertisement ($r=.36$, $p=.015$), as well as the percentage of times reporting an advertisement for each individual product ($r>.3$, $p<.03$). Among the 28 young adults who reported seeing tobacco advertisements, attitudes among ever-users ($M=2.47$, $SD=0.69$) were significantly greater than those among never-users ($M=1.53$, $SD=0.53$; $t(26)=-3.07$, $p=.005$). Likewise, attitudes among intermittent users ($M=2.73$, $SD=0.45$) were significantly greater than those among non-intermittent users ($M=1.97$, $SD=0.78$; $t(26)=-2.94$, $p=.007$). A similar pattern was found for alcohol: attitudes among binge drinkers ($M=3.22$, $SD=0.55$) were significantly greater than those among non-binge drinkers ($M=2.66$, $SD=0.81$; $t(36)=-2.54$, $p=.015$).

Finally, the MLMs indicated that, among the 28 young adults who reported seeing tobacco advertisements, tobacco use was significantly associated with attitudes, both for the model in which ever-use was a predictor ($\gamma=.96$, $p<.001$) and for the model in which intermittent use was a predictor ($\gamma=.64$, $p<.01$). The interpretation of the unstandardized coefficients is that ever-users had an expected mean attitude that was .96 points more positive (on the 5-point scale) than the never users; and intermittent users had an expected mean attitude that was .64 points more positive than the non-intermittent users.

DISCUSSION

This study tracked young adult's daily exposures to the new landscape of tobacco advertising using EMA methodology, which provides more accurate results than traditional surveys (Shiffman et al., 2007). We found that our sample was exposed to an average of 1.9 tobacco advertisements over the 10-day period. It is important to note that this study was conducted on a campus with a tobacco-free policy, and thus exposure rates are likely higher in other areas where tobacco-free policies are not enforced. Roughly a quarter of the tobacco advertisements reported were for products that are newly subject to FDA regulation (FDA, 2016). These findings underscore the need to fully implement the rule and to build upon it by imposing marketing restrictions on the newly deemed products that will match those applied to cigarettes and SLT.

In support of our first hypothesis, we found intermittent tobacco users reported greater exposure than non-intermittent users to tobacco advertising. This study was not designed to determine *why* tobacco users were experiencing more exposure; yet we suspect it was due to both the heightened awareness of tobacco users to tobacco advertising (i.e., attentional bias), as well as marketing that specifically targets tobacco users. In support of our second hypothesis, we found tobacco users also reported more positive attitudes toward tobacco advertising. This finding is particularly important because the tobacco users in our sample were largely experimental and occasional users. Thus, their heightened exposures and

positive attitudes toward the advertising could be encouraging their movement along the initiation process and toward regular use—which puts these young adults at risk for a lifetime of nicotine addiction and tobacco-related diseases.

Study limitations include the small sample size, which prevented us from breaking-down the data to look at how use of specific products relates to attitudes toward those products. This study was designed to examine attitudes toward each advertisement to which a participant was exposed, and thus did not ask about attitudes during periods of non-exposure; as a result, we were unable to examine how attitudes *changed* as a function of exposure. Despite these limitations, this study is among the first to track young adult's daily exposures to marketing for alternative tobacco products, and detected important differences based on use history. Future EMA studies with larger samples could answer additional valuable questions, such whether certain retail locations are driving the effects, or how much the effects are related to purchasing behavior. Future work should also pair this type of EMA methodology with prospective research and experimental designs, in order to more strongly demonstrate the causal link between exposure and behavior.

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Table 1

Types, locations, and attitudes toward advertisements, as reported by young adults over the 10-day EMA period (N=44).

		Average # of Times Reported by Participants	Average % of Times Reported by Participants	Average Attitude (SD)
Types of Advertisement Seen	Tobacco	1.91	9	2.27 (0.76)
	Alcohol	3.89	17	2.97 (0.73)
	Soda	3.48	16	2.94 (0.66)
	Snack Food	2.91	13	
	Fast Food	4.11	18	
Location of the Tobacco Ad ^a	Gas Station	1.43	7	
	Grocery Store	0.61	3	
	Bar	1.07	5	
	Mail ^b	0.75	3	
	Internet	1.02	4	
	Movie	0.16	1	
	Sport Event	0.07	<1	
	Radio	0.23	1	
	Other	0.07	<1	
Tobacco Product Advertised ^a	Cigarettes	1.52	7	
	E-Cigarettes	0.39	2	
	Smokeless Tobacco ^c	0.41	2	
	Cigars	0.18	<1	

^aThese values are for the 28 young adults who reported exposure to a tobacco advertisement.

^bThis response option read: "Something I got in the mail, including coupons."

^cSmokeless tobacco was specified as including snuff, chewing tobacco, or snus.