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Prevalence of Use and Perceptions of Risk of Novel and other Alternative Tobacco Products among Sexual Minority Adults: Results from an Online National Survey, 2014–2015

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Abstract

Sexual minority (lesbian, gay, and bisexual [LGB]) populations experience disparities in cigarette use, but sparse evidence exists about novel and other alternative tobacco product use. In this study, we compared rates of novel and other alternative tobacco product use, risk perceptions, and worldview between LGB and heterosexual (HET) adults. An online survey administered in 2014–2015, using a weighted probability sample of 11,525 U.S. adults, assessed awareness of tobacco products; ever and current use of e-cigarettes, cigars, little cigars and cigarillos, and hookahs; perceptions of e-cigarettes; and worldview (individualism vs. communitarianism). Bivariate and adjusted multivariable analyses were performed to determine differences between LGB and HET groups. In the adjusted analyses, LGB adults were 1.5 times more likely to have ever used e-cigarettes (95% CI 1.2–1.9) and 1.9 times more likely to have ever used hookahs (95% CI 1.5–2.4) as compared to HET adults. A lower percentage of LGB adults, as compared to HET adults (16.7% vs. 19.2%), believed that exposure to vapors from e-cigarettes was “harmful” and reported that they “did not know” of any harm (35.1% vs. 39.8%). LGB were 20% less likely than were HET adults to endorse an individualistic worldview. These results suggest that a disparity exists, whereby LGB adults are more likely to have used e-cigarettes and hookahs. In addition, although vapor from e-cigarettes contains nicotine and other chemicals, LGB adults are less likely to perceive exposure to secondhand vapor as harmful. Tailored awareness campaigns and interventions are needed to convey the risks and curb use of these products.

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Keywords

Tobacco use; lesbian; gay; and bisexual; e-cigarette; risk perception; dual use; intentions; cigar; pipe; hookah

Introduction

Among adults in the United States, the rates of tobacco smoking declined from 20.9% in 2005 to 15.3% in 2015, and the proportion of daily smokers decreased from 16.9% in 2005 to 13.7% in 2013 (Jamal et al., 2014; U.S. Department of Health and Human Services. et al., 2016). However, cigarette smoking has remained high among certain groups, such as sexual minorities (i.e., lesbian, gay, and bisexual [LGB] individuals), for whom rates are consistently higher in comparison to those of heterosexual (HET) individuals (Jamal et al., 2014). Indeed, a systematic review of 42 studies conducted between 1987 and 2007 reported strong associations between LGB status and smoking, with odds ratios (ORs) between 1.5 and 2.5 (Lee et al., 2009). Thus, it has been well documented that sexual minority populations experience significant disparities related to tobacco use (Balsam et al., 2012; Bennett et al., 2015; Fallin et al., 2015a; Fallin et al., 2015b; King et al., 2012; Lee et al., 2009; Rath et al., 2013). One potential mechanism that explains this disparity is that LGB individuals experience stigma and harassment, discrimination, rejection from family, and even emotional and physical violence (Balsam et al., 2012; Gruskin et al., 2007). As a result, LGB individuals experience more stress, depression, and low self-esteem than do their HET counterparts, making them more vulnerable to use substances such as tobacco.

In response to declining cigarette sales, tobacco companies have shifted their focus from combustible tobacco products to novel tobacco products, including e-cigarettes and, to some degree, alternative tobacco products (e.g., cigars, cigarillos/little cigars, hookahs). Coupled with pervasive marketing strategies (Duke et al., 2014; Kim et al., 2014; Kornfield et al., 2015; Shang and Chaloupka, 2017), this shift to novel tobacco products has resulted in an increase in e-cigarette awareness, ever use, and current use among U.S. youth and adults (Agaku et al., 2014; Huang et al., 2015; King et al., 2015; Regan et al., 2013). Several studies have estimated the prevalence of the use of e-cigarettes and other alternative products among LGB individuals to determine whether there are patterns. The results suggest a disparity in the rates of use; however, with a few exceptions (Cabrera-Nguyen et al., 2016; Emory et al., 2016; Huang et al., 2015), the studies were either conducted with small sample sizes (Tami-Maury et al., 2015) or restricted to one city or state (Gruskin et al., 2007; Jordan et al., 2014). In addition, most studies did not examine the underlying factors that contribute to the higher rates of novel and other alternative tobacco product use, especially for e-cigarettes.

Perceived risk may be a significant underlying factor, as research has shown that risk perceptions influence many types of health behavior, such as sexual behavior, bike helmet use, diet, and exercise (Slovic, 2000). Risk perceptions significantly influence decision making such that individuals who perceive little to no risk for certain behaviors are more likely to engage in those behaviors compared to individuals who perceive the behavior to

have a high risk (Slovic, 2000; Slovic, 2010). Risk perceptions for cigarette smoking are particularly important in the initiation of smoking, as the beginning smoker perceives very little risk from smoking (Davis et al., 2008; Weinstein et al., 2005). Perceptions of risk are influenced by factors such as marketing and promotion. Manipulative advertisements often associate cigarette smoking with happiness, fun, and stress relief (U.S. Department of Health and Human Services, 1994) and do not convey risks; thus, perceptions of risk may be minimal. In addition to stigma and discrimination, LGB populations are also exposed to targeted marketing practices of the tobacco industry through direct advertising in LGB publications, outreach efforts, and event sponsorships (Hine et al., 1997).

