



Short Communication

Exposure to pro- and anti-tobacco messages online and off-line among people experiencing homelessness

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ABSTRACT

The prevalence of cigarette smoking among people experiencing homelessness is 70%. The internet is a common mode of exposure to tobacco-related messaging, yet little is known about these exposures among people experiencing homelessness. Using time-location sampling, we recruited a sample of adults experiencing homelessness who were current cigarette smokers (i.e. smoked in the past 30 days) from shelters and service sites in San Francisco. We administered a survey to explore self-reported use of the internet and online streaming services; and exposure to tobacco messaging online and offline. Of the 470 participants, 75.5% reported using the internet and 67.2% reported using online streaming video in a typical week. Many participants had seen online advertisements for tobacco products ($N = 197$, 41.7%) or anti-tobacco industry messages ($N = 215$, 45.6%), although participants reported seeing both advertisements and warnings related to tobacco more frequently offline than online. Respondents who reported using the internet for more than 4 h in a typical week were more likely to recall seeing tobacco-related warnings or advertisements online. Respondents who reported seeing tobacco-related warnings and advertisements were more likely to have attempted to quit smoking within the past year. These findings suggest an opportunity to use the internet to communicate the harms of tobacco products with messages tailored towards adults experiencing homelessness. Our results suggest further that now is the time to saturate the internet and online streaming services with anti-tobacco industry messages before advertisements for tobacco products become as ubiquitous online as they are elsewhere.

1. Introduction

Smoking is the leading cause of morbidity and mortality among individuals experiencing homelessness aged 45 years and older in the United States (Baggett et al., 2013). While an estimated 15.5% (37.8 million) of U.S. adults currently smoke cigarettes (Jamal et al., 2018), an estimated 70% of adults experiencing homelessness report current smoking (Baggett et al., 2013). The high prevalence of smoking among adults experiencing homelessness has been attributed to high rates of comorbid mental illness and substance use disorders, both of which increase vulnerability to nicotine addiction (Schroeder and Morris, 2010). These characteristics have been explicitly targeted by tobacco industry marketing efforts.

Individuals with mental illness and substance use, including those experiencing homelessness, were identified as a critical subpopulation for sales by the tobacco industry as early as the 1970s (Reynolds, 1989;

Brooks, 1977). By the early 1990s, adults experiencing homelessness became a target for major tobacco companies as part of larger marketing efforts directed towards “downscale customers.” (Reynolds, 1995; Apollonio and Malone, 2005) Advertisements for cigarettes were expressly banned from television and radio in 1971 (Centers for Disease Control and Prevention, 2019), and the 1998 Master Settlement Agreement included bans on transit and billboard advertisements, paid brand placement, as well as advertising and marketing practices that targeted individuals under 18 year of age (Master Settlement Agreement, 1998). Nevertheless, industry documents revealed efforts to circumvent advertising restrictions and recruit new smokers by distributing free sample packs of cigarettes to homeless shelters and soup kitchens (Apollonio and Malone, 2005). In 1995, R.J. Reynolds initiated a major campaign internally referred to as “Project SCUM” targeting adults experiencing homelessness in San Francisco (Reynolds, 1995; Stevens et al., 2004). Since the 1990s, advertising strategies of major

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tobacco companies have continued to evolve and shift towards new media, including the internet, social media websites, and YouTube (Cavazos-Rehg et al., 2013).

Direct estimates of internet access among adults experiencing homelessness are limited. Two previous studies of unsheltered adults in the 2000s found that 39% of participants had regular access to email through their mobile phones (Stennett et al., 2012) and that 47% had used a computer within the past 30 days (Eyrich-Garg, 2010). A more recent study of sheltered older adults experiencing homelessness in Northern California found that 55% had ever accessed the internet (Raven et al., 2018). The extent to which these estimates generalize to sheltered populations is unclear. Nevertheless, past research suggests there is promise for delivery of health-promoting information and messages through mobile technologies and the internet, and most individuals experiencing homelessness appear amenable to receiving health-promoting messages via their cell phones and the internet (Eyrich-Garg, 2010; Asgary et al., 2015). However, the internet may be an important source of exposure to tobacco industry advertisements and messaging among individuals experiencing homelessness.

