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Original Investigation

Psychological, Normative, and Environmental Barriers to Tobacco Cessation that Disproportionally Affect Sexual Minority Tobacco Users

Christopher W. Wheldon PhD[1,], Kara P. Wiseman MPH, PhD[2]

[1]Department of Social and Behavioral Sciences, College of Public Health, Philadelphia, PA, USA; [2]Department of Public Health Sciences, School of Medicine, University of Virginia, Charlottesville, VA, USA

Corresponding Author: Christopher W. Wheldon, PhD, Department of Social and Behavioral Sciences, College of Public Health, 1301 Cecil B. Moore Avenue, Ritter Annex, 9th floor, Philadelphia, PA 19122, USA. Telephone: 215-204-5184; E-mail: chris.wheldon@temple.edu

Abstract

Introduction: Sexual minority populations—particularly gay/lesbian and bisexual women—use tobacco at higher rates than their heterosexual peers. Evidence-based biopsychosocial interventions for tobacco cessation are available; however, research is lacking on the specific barriers to tobacco cessation in these populations. The purpose of this study is to describe the psychological, normative, and environmental barriers to cessation that disproportionally affect sexual minority tobacco users.

Methods: Data from wave 1 of the Population Assessment of Tobacco and Health were used to explore differences by sexual identity across psychosocial barriers and facilitators of tobacco cessation. The analytic sample consisted of current tobacco users (including cigarettes, e-cigarettes, cigars, cigarillos, pipes, hookah, dissolvable snus, and smokeless products). Psychosocial barriers/facilitators were modeled using logistic regression analyses, controlling for age, race/ethnicity, poverty, education, census region, and urbanicity and were stratified by sex. Models accounted for the complex study design and nonresponse.

Results: Substance use and internalizing/externalizing behavioral problems were more common among gay/bisexual men. Bisexual, but not gay/lesbian, women also had higher odds of these behavioral problems. Bisexual men and women reported less normative pressure to quit than their heterosexual peers (no differences in gay/lesbian tobacco users). Gay men had more environmental barriers to quit, being more likely to receive tobacco promotion materials, and live with another tobacco user.

Conclusions: Several barriers to tobacco cessation were identified as disproportionally affecting sexual minority groups in this study; however, there were considerable differences between sexual minority men and women, as well as between gay and bisexual participants.

Implications: Several important psychological, normative, and environmental barriers to tobacco cessation were identified that disproportionally affect sexual minorities. There was considerable heterogeneity in the prevalence and relative difference of these barriers across sexual minority subgroups, suggesting that community-based tobacco cessation programs should be responsive to differences in gay and bisexual men and women.

Introduction

Sexual minority populations suffer from higher rates of certain tobacco-related health problems, such as respiratory disease, cardiovascular disease, and cancer.[1–3] Evidence suggests that higher proportions of sexual minority populations—particularly gay/lesbian and bisexual identified women—use tobacco products compared with their heterosexual peers.[4–6] In a recently published population-based study of adults in the United States, sexual minority women had the highest lifetime cigarette and e-cigarette use compared with all other men and women in the sample.[4] However, as in other population-based studies, tobacco use varied not only between sexual minorities and heterosexuals but also between sexual minority subgroups.[4–7]

There are important within-group differences that should be considered in tobacco disparities research. For example, when considering age, it was found that gay men under age 25, but not older gay men, had higher cigarette use compared with their heterosexual counterparts.[4] This was not the case for men who identified as bisexual. However, bisexual men 25 years of age or older were more likely to have used cigars compared with other men.[4] These findings underscore the intragroup nuances that exist for sexual minority populations.[7] Across multiple studies, bisexual women, even when compared with gay/lesbian identified women, may be at elevated risk for tobacco use.[5,7] The intragroup differences observed in the patterns of tobacco uptake and use may also be related to tobacco cessation.