Risk perceptions, according to the cultural theory of risk, also may be influenced by a person's worldview (Douglas and Wildavsky, 1983; Kahan et al., 2009; Palmer, 1996). The premise of this theory is that individuals form beliefs about societal dangers that mirror and support their idealized form of how society should be organized (Douglas, 2007; Olstedal et al., 2004). In other words, people are "the active organizers of their own perceptions" (p.43) (Wildavsky and Dake, 1990), choosing what to fear, such as the use of tobacco products.

Cultural cognition, a concept related to cultural theory, is a heuristic approach that can be used to measure an individual's cultural worldviews (Kahan, 2012) and has been conceptualized as two intersecting categories called "grid-group." *Grid* refers to the degree of social stratification within society and ranges from egalitarianism (low grid) to endorsing of a hierarchy (high grid), whereas *group* refers to the degree to which there is group control of individual behavior and ranges from complete independence (low group) to dependence among individuals (high group) (Hirsch and Baxter, 2011). Low group or individualism values commerce, industry, and limited government involvement, whereas high group or communitarianism holds a moral suspicion of commerce and industry and values government regulation. Using this perspective, worldviews have been researched in terms of many different types of risky situations or dangers and have been linked to risk perceptions of financial investments and health activities (Palmer, 1996), technology and the environment, war, the economy (Wildavsky and Dake, 1990), and pesticide policies (Hirsch & Baxter, 2011). Nevertheless, it is not well documented whether LGB individuals differ significantly from HET individuals on their worldviews. It stands to reason that they may differ given their diverse cultural and life experiences and that these differences may affect their risk perceptions; thus, they should be explored.

Another related issue is the promotion of e-cigarettes as an effective harm-reduction tool for smoking cessation (Drummond and Upson, 2014; Loughhead, 2015; Martinez-Sanchez et al., 2015). Although many strongly believe that e-cigarettes are less risky than combustible cigarettes, the FDA and many leading public health organizations have reported concerns about the safety of e-cigarettes, the potential for increased nicotine addiction, and how these products are marketed to the public (Drummond and Upson, 2014; Knorst et al., 2014; Loughhead, 2015). E-cigarettes may be harmful, particularly to youth, if they increase the likelihood that nonsmokers or former smokers will start using combustible tobacco products or if they discourage smokers from quitting. The American Association for Cancer Research and the American Society of Clinical Oncology published policy statements on electronic nicotine delivery systems (ENDS), stating that they "recognize the potential ENDS have to

alter patterns of tobacco use and affect the health of the public; however, definitive data are lacking” (p, 952) (Brandon et al., 2015). Until there is more definitive evidence of the safety of e-cigarettes, there is a need for research to address the role of risk perception in e-cigarette use and whether these products promote smoking cessation or perpetuate nicotine addiction through experimentation, initiation, or the use of combustible cigarettes plus novel and other alternative tobacco products (dual use or poly use). Because LGB populations experience disparities in smoking rates, and some evidence suggests disparity in the rates of e-cigarette use as well, more research is needed to examine the risk perceptions in regard to ecigarettes (e.g., “effects on health,” “useful for cessation”) and the potential factors specific to LGB individuals that may contribute to their use. Our study addresses these concerns by utilizing a nationally representative sample of LGB adults and by generating new knowledge to help inform tobacco prevention and control efforts. The objectives of this study are to document the prevalence and frequency of novel and other alternative tobacco product use in a sample of self-identified sexual minority adults (gay, lesbian, or bisexual) and to examine differences between HET and LBG adults in novel and other alternative tobacco product use, related health risk perceptions, and worldviews. We also examined their use of regular tobacco cigarettes and their intentions to quit, as both may be predictive of novel and other alternative tobacco product use.

Methods

This study used combined data from the 2014 and 2015 Tobacco Products and Risk Perceptions Surveys conducted by the Georgia State University Tobacco Center of Regulatory Science. This annual survey draws a probability sample of U.S. adults from KnowledgePanel, which is weighted to be representative of non-institutionalized U.S. adults. Participation rates for each year were 74% and 75%, respectively. A combined sample of 11,768 adults was obtained from the two years (5,717 in 2014 and 6,051 in 2015). Demographic and geographic distributions from the most recent Current Population Surveys were employed as benchmarks for adjustment and included age, gender, education, annual household income, race/ethnicity, census regions, and metropolitan area. The analytical sample for the present study was restricted to respondents who reported their sexual orientation, yielding a final study sample of 11,525. This study was approved by Georgia State University’s Institutional Review Board.

