

Original investigation

Intragroup Variance in Lesbian, Gay, and Bisexual Tobacco Use Behaviors: Evidence That Subgroups Matter, Notably Bisexual Women

Kristen Emory PhD^{1,2}, Yoonsang Kim PhD¹, Francisco Buchting PhD³,
Lisa Vera BA^{1,2}, Jidong Huang PhD¹, Sherry L. Emery PhD¹

¹Health Media Collaboratory, Institute for Health Research and Policy, University of Illinois at Chicago, Chicago, IL; ²Moore's Cancer Center at the University of California, San Diego, La Jolla, CA; ³Moore's Cancer Center, Horizons Foundation, San Francisco, CA

Corresponding Author: Kristen Emory, PhD, Health Media Collaboratory, Moore's Cancer Center at the University of California, San Diego, 3855 Health Sciences Dr., La Jolla, CA 92093, USA. Telephone: 209-996-9123; Fax: 858-657-7395; E-mail: kemory@mail.ucsd.edu

Abstract

Introduction: Emerging evidence suggests bisexual populations are at increased risk for a variety of negative health outcomes, including tobacco use. Lesbian, gay, and bisexual (LGB) populations are at increased risk for cigarette smoking, but research on LGB subpopulations' use of tobacco products beyond cigarettes and tobacco use differences across LGB subgroups is in its infancy. This study explores differences in use of tobacco products across LGB subgroups, including gender differences among bisexuals.

Methods: This study reports results from a 2013 nationally-representative cross-sectional online survey of US adults ($N = 17\ 087$). Weighted tobacco use prevalence and adjusted logistic regression results are reported.

Results: LGB populations reported higher current use of any tobacco product (35.7%) and current use of cigarettes (32.0%), e-cigarettes (8.9%), regular (5.5%) and small cigars (11.6%), compared with non-LGB. Bisexual (odds ratio [OR] = 2.6, 95% confidence interval [CI]: 1.7–3.9) and lesbian (OR = 1.7, 95% CI: 1.0–2.7) women have higher odds of any tobacco use than heterosexual women; including greater odds of regular (OR = 2.9, 95% CI: 1.2–7.0 and OR = 2.2, 95% CI: 1.3–3.9; respectively) and small cigar use (OR = 2.4, 95% CI: 1.4–4.1 and OR = 3.2, 95% CI: 2.0–5.1; respectively). Gay men had lower odds of cigar use (OR = 0.4, 95% CI: 0.2–0.8) than heterosexual men.

Conclusions: This is the first US adult population study to assess differences in use of various tobacco products across adult LGB subpopulations and by gender, confirming their increased risk of use and illuminating differences by subgroup and gender. Exploring LGB as a unified population appears inadequate to accurately characterize LGB tobacco use risk. Tobacco-related LGB health inequities, particularly among bisexual and lesbian women, may be greater than previously indicated.

Implications: This manuscript provides important contributions to the field of tobacco control and prevention, and more specifically to LGB tobacco-related health disparities research. This is among the first population level studies to explore various tobacco use across LGB populations and across genders, comparing results to non-LGB populations in a national study. We provide novel evidence that bisexual women in particular, have a higher risk for use of various tobacco products, compared with other LGB subpopulations. In order to address this disparity, tobacco control professionals need to be made aware of these important differences in tobacco use behavior.

Introduction

An emerging body of evidence suggests that bisexual peoples are at higher risk for a variety of negative health outcomes compared with their lesbian or gay counterparts, including: tobacco, alcohol, alcohol-related problems, drug use, and suicide.¹⁻³ This may be particularly relevant for tobacco control, as there is a plethora of compelling evidence to suggest that lesbian, gay, and bisexual (LGB) populations in the United States smoke cigarettes at disproportionately higher rates (LGB prevalence has been reported between 20% to 50%)⁴⁻⁶ than the national average (17.8%).⁷ Despite clear heterogeneity across LGB populations, health research typically assesses LGB as a single group. Limited attention has been paid to explore variation in tobacco use across LGB subgroups (eg, gay, lesbian, bisexual males, and bisexual females) and the limited extant research has been conducted with small localized samples. One study examined cigarette smoking among LGB subgroups and found that bisexuals appear to smoke cigarettes at even higher rates than their gay and lesbian counterparts.⁸ In other research bisexual women, in particular, reported higher rates of cigarette and cigar consumption compared with lesbians, even after adjustment for other relevant factors.^{5,9,10} Studies have found elevated rates of tobacco use among lesbian and bisexual women that were not found among gay or bisexual (GB) men, as compared with heterosexuals.¹¹