Higher rates of tobacco use in sexual minority populations are thought to result from stress processes associated with discrimination, stigma, violence, and social rejection. These processes can result in poor mental health and increased substance use, which is synergistically related to tobacco addiction.[8,9] These processes linked to sexual identity are explicated in a model of minority stress.[10] In the model, minority status is linked to stress responses, but also social resources (eg, group solidarity and community connectedness) that can attenuate the impact of minority stress.[8] Complimentary to the minority stress model is a broader consideration of social and environmental contexts that might promote disparate patterns of tobacco use, including barriers to cessation and factors associated with sustained abstinence.[11]

The National Cancer Institute outlined a comprehensive socio-ecological framework to reduce tobacco-related health disparities that underscores the interrelationships between life circumstances that may systematically differ in minority populations and tobacco use.[12]

At the individual level, stress-related processes can trigger internalizing (eg, anxiety) and externalizing (eg, hyperactivity/impulsivity) problems that may increase susceptibility to substance use.[13] In sexual minority populations, these psychological problems can result from experiences of trauma and chronic stress. Substance use behaviors, including tobacco use, may be used to cope with experiences of trauma and chronic stress.[14,15]

The coping resources that result from minority stress (eg, group solidarity and community connectedness), while important and beneficial, may also increase one's exposure to tobacco use behaviors and norms. Interpersonal contexts may encourage tobacco use as an acceptable stress response or govern social relationships through descriptive (ie, perceptions of others' tobacco use) and injunctive (ie, perceived disapproval of one's own tobacco use) normative processes.[16,17] These norms may be amplified and sustained by cultural factors that connect diverse LGBTQ (ie, lesbian, gay, bisexual, transgender, queer/questioning) communities, such as the shared value of bars as historic and current "safe spaces" that foster inclusion and identity expression.[18,19] Tobacco use at bars has been shown to be a predictor of smoking among sexual minority young adults.[20]

Characteristics of environmental contexts in which sexual minorities live may also promote and sustain tobacco use through direct marketing of tobacco products, as well as exposure to tobacco use at home and/or the workplace.[12] Targeted marketing of tobacco products is common in specific venues (eg, bars), but may also be higher in neighborhoods (eg, direct mailings in areas with high concentrations of sexual minorities) or online (eg, targeted e-mail campaigns).[21]

Tobacco use in the home and workplace can serve as significant barriers to cessation attempts. There is evidence to suggest that secondhand smoke exposure is more common among nonsmoking sexual minority women in the home and workplace compared with heterosexual women.[22] The higher population prevalence of tobacco use among sexual minority women increases the likelihood that at least one individual in a female same-sex partnership is a current tobacco user. There is also evidence that gay men and gay/lesbian women have been, to some extent, residentially segregated from their heterosexual counterparts—and even from each other—in cities across the United States.[23] The causes for residential segregation are likely a combination of self-selection and socioeconomic forces and these residential differences also reflect differences in community-based tobacco norms more favorable for tobacco use. In addition, given that gay/lesbian women have been found to be underrepresented in traditionally "female professions" and overrepresented in "nonelite male professions," workplace social environments may explain higher tobacco use among sexual minority women.[23]

The cumulative result of these psychological, interpersonal, and environmental differences may act as barriers to tobacco cessation. Understanding the relative prevalence of these factors in sexual minorities at a national level can inform tobacco cessation interventions, specifically by providing information on how best to tailor interventions to specific sexual minority subpopulations and through the prioritization of intervention targets.

The purpose of this study was to describe the psychological, normative, and environmental barriers that disproportionally affect sexual minority tobacco users.

Methods

Data and Study Population

The data set included a subset of responses from Wave 1 (fielded September 2013 to December 2014; N = 32 320) of the Population Assessment of Tobacco and Health (PATH) study.[24,25] The PATH study used a stratified address-based, area-probability sampling design that oversampled young adults (aged 18–24 years), tobacco users, and African Americans. The overall weighted response rate was 74%.

The subset used for this study (N = 14 325) included adults (18 years of age or older) who were current tobacco users. Current tobacco use was operationalized as those who now use any one of the following tobacco products every day or on some days: cigarettes, e-cigarettes, cigars, cigarillos, pipes, hookah, dissolvable snus, and smokeless. Of this subsample, 258 did not respond to the sexual identity variable and 183 described their sexual identity as something other than lesbian, gay, bisexual, or heterosexual. An additional 28 respondents had missing data on the demographics

section. These respondents were removed, resulting in an analytic sample of 13 856. The distribution by sex and sexual identity was as follows: 7694 heterosexual men, 5223 heterosexual women, 152 gay men, 176 gay/lesbian women, 115 bisexual men, and 496 bisexual women.