Measures

Sexual Identity—Respondent were asked, “Do you consider yourself to be . . . ?” and responses were categorized as heterosexual or straight, and non-heterosexual (“lesbian,” “gay,” “bisexual,” and “other”).

Primary Outcomes

Awareness, ever use, and current use of novel and other alternative tobacco

products: The survey assessed awareness, ever use, and current use of the following four novel and other alternative tobacco products: (1) electronic vapor products, including e-cigarettes, e-cigars, e-hookahs, epipes, vape pens, hookah pens, or personal vaporizers/mods; (2) traditional cigars or large (premium) cigars; (3) little cigars, cigarillos, and filtered

cigars (LCCs); and (4) hookahs, also referred to as water pipes or narghile pipes that are often used to smoke tobacco.

For each novel and other alternative tobacco product, *awareness* was assessed, using the response to the question, “Which of the following tobacco products have you ever seen or heard of? For each product, a response of “yes” was coded as being aware of the tobacco product; all other responses were coded as being unaware. *Ever use* of each novel and other alternative tobacco product was identified with a “yes” or “no” response to the question, “Have you ever smoked/used [product type], even one or two puffs? Participants who responded “yes” then received a follow-up question with a “yes” or “no” response: “In the past 30 days, have you smoked/used [product type], even one or two puffs?” A response of “yes” was used to identify current users of each of the four novel and other alternative tobacco products: e-cigarettes, cigars, LCCs, or hookahs. In addition, we defined any use of the tobacco products as those who were current users of conventional cigarettes, e-cigarettes, cigars, LCCs, or hookahs.

Smoking status—*Current smokers* were respondents who reported lifetime smoking levels of at least 100 cigarettes and smoking “every day” or “some days.” *Former smokers* were respondents who reported lifetime smoking levels of at least 100 cigarettes and were currently not smoking, and *never smokers* were those who reported not smoking at all.

Dual Use—Dual use was defined as current cigarette smokers who had also used e-cigarettes in the past 30 days.

Other Outcomes of Interest

Intention to quit and quit attempts: Respondents who were current smokers were asked about their intention to quit smoking cigarettes with the question, “What best describes your plans regarding quitting smoking cigarettes?” Responses were categorized as “high intention to quit” (responses of “intend to quit in the next 7 days” or “intend to quit in the next month,” “intend to quit in the next 6 months,” or “intend to quit in the next year”), and “low intention to quit” (responses of “intend to quit someday, but not within the next year” or “never plan to quit”). Current smokers also were asked whether they had made a quit attempt in the past year; those who answered affirmatively were categorized as having made a quit attempt.

Risk Perceptions of E-Cigarettes

Perceived addictiveness and use of e-cigarettes to quit: Respondents were asked their perceptions of addiction from using e-cigarettes through the question, “Do you think people can become addicted to electronic vapor products?” Beliefs about the likelihood of e-cigarette users’ quitting smoking regular cigarettes was assessed using the unfinished statement, “Cigarette smokers who also use electronic vapor products while trying to quit smoking cigarettes are . . .” with responses of (1) “less likely to quit smoking cigarettes”; (2) “equally likely to quit smoking cigarettes”; and (3) “more likely to quit smoking cigarettes.” Respondents who indicated they were aware of e-cigarettes were asked the above question and to complete the above statement.

Perceived harmfulness of e-cigarettes—Respondents who indicated that they were aware of e-cigarettes were asked to score the perceived harmfulness of e-cigarettes relative to combustible cigarettes through the question, “Is using electronic vapor products less harmful, about the same, or more harmful than smoking regular cigarettes?” These respondents also were asked, “Do you think that breathing vapor from other people’s electronic vapor products is . . .?” The response options were: (1) “not at all harmful to one’s health”; (2) “somewhat harmful to one’s health”; or (3) “very harmful to one’s health.” Respondents could also select, “I don’t know” for both items.

Respondents who indicated having ever used e-cigarettes were asked to report perceived harm as follows: “How might using electronic vapor products harm your health?” and “When you first used electronic vapor products, how much did you think about how they would harm your future health?” Responses for both items were “not at all,” “a little,” and “a lot.”

Cultural Cognition Worldview Scale—Four statements of belief from the Cultural Cognition Worldview Scale were used to assess the related worldview pertaining to “group”: (1) “Sometimes the government needs to make laws that keep people from hurting themselves”; (2) “It’s not the government’s business to try to protect people from themselves”; (3) “The government should stop telling people how to live their lives”; and (4) “The government should put limits on the choices that individuals can make so they don’t get in the way of what’s good for society” (Kahan, 2012; Kahan et al., 2009). Responses were collected as a score on a 6-point Likert scale, ranging from “strongly disagree” to “strongly agree.” Responses of “slightly agree/moderately agree/strongly agree” were categorized as “agree,” and responses of “slightly disagree/moderately disagree/strongly disagree” were categorized as “disagree.” All respondents were asked to report their agreement or disagreement with the above four statements.