Additionally, there is evidence that bisexual people suffer worse outcomes on a variety of negative health consequences when compared with their lesbian, gay and heterosexual counterparts,^{4,12-14} including tobacco.^{8,15-17} However, the literature on differences in health outcomes between bisexual women and men is mixed. In adult populations there is evidence that, compared with heterosexuals, both bisexual men and bisexual women are at elevated risk for poor self-rated health outcomes including: increased barriers to health care, sadness/mental distress, suicidal ideation, current smoking, and cardiovascular disease.^{4,12,14} Other studies indicated bisexual women may be uniquely at risk for a variety of health outcomes compared with their LGB male counterparts, including poor self-rated health,¹³ lifetime physical intimate partner victimization,¹² and binge drinking.¹²

Until recently, LGB have historically been excluded from scientific research. A recent review documented 26 studies, some of which used population-based design.^{12,18} However, there remains limited population-level evidence from the available, more localized studies, which have assessed differences in various tobacco product use by LGB and across LGB subpopulations. The first national-level LGB tobacco use study included data from the 2012–2013 National Adult Tobacco Survey (NATS); LGB (30.8%) smoking prevalence was nearly 50% higher than non-LGB (20.5%).^{19,20} The 2013 National Health Interview Survey reported similar findings, with 26.6% of LGB reporting current cigarette smoking compared with only 17.6% of heterosexual adults.⁷ Two youth studies indicated higher smoking prevalence among lesbian and gay students compared with heterosexuals.^{16,21} Yet to date, few population-level studies have examined intragroup differences in various tobacco product use among LGB subgroups and by gender.

Further, few studies have explored LGB tobacco use beyond cigarette smoking, fewer of which were national studies.^{8,22-24} Limited evidence from national studies suggests higher other tobacco use among LGB and Transgender (assessed as a single population) for current use of: combustible tobacco products; cigars, cigarillos and small cigars; and water pipes (hookah).²³ In a young adult study by Rath et al.,²⁴ LGB respondents reported higher rates of current

smoking, and ever use of other types of tobacco products (such as cigars, little cigars, e-cigarettes (e-cigs), chewing tobacco, dissolvable tobacco, and hookah), compared with non-LGB. Few studies have considered differences in use of various tobacco products across LGB subgroups. Even among national surveys, the sample sizes are typically too small to conduct such fine-grained analyses.^{8,24} Studies with large sample sizes are needed to further explore current use of tobacco products other than cigarettes in order to determine whether current use of these products is similar to the trends observed for ever use, and whether subgroup differences exist.

The current study aims to address these gaps in the literature by exploring tobacco use—beyond cigarette smoking—among LGB sexual identity gender subgroups who responded to a large, nationally representative survey (Tobacco in a Changing Media Environment [TCME]). To our knowledge, this is the first US adult population-level study to examine the use of various tobacco products in addition to cigarettes, exploring for differences across sexual orientation and gender subgroups. The analyses describe the LGB populations' current use of cigarettes, e-cigs, regular cigars, and small cigars as well as ever use of hookah and dissolvables, controlling for demographic factors related to tobacco use. This study builds upon the current evidence base about health disparities across tobacco products to potentially inform and direct efficient tailoring of prevention efforts to the products and populations most in need. In particular, this study focuses on bisexual women and men, sexual orientation populations who have been documented to be at elevated risk for various negative health outcomes and who have been largely understudied in the scientific literature.

Methods

Data

Data were collected in an online survey developed by the Health Media Collaboratory at the University of Illinois, Chicago and fielded by The GfK Group (GfK) in February–March, 2013. A total of 17 522 US adults aged ≥ 18 completed the survey.