Despite high smoking rates and mixed evidence around access to the internet among adults experiencing homelessness, we know of no studies that have examined the extent of exposure to tobacco-related messages in this population – either positive or negative – via internet media. For the present study, we examine exposure to tobacco-related messaging both online and offline in a sample of adult current smokers who were experiencing homelessness and living in San Francisco.

2. Methods

2.1. Study setting, participants, and sampling procedures

We recruited study participants from emergency shelters; navigation centers offering short-term shelter and services; a program offering day-time referral services; and a community center serving older, indigent adults in San Francisco, California. Recruitment was proportional to the size of each study site, with more participants recruited from larger facilities. Participants were eligible to participate if they were 18 years or older; had smoked at least 100 cigarettes in their lifetime and currently smoked cigarettes, defined as use in the past 30 days; were receiving services at the recruitment site, and were currently experiencing homelessness as defined by the Homeless Emergency Assistance and Rapid Transition to Housing Act (e.g. unsheltered, in a temporary shelter, or living doubled up with family or friends) (Act TM-VHA, 2009).

Data collection took place between November 2017 and July 2018. We used time-location sampling, a method used to collect data from hard-to-reach populations (Karon and Wejnert, 2012; MacKellar et al., 1996). Study staff identified eight potential study sites and sampling times, which formed the sampling frame from which study locations were selected.

We recruited participants using flyers and announcements at each site. During the allotted time for recruitment, study personnel invited eligible participants to enroll, screened participants for study eligibility, and obtained verbal consent. We used procedures to avoid enrolling participants more than once. A trained researcher administered the questionnaire using a tablet computer. The questionnaire took approximately 20 minutes to complete, and participants who completed the questionnaire received a \$15 gift card to a local retail store. All study procedures were approved by the University of California, San Francisco Committee on Human Subjects Research.

2.2. Study measures

2.2.1. Participant demographics, smoking characteristics, and use of the internet

We gathered self-reported demographic characteristics including

age, gender, race/ethnicity, and educational attainment. Participants reported their smoking characteristics, including average number of cigarettes smoked per day, time to first cigarette after waking, and past 30-days use of alternative tobacco products (e.g. e-cigarettes). We classified participants who had used cigarettes with one or more alternative tobacco product in the past 30 days as concurrent tobacco users. We assessed internet use by asking how many hours in a typical week they spent watching streaming video online (including Netflix, Hulu, and YouTube) and how many hours in a typical week they spent on the internet in general, including time spent on smartphones and tablets.

2.2.2. Exposure to media and marketing

Participants reported their general exposure to pro-tobacco messages *within the past 30 days* and their exposure to anti-tobacco information *within the past 30 days* via the internet, television, or radio. Participants were asked whether they had *ever* seen advertisements for or warning messages related to tobacco products via the internet (including social media, blogs, email, streaming online video, internet radio, or Google). Participants were then asked whether they had *ever* seen advertisements for tobacco products via non-internet media (including billboards, liquor stores, on tv/cable, busses or trains, radio, magazines, gas stations, or convenience stores).

2.3. Statistical analyses

We summarized participant demographic characteristics, smoking characteristics, and use of the internet and online streaming video with percentages for categorical variables and median and interquartile ranges (IQR) for continuous variables. We calculated the percentage of participants exposed to either pro- and anti-tobacco industry messages through television, radio, or online *within the past 30 days*. We next calculated the percentage of participants that had *ever* been exposed to advertisements or warnings for tobacco products via internet and non-internet media.