Data Analyses

Cross-tabulations were used to compare LGB and HET groups (the main predictor) on sociodemographic characteristics to determine covariates and included age, sex, ethnicity, education, household annual income, region, and perceived health status. Significant bivariate differences by group in awareness, ever use, and 30-day use of novel and other alternative tobacco product were determined and then tested in adjusted multivariable logistic regression models to identify significant differences in these outcomes after controlling for demographic characteristics. The results from the multivariable logistic regression model, controlling for significant demographic covariates are reported as adjusted odds ratios (AORs) and 95% CIs. Finally, bivariate analyses of outcome variables, including smoking status, awareness and use of novel and other alternative tobacco products, intention to quit and quit attempts, perceived addiction and harmfulness of e-cigarettes, and cultural worldview, were assessed by respondents’ sexual orientation. For all analyses, statistical significance was set at $p < .05$.

Results

Sample Characteristics

The pooled data from 2014 and 2015 yielded a study sample of 11,525, with approximately 6% ($n = 670$) of the sample self-identified as LGB. From the LGB sample, 2.9% self-identified as gay ($n = 266$), 1.9% as bisexual ($n = 236$), 0.7% as lesbian ($n = 74$), and 0.9% as other ($n = 94$). Differences between groups are shown in Table 1. LGB and HET adults differed significantly ($p < 0.05$) by sex (LGB, 54.8% male; HET, 47.9% male) age (LGB, mean age 40.2 years; HET, mean age 47.6 years), ethnic minority status (LGB, 43.0%; HET, 33.5%), income (LGB 39.9% more than \$60K; HET 51.6% more than \$60K), and health status (LGB, 18.3% fair/poor health; HET, 13.9% fair/poor health). LGB and HET adults did not differ by educational level. Smoking status differed across the two groups, with the LGB group's having a higher proportion of current smokers (22.5%) as compared to the HET group (15.3%). Gender, age, race, income, region and perceived health status were controlled for in subsequent multivariable analyses.

Awareness, ever use, and current use of novel and other alternative tobacco products

Awareness was high for novel and other alternative tobacco products, ranging from 80% to 90% (Figure 1). The unadjusted prevalence of awareness proportions was similar among the LGB and HET populations for e-cigarettes, cigars, and LCCs; however, awareness of hookahs was significantly higher among the LGB group (89.3%) as compared to the HET group (80.6%). Adjusted multivariable analyses showed that LGB respondents were more likely to be aware of hookahs (AOR 1.9, 95% CI 1.3–2.6) compared to their HET counterparts (Table 2).

Prevalence of ever use differed significantly among the LGB and HET groups for e-cigarettes, LCCs, and hookahs, but was not significantly different for cigars (LGB, 33.4%; HET, 29.4%) (see Figure 1). Adjusted multivariable analyses showed no differences between groups in ever use of LCCs; however, ever use of e-cigarettes (adjusted OR [AOR] 1.5, 95% CI, 1.2–1.9) and ever use of hookahs (AOR, 1.9, 95% CI, 1.5–2.4) were more likely among the LGB group compared to the HET group (Table 2). Dual use of e-cigarettes and traditional cigarettes was higher among LGB adults (24.1%) as compared to HET adults (20.8%) but was not significantly different. Current use of any tobacco product (i.e., current use of any cigarettes, e-cigarettes, cigars, LCCs, or hookahs) was significantly higher among LGB adults as compared to HET adults (27.6% vs. 20.0%) in the bivariate analysis but was not significant in the adjusted multivariable model.

Intentions to Quit Smoking and Quit Attempts

Overall, 47.7% of HET adults had intentions to quit smoking cigarettes as compared to 41.1% of LGB adults; however, this difference was not significant ($p = .17$) (data not shown). In terms of actual quit attempts, 45.6% of LGB adults had made attempts to quit smoking in the past year as compared to 39.6% of HET adults, but this difference was not statistically significant ($p = .22$).

Differences between Groups on Risk Perceptions Related to E-Cigarette Use

Table 3 shows bivariate analyses for differences between groups on perception items related to e-cigarette use. There were no differences between groups on any perceptions related to e-cigarettes except for the potential of e-cigarettes for quitting smoking and perceptions related to harm from secondhand exposure to e-cigarettes. Bivariate results showed that 33.1% (95% CI, 28.39–38.0) of LGB believe that smokers who use e-cigarettes while trying to quit are more likely to quit smoking. Among the LGB group, 16.7% (95% CI, 12.7–20.6) agreed that exposure to vapors from e-cigarettes is “very harmful” to one’s health as compared to 19.2% (95% CI, 18.3–20.2%) of the HET group. In addition, about one-third of the LGB group (35.1%, 95% CI, 30.3–39.9) reported that they did not know “of any harm” from exposure to vapors from e-cigarettes vs. 39.8% (95% CI, 38.6–40.9%) of the HET group.