Sample

The majority of participants (75%) were drawn from GfK's KnowledgePanel (KP), a probability-based sample of adults recruited using random digit dialing supplemented by address-based sampling.²⁵ Of the 34 097 KP members, 61% completed screening for eligibility and 97% of those eligible completed the survey. To ensure sufficient sample size for key demographic groups, tobacco users were oversampled. In addition, GfK collected an off-panel convenience sample (25%) by screening people who clicked on online ads and who met study eligibility criteria, which was then calibrated into the probability sample based on demographic characteristics and tobacco use status. Response rates for the convenience sample are unavailable because there is no known sampling frame. All respondents provided online consent prior to participation.

To compensate for known deviations from equal probability sampling, weighting adjustments were made. Post-stratification weights were developed to account for nonresponse, over-sampling of tobacco users, calibration of off-panel respondents, and other sources of nonsampling error. No particular strategies were employed specifically to recruit LGB participants into the survey sample. Participants who self-identified as LGB were recruited from all states as part of the general sampling scheme.

Self-identified transgender respondents ($N = 168$) were excluded from this study because transgender populations may face unique characteristics and experiences, such as social stressors, which differ from those of LGB.²⁶ Further, those who responded to the “other” sexual orientation category and who refused to identify their sexual orientation were excluded from analysis. The resulting sample includes 17 087 participants, with 924 self-identified LGB (175 lesbian, 326 gay men, 423 bisexual) respondents and 16 163 heterosexual (non-LGB) respondents. The study received institutional review board approval from the University of Illinois at Chicago.

Measures

Sexual Orientation

Participants self-reported sexual orientation (heterosexual or straight, gay, lesbian, bisexual, other). Those who selected “other” were prompted to describe their sexual orientation in text. Responses were coded independently by two members of the research team; when there was disagreement for recoded responses those items were discussed by the research team to achieve consensus. Apparent descriptions (eg, pansexual) were used to further classify them into one of the groups. Those who refused to identify or provided vague descriptions were excluded.

Tobacco Use

Participants responded to questions regarding ever use of tobacco products: cigarettes, e-cigs, cigars, cigarillos, mini cigars, hookah, and dissolvables. For ever users of each product, participants were then asked “Do you now use (tobacco product) every day, some days, or not at all?” Response was dichotomized as current use or no current use. Those who self-reported having never tried the tobacco product or who reported trying but not currently using the tobacco product were categorized as noncurrent users of the product; those who reported currently using the tobacco product some days or every day were categorized as current users. Any current tobacco use was inferred if respondents reported using either cigarettes, e-cigs, cigars, cigarillos or mini cigars either “every day” or “some days”; current use of hookah and dissolvables was not assessed. Small cigar users were defined as those who currently use cigarillos or mini cigars to reflect similarities between the two products.

Control Variables

Respondents reported age, gender, race and ethnicity, household income, education, and marital or relationship status. Self-reported sexual orientation and gender identity represented contradictory information for some respondents: six males reported being lesbian and 14 females reported being gay. Sexual orientation identity is the primary construct of interest; thus in the analysis stratified by sexual orientation, respondents were categorized based on sexual orientation rather than gender so all self-reported lesbian respondents were included as females and all gay respondents were included as males. To control for the potentially influential effects of committed partnership, partnership was dichotomized into currently being married or living with a partner versus not currently being married or living with a partner.

Statistical Models

Descriptive statistics were computed for all variables. Rao–Scott chi-square tests were employed to examine associations of sexual orientation with demographic factors and use of cigarettes and other tobacco products. Logistic regressions were used to examine

differences in current use of tobacco products (cigarettes, e-cigs, regular cigars, small cigars) between LGB and non-LGB, as well as differences across LGB subgroups (eg, non-LGB, lesbian, gay, bisexual) compared with non-LGB, adjusting for age, gender, race or ethnicity, income, and education. We further examined these relationships stratified by gender. All analyses were performed using survey procedures in SAS version 9.4 for Windows, incorporating survey designs and weights as appropriate. Unweighted frequencies, weighted percentages and weighted odds ratios are reported.