We examined the association between duration of weekly internet use (zero hours, between zero and 4 h, more than 4 h) and lifetime exposure to tobacco-related warnings and advertisements using generalized logistic regression. We subsequently examined the association between lifetime exposure to tobacco-related warnings and advertisements and self-reported quit attempts in the past year using generalized logistic regression. Models were adjusted for age, gender, race/ethnicity, and education. All analyses were conducted with R, version 3.3.2 (R Foundation for Statistical Computing, Vienna, Austria).

3. Results

The final study population included 470 participants. Participants' median age was 50 years (IQR 41.0–59.0), the majority were non-white ($N = 335$, 71.3%) and male ($N = 309$, 65.5%). On average, participants smoked 10 cigarettes per day. Approximately two-thirds were concurrent tobacco users ($N = 308$, 65.5%). The majority ($N = 355$, 75.5%) reported using the internet and 49.4% used the internet for more than 4 h in a typical week. Most reported watching streaming videos online ($N = 316$, 67.2%) and 40.9% watching more than 4 h in a typical week (Table 1).

Approximately half of participants reported seeing information on ways to quit smoking ($N = 258$, 45.7%), cigarette taxes ($N = 239$, 50.6%), and warnings about tobacco products ($N = 258$, 54.7%) within the past 30 days on radio, television or online. Similarly, approximately half of participants were exposed to industry messages about cigarettes ($N = 235$, 49.8%) and e-cigarettes ($N = 231$, 48.9%) through these media (Web Table).

Lifetime exposure to both tobacco-related advertisements and warnings offline were reported far more frequently than online exposure. Online exposure to tobacco-related advertisements and

Table 1
Demographics, smoking characteristics, and internet use patterns (N = 470).

Demographic characteristics	
Age – median (IQR)	49.8 (41.0–59.0)
Gender – N (%)	
Female	145 (30.7)
Male	309 (65.5)
Transgender	13 (2.8)
Race – N (%)	
White	135 (28.6)
Black	209 (44.3)
Hispanic	42 (8.9)
Asian	11 (2.3)
Other	72 (15.3)
Education – N (%)	
Less than HS	103 (21.8)
HS or GED	160 (33.9)
Some college	142 (30.1)
College	61 (12.9)
Smoking characteristics	
Concurrent tobacco use – N (%)	
Any concurrent tobacco use ^a	308 (65.5)
Blunt use	207 (44.0)
Cigar use	191 (40.6)
E-cigarette use	65 (13.8)
Tobacco pipe use	27 (5.7)
Hookah use	9 (1.9)
Avg. cigarettes per day – median (IQR)	10 (5–15)
Time to first cigarette after waking – N (%)	
Within 5 min	171 (36.4)
Six to 30 min	98 (20.9)
31 to 60 min	74 (15.7)
After 60 min	126 (26.8)
Internet use patterns	
Time spent on the internet	
Zero hours per week	115 (24.5)
Between one and 4 h per week	112 (23.8)
More than 4 h per week	232 (49.4)
Hours spent watching streaming video online	
Zero hours per week	154 (32.8)
Between one and 4 h per week	123 (26.2)
More than 4 h per week	192 (40.9)

^a Participants were classified as concurrent tobacco users if they used cigarettes and one or more non-cigarette tobacco product in the past 30 days or as cigarette only users otherwise. Non-cigarette tobacco products included blunts, cigars, e-cigarettes, tobacco pipes, and hookah.

warnings occurred most frequently through social media websites (advertisements 23.6% and warnings 30.6%) and Google (advertisement 21.9% and warnings 25.5%) (Fig. 1, top panel). Offline, nearly all participants reported some exposure to advertisements or warnings, and advertisements were consistently reported more frequently than warnings (Fig. 1, bottom panel).

Participants who used the internet for four or more hours in a typical week were more likely to report exposure to tobacco-related warnings (OR = 4.54, 95% CI 2.56–8.03) and advertisements (OR = 4.67, 95% CI 2.68–8.13) compared to participants who reported no internet use. Non-white participants were more likely to report exposure to both advertisements and warnings for tobacco products online. Exposure to advertisements (OR = 1.55, 95% CI 1.05–2.29) and warnings (OR = 1.68, 95% CI 1.14–2.47) were associated with quit attempts in the past year.