Cultural Cognition Worldview

The only significant difference observed for the four statements on “group” worldview was the item that supported an individualistic perspective versus communitarian (Table 4). A significantly lower proportion of LGB individuals as compared to HET individuals (52.52% vs. 58.49%) indicated their agreement with the statement, “It’s not the government’s business to try to protect people from themselves” ($p = .02$). In adjusted multivariable analyses, the results remained significant, as LGB respondents were less likely than HET respondents (AOR 0.80, 95% CI 0.65–0.98) to agree with this statement.

Discussion

This study identifies variations in the awareness, ever use, and current use of e-cigarettes and other alternative tobacco products among sexual minorities. Previous research has documented that disparities exist for LGB individuals in the use of cigarette smoking. Our study extends previous findings on tobacco use behaviors and risk perceptions by providing estimates of novel and other alternative tobacco product use, risk perceptions related to e-cigarette use, and worldview for LGB adults as compared to their HET counterparts. We identified high levels of awareness of novel and other alternative tobacco products that ranged from 80% to 90% of all respondents, with 88.6% of the LGB group and 90.3% of the HET group being aware of e-cigarettes. These latest estimates of level of awareness were inconsistent with previous estimates from a 2013 national survey among U.S. adults, which found that the LGB group had a higher level of awareness of e-cigarettes than did the HET group (89.9% vs. 86.6%) (Huang et al., 2015).

Previous research also has estimated the prevalence of e-cigarette use and that of other alternative tobacco products among LGB individuals and found a disparity in the rates of use. Our findings are consistent in that we found that ever use of e-cigarettes was 26% among LGB adults versus only 15.3% among HET adults in our sample. These estimates also are consistent with those reported in an earlier study: 25.1% for LGB and 14.3% for HET adults (Huang et al., 2015). In our study, however, current use, i.e., past 30 days, of novel and other alternative tobacco products did not differ significantly for e-cigarettes, cigars, little cigars, and hookahs across the LGB and HET groups. This is inconsistent with

another study that used a nationally representative sample of U.S. adults in 2013 (Emory et al., 2016) and found that, compared to the HET population, the LGB population was twice as likely to be current users of e-cigarettes and small cigars.

“Any tobacco use” among LGB adults as compared with HET adults also was higher than our estimate of any tobacco product use. The difference in rates of “any tobacco use” between our study and the Emory et al. (2016) study may be explained by differences in the measurement characteristics used to assess current use. Current use of cigars and LCCs among LGB adults was higher than that among their HET counterparts, but the same was not observed for e-cigarettes and hookahs. Our findings were in contrast to the results from another study that found cigar use to be lower among the LGB population (Gruskin et al., 2007). Another study that used data from the 2012–2013 National Adult Tobacco Survey (NATS) examined current cigarette smoking and the use of other tobacco products (cigars, pipes, hookahs, e-cigarettes, and smokeless tobacco) by sexual identity and gender (Johnson et al., 2016). The findings from this study contrasted with our study results by showing a higher prevalence of the use of e-cigarettes and hookahs among LGB adults as compared to their HET counterparts. It is possible that differences in features of survey administration may have contributed to the differences in findings across these studies. For example, the NATS data set was from the years 2012 and 2013, whereas this study used data from more current years, 2014 and 2015, a different mode of data collection (NATS uses a telephone survey, whereas ours was an online survey), and overall response rate (44.9%), which may provide an explanation for differences in the study findings. Moreover difference in participant characteristics itself may contribute to inconsistent results, for example 3.6% of the respondent population in our sample self-identified themselves as gay or lesbian while only 2.0% of NATS population identified themselves as lesbian/gay.

Consistent with findings from previous studies on smoking prevalence, although this was not the main focus of our study, our findings indicate that a significantly higher proportion of LGB adults smoke cigarettes as compared to HET adults. We found that the overall prevalence of current cigarette smoking was higher among sexual minorities (22.5% in LGB adults) as compared to HET adults (15.3%), which is similar to the findings of other studies (Bennett et al., 2015; Fallin et al., 2015a; Fallin et al., 2015b; Johnson et al., 2016; King et al., 2012; Lee et al., 2009; Max et al., 2016). Justifications for this high prevalence include normative behavior of socializing at bars, to cope with stress, and having friends and family who smoke (Gruskin et al., 2008; Jannat-Khah et al., 2017; Remafedi, 2007). LGB communities are more often targeted by tobacco industry marketing activities to make their products more appealing (Dilley et al., 2008). One caveat to this observation is that even though men are much more likely to smoke cigarettes than women, this gender difference has been absent among sexual minorities. As observed in California Health Interview survey, lesbian or bisexual women were just as likely as or more likely than gay or bisexual men to be current smokers (Cochran and Mays, 2017). One explanation is that sexual minority women have reported being more receptive and having more exposure to tobacco industry marketing compared to HET women (Dilley et al., 2008).