Results

Population Description

Table 1 presents participant demographics. Approximately 5% of respondents self-identified as lesbian, gay or bisexual. Of LGB respondents, 15.6% self-identified as lesbian, 40.7% as gay, and 43.7% as bisexual. LGB participants were more likely to be male, younger in age, and have lower annual household incomes (29% had <\$25 000) and higher education levels (68% had some college or more) than non-LGB respondents.

Current Tobacco Use

Taken together, LGB reported significantly higher levels of any tobacco use compared with non-LGB (35.7% vs. 24.7%, including: cigarettes, e-cigs, regular cigars, and small cigars), as well as current use of: cigarettes (32.0% vs. 20.2%), e-cigs (8.9% vs. 4.8%), and small cigars (11.6% vs. 6.2%; Table 1). Figure 1 demonstrates that current e-cig use and small cigar use are almost twice as high across LGB populations when compared with non-LGB (striped bars). Figure 1 shows significant differences across LGB subgroups, with bisexual participants (dark gray bars) reporting the highest level of current use of any tobacco products (42.1%), cigarettes (36.6%), e-cigs (11.3%), and small cigars (18.4%), followed by gay males (light gray polka-dot bars; cigarettes = 28.9%, e-cigs = 7.8%) and lesbian females (checkered bars; cigarettes = 27.4%, e-cigs = 5.1%). Compared with non-LGBT, bisexual men and women reported significantly more current use of any tobacco product assessed, cigarettes, e-cigs, and small cigars, as demonstrated by the nonoverlapping error bars. Further, bisexuals reported significantly higher rates of e-cig use compared with lesbian women, and significantly higher rates of small cigar use compared with gay men (Figure 1). Lesbian women reported nearly twice as much current small cigar use (9.6%) than did gay men (5.2%), although these results did not reach statistical significance (Figure 1). Lesbian women and gay men reported the same levels of any tobacco use (31.0%, Figure 1).

Table 2 presents associations between sexual orientation and use of cigarettes and other tobacco products adjusting for demographic factors related to tobacco use. LGB respondents have 50% higher odds of using any tobacco products and 50%–70% higher odds of smoking cigarettes, e-cigs, and small cigars compared with non-LGB. In particular bisexual respondents are more likely to use cigarettes (odds ratio [OR] = 2.0), e-cigs (OR = 2.0), and small cigars (OR = 2.8) than non-LGB. Gay men are less likely to use cigars (OR = 0.4) and small cigars (OR = 0.6) than heterosexual respondents, while lesbian women are more likely to use small cigars (OR = 2.0).

Current Tobacco Use Stratified by Gender

Table 3 presents the associations between sexual orientation and current use of cigarettes and other tobacco products, stratified by gender, adjusting for demographic factors. Among female

Table 1. Adult Demographic Characteristics and Tobacco Use in 2013 (Unweighted N = 17 087, Weighted %)

Variable (category)	Non-LGB 16 163 (95.2%)		LGB 924 (4.8%)		P
	N	Weighted %	N	Weighted %	
Sexual orientation subpopulation					
Straight	16 163	100.0	0	0.0	<.0001
Gay	0	0.0	326	40.7	
Lesbian	0	0.0	175	15.6	
Bisexual	0	0.0	423	43.7	
Gender					
Male	7153	47.4	458	59.7	<.0001
Female	9010	52.6	466	40.2	
Age					
18 to 24	1087	9.4	138	16.2	<.0001
25 to 44	447	34.4	338	36.8	
45 to 64	6818	38.0	357	41.4	
≥65	3781	18.2	91	5.5	
Race or ethnicity					
White	12 939	68.6	694	63.3	.0891
Black	1193	11.4	71	10.4	
Latino	1098	13.2	91	17.0	
Other	933	6.8	68	9.3	
Intimate partnership (married or living with partner)					
Yes	10 005	63.0	450	45.5	<.0001
No	6149	37.0	474	54.5	
Income					
<\$25 000	3299	17.9	289	29.0	<.0001
\$25 000–\$49 999	4406	23.9	232	17.8	
\$50 000–\$84 999	4444	28.7	206	25.1	
≥\$85 000	4014	29.5	197	28.1	
Education					
<High school	618	6.6	43	7.1	.0003
High school	3650	36.6	155	25.0	
Some college	5833	31.0	376	37.2	
Bachelor’s degree	3799	15.8	240	16.7	
Higher degree	2263	10.0	146	14.0	
Current tobacco use					
Any tobacco	6718	24.7	545	35.7	<.0001
Cigarette	5929	20.2	498	32.0	<.0001
E-cigarette	1378	4.8	144	8.9	<.0001
Cigar	1332	5.4	91	5.5	.9098
Small cigar	1642	6.2	180	11.6	<.0001