4. Discussion

We found that 76% of participants used the internet in a typical week, and that 67% used online streaming services. This is in contrast with past studies of unsheltered adults, which find generally lower prevalence (39% to 55%) (Stennett et al., 2012; Eyrich-Garg, 2010; Raven et al., 2018). Although exposure to tobacco messaging offline

was more common, approximately half of participants reported exposure to industry advertisements or anti-tobacco warnings online. Longer duration of internet use was associated with greater exposure to tobacco-related messaging. Exposure to tobacco-related warnings and advertisements were associated with recent quit attempts, although this is likely because the majority of respondents who were exposed to tobacco-related warnings were also exposed to tobacco-related advertisements. To our knowledge, this study is the first to examine use of the internet and exposure to both tobacco-related advertisements and warnings among adults experiencing homelessness.

Taken together, the results of the present study suggest the potential for internet media as a delivery mechanism for health-promoting, anti-tobacco messages among adults experiencing homelessness. Our finding that non-white respondents were more frequently exposed to tobacco-related messaging online underscores that individuals experiencing homelessness comprise a heterogeneous population within which certain subgroups may be more or less exposed. Previous studies have shown that that individuals experiencing homelessness are amenable to receiving health-promoting messages via their cell phones and the internet (Eyrich-Garg, 2010; Asgary et al., 2015). Older individuals experiencing homelessness who accessed cell phones were more likely to be socially connected and less likely to experience a lapse in their access to medical care (Raven et al., 2018). However, no studies to-date have evaluated internet-delivered anti-tobacco interventions to people experiencing homelessness; findings from our study suggest a role for these types of interventions to increase awareness of the harms of tobacco products.

While more participants reported exposure to advertisements offline (i.e. through magazines and billboards), anti-tobacco industry messages were recalled more frequently than advertisements online. This suggests an opportunity to saturate internet media with tobacco warnings and health-promoting messages before advertising for tobacco products becomes as pervasive online as it is offline.

Although tobacco industry marketing strategies have historically capitalized on the unique vulnerabilities of populations experiencing homelessness [10], the internet may present a unique opportunity for counter-marketing strategies (Ribisl, 2003; Ribisl and Jo, 2012). Targeted messages that resonate with the unique experiences of individuals experiencing homelessness delivered via the internet, such as the Food and Drug Administration's youth-focused Real Cost campaign, could therefore be harnessed in the development of public health campaigns to prevent smoking initiation or encourage smoking cessation. This finding is particularly relevant given that cigarette smoking is heavily concentrated among individuals experiencing homelessness, and interventions to address tobacco use among these populations are urgently needed.

5. Limitations

Our study relies on self-reported smoking characteristics and exposure to tobacco-related messages, which introduces the possibility for measurement error due to poor recall. Additionally, the cross-sectional nature of the present study makes the temporal ordering of events (i.e. exposure to online tobacco-related messaging and quit attempts) ambiguous.

6. Conclusion

In order to effectively reduce the overall prevalence of smoking in the U.S., we must consider effective strategies to decrease the prevalence of smoking in vulnerable sub-populations. Historically, the tobacco industry has developed media strategies in order to target people experiencing homelessness. Results from our cross-sectional survey suggest that the internet is not only an increasingly important source of exposure to advertisements for tobacco products, but also a means through which targeted anti-tobacco messages may be delivered to