Even though a higher percentage of LGB adults than HET adults reported smoking, we did not find significant differences between groups for quit attempts or intentions to quit. This

finding suggests that this smoking-related disparity may continue to prevail in the LGB population without targeted intervention. Having intention to quit and having made quit attempts are associated with quitting smoking (U.S. Department of Health and Human Services, 2014). Additionally, studies report that LGB individuals are less likely to have health insurance (Matthews et al., 2011; McKirnan et al., 2006) than are HET individuals, and lack of health insurance may limit their access to cessation treatments, including counseling and medication. This may partly explain why LGB individuals are five times more likely than others to never intend to call a smoking cessation quitline (Burns et al., 2011). Sexual minority men are 20% less likely than are HET men to be aware of smoking quitlines, despite similar exposure to tobacco cessation advertisements in both groups (Fallin et al., 2016). This may have unfavorable public health implications, including slowing the rates of smoking cessation and increasing the rates of tobacco-related disease.

A majority of the study respondents perceive less or about the same level of harm to their health from using e-cigarettes as compared to regular cigarettes. More than 60% of our respondents reported that they did not think about how e-cigarettes may harm their future health. Our findings are in alignment with another study that found that about 60% of the study sample believed that e-cigarettes are harmless (Volesky et al., 2016). In this latter study, the authors point out that a small proportion of individuals reported that they perceived e-cigarettes to be as harmful as tobacco cigarettes. Although the respondents do not believe that e-cigarettes are entirely harmless, a majority of the respondents in our sample perceive that the harmfulness from using e-cigarettes as compared to cigarettes is less or about the same, and these proportions were similar in LGB and HET.

The lowered risk perception for harmfulness may have implications for the continued use of e-cigarettes. A recent study (Pechacek et al., 2016) found that the perception that e-cigarettes were less harmful was the most highly rated reason for continuing their use among those who switched from traditional cigarettes to e-cigarettes. Other reasons reported in the literature (Etter and Bullen, 2011; Pechacek et al., 2016) for using e-cigarette were that e-cigarettes (among former smokers) helped them to quit cigarettes or to avoid relapse and helped them to deal with cravings for tobacco and nicotine withdrawal symptoms. Perceiving e-cigarettes as harmless may play a role in whether individuals continue to use these products and perhaps their ability to reverse their nicotine addiction.

Among current smokers, those with intention to quit and those who had made quit attempts were more likely to have ever used and to currently use e-cigarettes (Huang et al., 2015). Smokers who intend to quit smoking combustible cigarettes may perceive e-cigarettes as less harmful than cigarettes and that they are effective smoking cessation tools (Brose et al., 2015; Pepper and Brewer, 2014; Pepper et al., 2015; Pepper et al., 2014; Siegel et al., 2011; Tan and Bigman, 2014; Vickerman et al., 2013). The current evidence on the use of e-cigarettes as a cessation tool, however, is insufficient and may aid in prolonging nicotine addiction among the LGB sub-population (Siu and Force, 2015).

Individuals' beliefs about risk are influenced by their cultural cognition (Kahan, 2012). According to cultural risk theory, individuals will align their perceptions of risk to their cultural cognitions related to supposedly dangerous activities and any policies for regulating

them. Thus, in the context of assessing risk of e-cigarettes, persons who subscribe to an “individualist” worldview would be more likely to reject claims of health risks and be opposed to any societal action that could lead to regulation and threaten economic markets related to the sale of e-cigarettes. Persons who hold a communitarian worldview, in contrast, would readily credit claims of health risk and endorse regulatory authority to limit people’s risk.

More than half of our sample agree that it is not the government’s business to try to protect people from themselves, and a lower proportion of LGB as compared to HET agreed that government should not infringe on their freedoms and rights. Thus, the LGB individuals in our sample are less likely to subscribe to an individualist worldview as compared to the HET group. These findings suggest that LGB individuals would be more receptive than HET individuals would be to tailored messaging that attempted to convey health risks associated with use of e-cigarettes or with exposure to secondhand vapor. LGB individuals might be more likely than HET individuals to be supportive of current regulations of e-cigarettes.

In summary, this study’s contribution goes beyond providing prevalence data for LGB tobacco use and has policy implications relevant to regulation and prevention among vulnerable populations. Tobacco regulatory efforts should focus on providing health education messages that can influence tobacco use through education campaigns, as this may be critical to reducing tobacco-related health disparities for LGB communities.

Limitations

This study used an online research panel and is limited to noninstitutionalized adults, which does not allow for generalizing the study findings to youth. Moreover, the e-cigarette industry is rapidly evolving, including newer designs and types of e-cigarettes (e.g., tanks, mods), which limits the ability to accurately identify terminology and survey questions to collect information on awareness, use, and risk perception of novel tobacco products. For example, in 2014, ENDS was used to identify e-cigarettes, whereas, in 2015, an updated terminology, “electronic vapor products,” was used to identify and encompass the broad range of e-cigarette devices; this could raise concern about comparability across data from 2014 vs. 2015. In addition, the survey measure assessed only sexual identity and did not exclusively measure gender identity. This limits our ability to measure tobacco use disparity among transgender individuals. To continue improving the quality of data collection, a comprehensive sexual orientation question that assesses both sexual orientation and gender identity could be included in future research.