LGB = lesbian, gay, and bisexual.

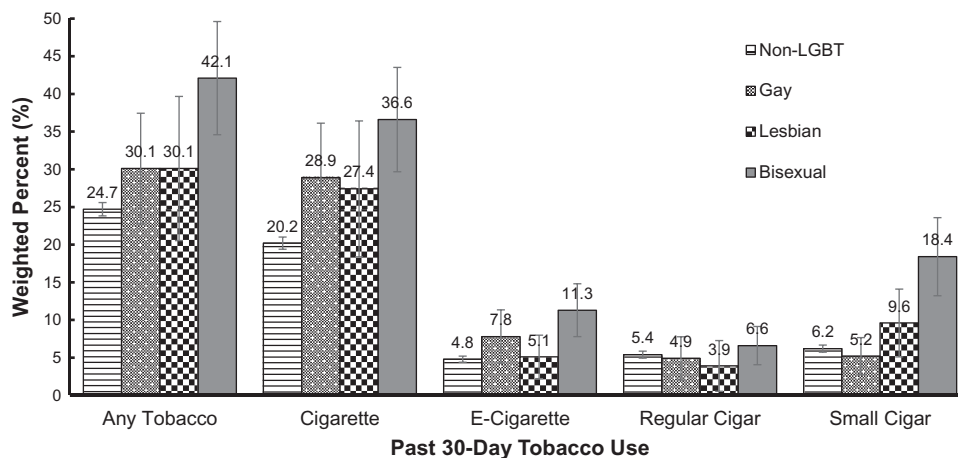


Figure 1. Current tobacco use among lesbian, gay, and bisexual (LGB) subgroups.

Table 2. Adult Current Tobacco Use by Sexual Orientation in 2013 (Weighted Regression)

Model 1: Sexual orientation (non-LGB, LGB) ^a											
Sexual identity	Category	Current cigarette		Current e-cig		Current regular cigar		Current small cigar		Current tobacco use (cigarettes, e-cigs, regular or small cigars)	
		OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
	Non-LGB	1	—	1	—	1	—	1	—	1	—
	LGB	1.7***	(1.4–2.2)	1.7**	(1.3–2.3)	0.8	(0.5–1.1)	1.6***	(1.2–2.1)	1.5**	(1.2–1.9)

Model 2: Sexual orientation with subcategories ^a											
Sexual identity—subgroups	Category	Current cigarette		Current e-cig		Current regular cigar		Current small cigar		Current tobacco use (cigarettes, e-cigs, regular or small cigars)	
		OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
	Non-LGB	1	—	1	—	1	—	1	—	1	—
	Gay	1.6*	(1.1–2.3)	1.5	(0.9–2.6)	0.4*	(0.2–0.8)	0.6*	(0.3–1.0)	1.1	(0.8–1.6)
	Lesbian	1.5	(1.0–2.5)	1.1	(0.6–2.1)	1.9	(0.8–4.7)	2.0*	(1.1–3.7)	1.6	(1.0–2.5)
	Bisexual	2.0***	(1.5–2.8)	2.0***	(1.4–2.9)	1.2	(0.8–2.0)	2.8***	(1.9–4.0)	1.9***	(1.4–2.7)

CI = confidence interval; e-cigs = e-cigarettes; LGB = lesbian, gay, and bisexual; OR = odds ratio.