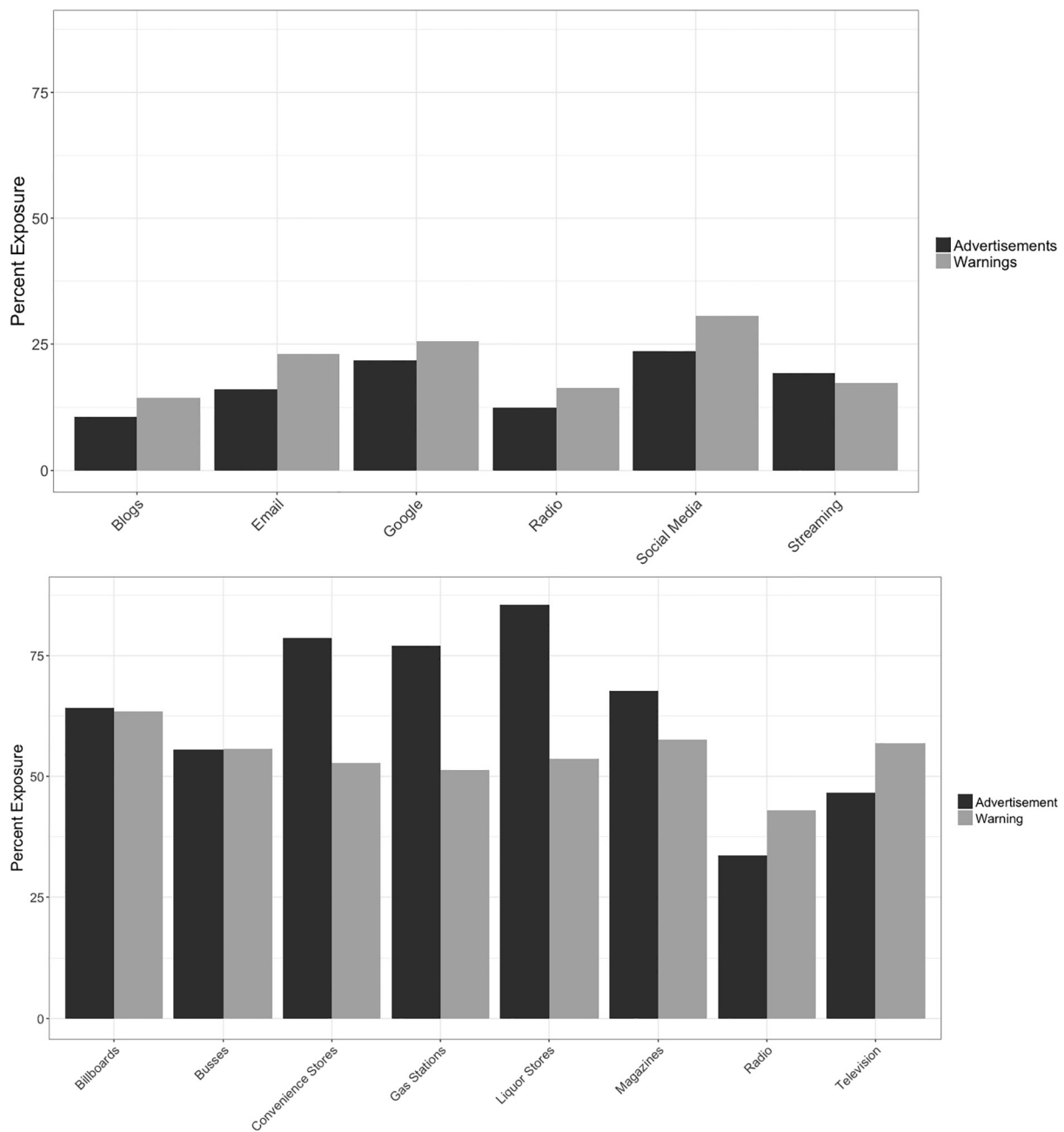


Fig. 1. Exposure to tobacco-related advertisements and warnings. We calculated the percentage of survey participants ($N = 470$) who recalled ever being exposed to advertisements and warnings for tobacco related products through various types of internet media, including blogs, email, Google, internet radio, social media, and streaming services (top panel) and the percentage who recalled ever being exposed to advertisements and warnings for tobacco related products via billboards, busses, convenience stores, gas stations, liquor stores, magazines, radio, and television (bottom panel).

individuals experiencing homelessness.

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Declaration of Competing Interest

The authors have no conflicts of interest to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2019.100944>.

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