Conclusions

These results help to inform LGB-targeted specific health promotion efforts to reduce potential health risks related to the use of tobacco products, specifically, ever e-cigarette use. Additional research is needed with larger sample sizes of the LGB population to better understand the modifiable risk factors for e-cigarette use, the use of other tobacco products, and, most important, dual use.

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Abbreviations

AOR	adjusted odds ratio
CI	confidence interval
ENDS	electronic nicotine delivery systems
HET	heterosexual
LCCs	little cigars, cigarillos, and filtered cigars
LGB	lesbian, gay, bisexual individuals
OR	odds ratio

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Highlights

- Smoking rates remain high among lesbian, gay, bisexual (LGB) individuals.
- Disparities in ever use of alternative tobacco products exist among LGB individuals.
- A lower percentage of the LGB population perceives exposure to vapor as harmful.
- Targeted health promotion efforts are needed to deal with health inequalities.

Figure 1.

Awareness, ever use, and current use of novel and other alternative tobacco products by sexual orientation, 2014–2015 data.

* $p < 0.05$; LGB = lesbian, gay, and bisexual; LCC = little cigars, cigarillos, and filtered cigars; Any tobacco- defined as current users of conventional cigarettes, e-cigarettes, cigars, LCCs, or hookahs.

Table 1Adult demographic characteristics and tobacco use in 2014–2015 (unweighted *N* = 11,525, weighted %)

Respondent characteristics	Overall sample (unweighted <i>n</i>)	Heterosexual weighted % (95% CI)	LGB weighted % (95% CI)	<i>p</i> -value
Sex				0.0062
Male	5,742	47.93 (46.81, 49.05)	54.81 (50.03, 59.59)	
Female	5,783	52.07 (50.95, 53.19)	45.19 (40.41, 49.97)	
Age (years)				<.0001
18–34	2,695	28.30 (27.22, 29.38)	43.64 (38.84, 48.44)	
35–54	3,787	32.87 (31.82, 33.91)	37.61 (33.03, 42.20)	
>55	5,043	38.83 (37.76, 39.90)	18.75 (15.30, 22.20)	
Mean age (years, SE)	47.15, 0.2	47.56 (47.16, 47.97), 0.2	40.20 (38.76, 41.65), 0.7	<.0001
Race/ ethnicity				0.0001
White, Non-Hispanic	8,529	66.49 (65.35, 67.63)	57.01 (52.13, 61.90)	
Other	2,996	33.51 (32.37, 34.65)	42.99 (38.10, 47.87)	
Education				0.1900
High school or less	4,430	41.93 (40.80, 43.06)	37.58 (32.69, 42.47)	
Some college	3,270	28.73 (27.71, 29.74)	31.54 (27.21, 35.86)	
College degree +	3,825	29.35 (28.38, 30.31)	30.88 (26.81, 34.95)	
Household income				<.0001
<30,000	2,779	22.39 (21.41, 23.36)	29.44 (24.99, 33.88)	
30,000–60,000	3,225	25.97 (25.00, 26.95)	30.70 (26.26, 35.14)	
>60,000	5,521	51.64 (50.52, 52.76)	39.86 (35.25, 44.47)	
Region				0.0028
Northeast	2,025	18.13 (17.27, 19.00)	14.89 (11.68, 18.11)	
Midwest	2,920	21.84 (20.96, 22.72)	16.78 (13.49, 20.07)	
South	3,998	37.07 (35.98, 38.17)	39.83 (35.05, 44.61)	
West	2,582	22.95 (21.99, 23.92)	28.50 (24.21, 32.79)	
Perceived health status				0.0063
Excellent /very good	5,248	48.29 (47.15, 49.42)	41.18 (36.47, 45.90)	
Good	4,305	37.79 (36.68, 38.90)	40.54 (35.83, 45.26)	
Fair/poor	1,666	13.92 (13.13, 14.72)	18.27 (14.53, 22.02)	
Smoking status				0.0002
Current smoker	2,579	15.31 (14.55, 16.06)	22.54 (18.72, 26.36)	
Former smoker	3,191	27.86 (26.87, 28.85)	26.50 (22.40, 30.59)	
Never smoker	5,755	56.83 (55.73, 57.93)	50.96 (46.20, 55.73)	

Multivariable logistic regression analysis examining novel and other alternative tobacco use among US adults, 2014–2015.