^aModels adjust for: gender, age, ethnicity, income, intimate partnership, and education.

P* < .05; *P* < .001; ****P* < .0001.

Table 3. Adult Tobacco Use by Sexual Orientation Sub-Population Stratified by Gender in 2013 (Weighted Regression)

Female ^a											
Sexual orientation	Current cigarette		Current e-cig		Current regular cigar		Current small cigar		Current tobacco use (cigarettes, e-cigs, regular or small cigars)		
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	
Non-LB female	1	—	1	—	1	—	1	—	1	—	
Lesbian	1.6	(1.0–2.6)	1.2	(0.6–2.2)	2.9*	(1.2–7.0)	2.4*	(1.4–4.1)	1.7*	(1.0–2.7)	
Bisexual female	2.6**	(1.7–3.9)	2.8**	(1.8–4.2)	2.2*	(1.3–3.9)	3.2**	(2.0–5.1)	2.6**	(1.7–3.9)	

Male ^a											
Sexual orientation	Current cigarette		Current e-cig		Current regular cigar		Current small cigar		Current tobacco use (cigarettes, e-cigs, regular or small cigars)		
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	
Non-GB male	1	—	1	—	1	—	1	—	1	—	
Gay male	1.5*	(1.0–2.2)	1.6	(0.9–2.9)	0.4*	(0.2–0.8)	0.6*	(0.3–1.0)	1.1	(0.8–1.5)	
Bisexual male	1.4	(0.8–2.5)	1.6	(0.9–3.0)	1	(0.5–1.8)	2.3*	(1.2–4.2)	1.4	(0.8–2.4)	

CI = confidence interval; e-cigs = e-cigarettes; GB = gay or bisexual; LB = lesbian and bisexual; OR = odds ratio.

^aModel adjusts for: age, ethnicity, intimate partnership, income, and education.

P* < .05; *P* < .0001.

respondents, lesbian and bisexual women are more likely to use any tobacco product (*OR* = 2.6 and 1.7, respectively) than non-LGB women. Examining by different products, bisexual women again are more likely to use cigarettes (*OR* = 2.6), e-cigs (*OR* = 2.8) and

small cigars (*OR* = 3.2) than non-LGB women. Lesbian respondents have higher odds of using regular cigars (*OR* = 2.9) and small cigars (*OR* = 2.4). Among male respondents, any tobacco product use is not significantly different between non-GB, gay, and bisexual

men. Compared with non-GB, bisexual men are more likely to use small cigars ($OR = 2.3$) while gay men are less likely to use them ($OR = 0.6$). In addition, gay men are less likely to use regular cigars ($OR = 0.4$), although there was no difference between bisexual and non-GB men. Sexual minority women, particularly bisexual women, appear to be at the highest risk for using various tobacco products, while gay men appear to be at lower risk for smoking regular and small cigars than non-GB. The highest levels of prevalence among bisexual respondents in [Figure 1](#) are likely to be driven by the high level of prevalence among bisexual women.

Ever Use of Nontraditional Tobacco Products

Ever use of hookah and dissolvable products was explored across sexual orientation subgroups. Overall, LGB were significantly more likely to have ever used hookah (29.0%) compared with non-LGB (15.1%); similar patterns were observed for both genders. Among females, lesbian (3.8%) and bisexual (2.6%) women had higher rates of ever use of dissolvables than heterosexual women (0.8%). No significant group differences in dissolvable use were observed among males.

Discussion

This population-level study makes a novel contribution to the existing literature by providing evidence that bisexual women may be at an extremely elevated risk for tobacco use, even when compared with lesbian women and gay or bisexual men (and not merely as compared with heterosexual populations). Additionally, these findings support the well-documented literature that LGB are at disproportionately higher risk of cigarette smoking compared with non-LGB populations.^{8,19,23} While previous work has reported on LGB populations' use of various tobacco products in aggregate,^{19,23,27,28} this is the first national US study to report both cigarette and other tobacco use by gender across LGB subpopulations (eg, lesbian women, gay men, bisexual women, and bisexual men), indicating the importance of including information on LGB subpopulations as a standard practice in health and social science research. The results suggest that when LGB subgroups and a variety of tobacco products are taken into account, LGB adults—particularly lesbian and bisexual women—may be at even higher risk for tobacco use than previously reported. It is essential to recognize that LGB populations are extremely heterogeneous, and a one-size-fits-all tobacco control approach may be insufficient to reduce tobacco-related health disparities among LGB.

Studies have consistently indicated that LGB populations' current cigarette smoking is much higher than non-LGB. While in 2014 non-LGB current smoking rate was estimated at 17.8%,⁷ prevalence estimates for LGB cigarette smoking vary greatly, ranging between 20% and 50%.^{5,6,29} This study indicates that overall LGB cigarette smoking indeed falls on the high end of that spectrum, with important variation based on sexual identity (27.4%–36.6%, [Figure 1](#)). Understanding these subgroup variations is important to better target prevention and cessation campaigns to segments of the LGB community at greater risk.

This study confirms results from the few previous studies—most of which used local-level surveys or small sample sizes—as well as a few population studies exploring LGB as a single aggregate group, which indicated that LGB's increased tobacco use risk is not limited to cigarette consumption.^{22–24} Our results expand upon these previous findings by including LGB subgroup analysis by sexual orientation and gender. These results support the hypothesis that there is

within-group variation in risk of using tobacco among LGB populations, with certain LGB subpopulations at higher risk to use various tobacco products compared with other LGB subgroups,^{5,8} even after adjusting for demographic and socioeconomic factors.

This also is the first national study to report between-gender differences in various tobacco product use across adult LGB populations. Gender appears to be an important correlate of tobacco risk among LGB adults. However, gender and sexual orientation differences have been reported previously in youth population studies.³⁰ Our results confirm previous findings that bisexual women may be at particularly high risk for cigarette smoking,^{1,5,9,10} and provide additional evidence that bisexual women may be at highest risk across adult LGB subgroups for using the tobacco products assessed.² Dissolvable tobacco was the only tobacco product where no significant differences were found by sexual orientation or gender.

To our knowledge, this is the first study to report e-cig use across LGB subgroups. Given the current tobacco environment within which e-cigs are heavily marketed and use of the products is rapidly increasing, the finding that LGB as a group, and particularly bisexuals, are at increased risk for e-cig use is concerning. This result has important implications for tobacco control policy and outreach, pointing to a need to increase efforts targeted at LGB communities and possibly to tailor tobacco control messaging toward bisexual women.

Previous research studying LGB as a single group reported that LGB used regular cigars more frequently (35.6%) than non-LGB (17.6%).³¹ In contrast, a California-based study indicated that LGB may actually be at decreased risk for cigar use.³² The current study provides evidence that while gay and bisexual men appear to be at decreased risk to use cigars, sexual minority women—particularly bisexual women—may be at greater risk. Gruskin et al.'s³² study possibly should be interpreted with caution; California has been recognized for strong tobacco control programs and may already be in the forefront of LGBT tobacco control, limiting generalizability to the US population as a whole. As our results indicate potential interaction between sexual orientation subgroups and gender, future research should be sure to consider between-gender differences in LGB.

Given the well-documented history of tobacco industry advertising to LGB populations,^{13,33–37} it should not be surprising that LGB are at increased risk for tobacco. There is evidence to suggest tobacco industry marketing successfully targets certain LGB populations, with bisexual and lesbian women reporting high levels of receptivity to tobacco industry advertising.⁸ In contrast, the research and tobacco control communities have been slower to include LGB and transgender as a standard practice.³⁸ It is vital that tobacco control programs continue recent efforts toward sexual minority inclusiveness and put antitobacco efforts in place to help combat the harmful influence of tobacco industry marketing that targets sexual minorities. The evidence presented here suggests that tobacco marketing may target not only LGB as a whole, but also specific LGB subgroups.