Table 2

	Having hookah awareness	LCC ever used	E-cigarettes ever used	Hookah ever used	* Any Tobacco products
Sexual orientation	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)
Heterosexual	Ref	Ref	Ref	Ref	Ref
LGB	1.85 ^b (1.32, 2.56)	1.20 (0.96, 1.52)	1.49 ^a (1.17, 1.89)	1.88 ^b (1.48, 2.39)	1.15 (0.91, 1.44)

^a $p < 0.01$,

^b $p < 0.001$;

Controlled for gender, age, race, income, region, and perceived health status; LCC = little cigars, cigarillos, and filtered cigars;

* Any tobacco products- defined as current users of conventional cigarettes, e-cigarettes, cigars, LCCs, or hookahs.

Table 3
Perceptions of e-cigarette use by sexual orientation among US adults, survey data 2014–2015

Survey questionnaire item	Overall sample (n)	Heterosexual weighted % (95%CI)	Non-heterosexual weighted % (95%CI)	p-value
<i>Do you think people can become addicted to e-cigarettes?</i>				0.2520
No	418	6.20 (5.47, 6.94)	4.71 (2.54, 6.88)	
Yes	6,722	93.80 (93.06, 94.53)	95.29 (93.12, 97.46)	
<i>Do you consider yourself addicted to e-cigarettes?</i>				0.4032
Not at all	1,165	87.23 (84.85, 89.69)	89.55 (84.37, 94.72)	
Yes, somewhat addicted to	134	10.29 (8.09, 12.50)	7.01 (2.67, 11.36)	
Yes, very addicted	34	2.44 (1.31, 3.57)	3.44 (0.55, 6.33)	
<i>Cigarette smokers who also use e-cigarettes while trying to quit smoking cigarettes are</i>				0.028
Less likely to quit smoking cigarettes	2,590	25.18 (24.15, 26.21)	22.08 (18.08, 26.08)	
Equally likely to quit smoking cigarettes	4,875	47.81 (46.63, 48.99)	44.80 (39.76, 49.84)	
More likely to quit smoking cigarettes	2,805	27.01 (25.97, 28.06)	33.12 (28.29, 37.95)	
<i>Is using e-cigarettes ... than smoking regular cigarettes?</i>				0.2113
Less harmful	3,531	33.02 (31.92–34.12)	38.07 (33.28, 42.85)	
About the same	3,201	31.63 (30.52, 32.73)	29.78 (25.19, 34.36)	
More harmful	300	3.08 (2.64–3.52)	3.68 (1.37, 5.99)	
I don't know	3,324	32.28 (31.18, 33.38)	28.47 (23.84–33.11)	
<i>Do you think that breathing vapor from other people's e-cigarettes is ...</i>				0.0280
Not at all harmful to one's health	1,501	12.86 (12.09, 13.63)	16.96 (13.39, 20.52)	
Somewhat harmful to one's health	2,854	28.14 (27.08, 29.21)	31.27 (26.66, 35.88)	
Very harmful to one's health	1,841	19.22 (18.28, 20.17)	16.65 (12.68, 20.62)	
I don't know	4,163	39.78 (38.63, 40.93)	35.12 (30.32, 39.92)	
<i>How might using e-cigarettes harm your health?</i>				0.8371
Not at all	1,240	61.65 (58.72, 64.58)	58.70 (49.81, 67.60)	
A little	553	27.58 (24.90, 30.26)	29.52 (21.65, 37.39)	
A lot	172	10.77 (8.78, 12.76)	11.78 (5.08, 18.47)	
<i>When you first used e-cigarettes, how much did you think about how they would harm your future health?</i>				0.2567
Not at all	1,314	68.23 (65.50, 70.96)	60.90 (52.06, 69.73)	
A little	564	24.21 (21.73, 26.69)	31.19 (22.83, 39.55)	

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Survey questionnaire item	Overall sample (n)	Heterosexual weighted % (95%CI)	Non-heterosexual weighted % (95%CI)	p-value
A lot	13	7.56 (5.94, 9.19)	7.91 (2.56, 13.27)	

Comparison of cultural cognition worldview among heterosexual and non-heterosexual (LGB) U.S. adults, survey data 2014–2015

Table 4

	Overall sample (n)	Heterosexual weighted % (95%CI)	LGB weighted % (95%CI)	p-value
Sometimes the government needs to make laws that keep people from hurting themselves	4,216	36.26 (35.16, 37.35)	35.62 (30.87, 40.37)	0.7989
	6,951	63.74 (62.65, 64.84)	64.38 (59.63, 69.13)	
It's not the government's business to try to protect people from themselves	4,428	41.51 (40.38, 42.64)	47.47 (42.61, 52.33)	0.0178
	6,733	58.49 (57.36, 59.62)	52.53 (47.67, 57.39)	
The government should stop telling people how to live their lives	3,575	33.90 (32.80, 34.99)	38.00 (33.31, 42.70)	0.0878
	7,583	66.10 (65.01, 67.20)	62.00 (57.30, 66.69)	
The government should put limits on the choices individuals can make so they don't get in the way of what's good for society	7,085	62.06 (60.96, 63.17)	61.40 (56.74, 66.05)	0.7841
	4,075	37.94 (36.83, 39.04)	38.60 (33.95, 43.26)	