In line with theories of marginalization and sexual minority stress,^{39–41} it also is possible that bisexuals use tobacco at higher rates compared with lesbian or gay counterparts due to experiences of increased marginalization, exclusion, and conflict resulting from experiences of not belonging or being accepted in straight, lesbian, or gay communities.⁴² Such experiences of alienation may increase the likelihood that an individual will use tobacco, either to cope with stress or to “fit in” with a social group. It is important that future

research explore both social and individual-level influencers such as those discussed here, which may differentially impact LGB subpopulations' use of tobacco, focusing particularly on factors which may place bisexual women at elevated risk for tobacco use.

This study supports the growing scientific evidence base suggesting that bisexual females may be at uniquely increased risk for a variety of health risk behaviors and health outcomes^{12,13,15,30} including tobacco use; not only compared with heterosexuals, but also when compared with their LGB male counterparts. Much of the literature, including this study, has included heterosexual men and women rather than lesbian or gay populations as the reference group.^{8,12,13,15-17} As the science increasingly approaches consensus that LGB populations are generally more at-risk than their heterosexual counterparts, moving forward it will be important to include lesbian and gay populations as the reference group when assessing differences in LGB health risk behaviors in order to determine which groups, if any, are most at-risk for negative health behaviors and outcomes within LGB populations.

This study has limitations. While sampling was designed to represent the US adult population with proper weight adjustment, the nonresponse due to sexual orientation was not accounted for. However, the sexual orientation is associated to some degree with the demographic factors used to construct the final survey weights; thus we believe that the bias, if any, is minimal. While the sampling structure was designed to be representative, the study may be biased because it is not inclusive of potential participants who declined to participate in the survey. Post-stratification weights were developed to account for nonresponse. This study had limited power to detect within- and between-group comparisons among LGB subpopulations. While this study includes a relatively large sample size of LGB participants, future studies should include even larger sample sizes of LGB to allow for sufficient power to detect within- and between-group comparisons.

Self-reported transgender respondents were excluded because they have unique characteristics and experiences, which may differently affect tobacco use behavior. Future study will investigate tobacco use behavior in transgender communities. The decision was made to include the 14 participants in their self-identified sexual orientation category in the stratified subgroup analysis, who either identified as both male and lesbian or female and gay, for a variety of reasons. First, while we understand many lesbians refer to themselves as "gay," the question was asked in a way that clearly delineates gay, lesbian, bisexual and other (open ended) so that participants are able to choose which option best fits their personal experience, particularly if it is a possibility that participants may be either pre- or post-operation transgender; and not yet identifying or no longer identifying as transgender. Further, secondary analysis was run excluding the 14 participants in question without altering the results. Additional analysis is underway to explore variation in tobacco use among LGB by other demographic factors such as race and ethnicity, the importance of which has been demonstrated in previous studies of LGB and heterosexual college students.⁴³ Replicating such findings at the population level would make an important contribution.

Results from this study reinforce the heterogeneity within sexual minorities, just like in other minority groups, and points to the danger of not looking at within-group differences and gender differences in health research whenever possible. Of particular interest is the apparent strength of the relationship between gender and LGB subpopulation membership and tobacco use patterns. If replicated, these findings have potential policy implications, particularly if certain

LGB subgroups such as bisexual women are consistently found to be at higher risk than others. Further, there continues to be a need for data on the long-term health effects of tobacco use among LGB populations to determine if, as with other minority populations, the long-term health consequences of tobacco use are more severe in different subgroups of the LGB populations (eg, LGB of color), thus providing evidence of greater disparities.

In summary, this study's contribution goes beyond providing prevalence data for LGB tobacco use by providing evidence that not all LGB populations have the same risk of tobacco use, and that bisexual women in particular may have unique risk factors that contribute to their elevated use of various tobacco products. These findings demonstrate the importance of including questions on LGB group membership as a standard part of research practice. Further, this study indicates that tobacco-related health disparities among LGB may be even greater than previously indicated, as LGB appear at increased risk not only for cigarette smoking but also for using other tobacco products currently being heavily marketed, such as e-cigs, cigars, and small cigars. It is vital for the public health community to tailor tobacco control efforts to help address tobacco-related health disparities among LGB subpopulations, as well as those populations most heavily reached by tobacco industry marketing.⁸

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Declaration of Interests

None declared.

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