Measures

The Global Appraisal of Individual Needs Short Screener (GAIN-SS) was used to assess indicators of mental health illness. This general population screening tool is designed to identify individuals with co-occurring disorders in multiple psychosocial domains.[26] In the PATH study, symptoms of substance use, as well as internalizing (eg, anxiety, depression, traumatic stress) and externalizing (eg, attention deficit, hyperactivity/impulsivity, and conduct disorder) symptoms, were assessed. Respondents endorsed each symptom experienced within the last year. As was done in previous research, the number of items endorsed were counted and scored to reflect no/low (0–1 symptoms), moderate (2–3 symptoms), or high (4 or more symptoms) severity of mental health issues.[27]

Injunctive Norms

One item assessed the perceived approval/disapproval of important referents "Thinking about the people who are important to you, how would you describe their opinion on using tobacco?" Responses were recorded on a 5-point bipolar scale ranging from "very positive" to "very negative" with a neutral midpoint and recoded for this analysis to represent negative, neutral, or positive attitudes.

Descriptive Norms

One item was used to assess agreement/disagreement with the following statement: "Most of the people I spend time with are tobacco users." Responses were recorded on a 5-point scale with "Not true of me" and "Extremely true of me" as end points. Responses were dichotomized to compare participants for whom most of their social networks were tobacco users (ie, "Extremely true of me") with everyone else (inclusive of the four other response categories).

Tobacco Promotion

Two items were used to assess exposure to tobacco marketing via standard mail or e-mail. They were asked if, in the past 6 months, they received promotions or coupons for cigarettes or tobacco products through e-mail or the mail. Responses were coded as "Yes" or "No"/"Don't Know."

Environmental Tobacco Exposure

One item was used to assess workplace exposure, "How recently did someone smoke around you while you were at work?" Categorical response items were "never," "today," "in the past week," "in the past two weeks," "in the past month," "longer than a month ago but within the past year," or "more than a year ago." The item was recoded to reflect respondents who had been exposed to any tobacco at work within the past year regardless of when that occurred. A separate item assessed tobacco exposure at home, "Does anyone who lives with you now do any of the following?" Individuals who responded "Smoke cigarettes," "Use smokeless tobacco," "Smoke cigars, cigarillos, or filtered cigars," and "Use any form of tobacco" were coded as having home exposure and those who responded "No one who lives with me now uses any form of tobacco" were coded as not having home exposure.

Sexual Identity

A single item, "Do you think of yourself as…" followed by the following response options, was used to measure sexual identity: lesbian or gay; straight, which is not lesbian or gay; bisexual; or something else. The something else response category is heterogenous and may or may not represent a "sexual minority" identity; thus, the operational definition for this study of sexual minority included those who identified as lesbian, gay, or bisexual.[28]

Covariates

We adjusted for age, ethnoracial identity, educational attainment, poverty status (based on US Department of Health and Human Services 2015 poverty guideline), US census region, and urban/rural designation of the county of residence. Sex was measured using binary male/female response categories.[24]

Analysis

Analyses were conducted in 2019–2020 using SAS 9.4 (SAS Institute Inc., Cary, NC). Estimates were weighted to represent the US adult population, and variances were estimated using the balanced repeated replication method with Fay's adjustment to increase estimate stability.[29] Binomial and multinomial logistic regression was used to estimate the associations between sexual identity and each barrier. All models adjusted for age, race/ethnicity, poverty, education, census region, and urbanicity and were stratified by sex. Statistical significance was considered by examining the 95% confidence intervals (CI) of the adjusted odds ratios.

Results

The weighted sample consisted of mostly men (60.3%; 95% CI: 59.3–61.3) 18 years of age or older (M = 41.2). The majority of respondents lived in urban areas (74.9%; 95% CI: 70.8–79.0). The distribution of ethnoracial identities was as follows: White (70.3%; 95% CI: 69.1–71.4), Black (12.8%; 95% CI: 12.1–13.6), Hispanic/Latino (10.8%; 95% CI: 10.1–11.4), or other/multiracial (6.2%; 95% CI: 5.7–6.6). A small percentage reported completing a bachelor's degree or higher (12.8%; 95% CI: 12.0–13.6) and nearly a third lived below the poverty level (32.3%; 95% CI: 31.2–33.5). The majority identified as heterosexual (94.3%; 95% CI: 93.9–94.7), with the remainder identifying as gay (2.2%; 95% CI: 1.9–2.5) or bisexual (3.5%; 95% CI: 3.2–3.9).

Tobacco use in the sample included those who regularly or sometimes used cigarettes (79.4%; 95% CI: 78.5–80.2), cigars (13.5%; 95% CI: 12.8–14.2), and/or e-cigarettes (10.4%; 95% CI: 9.7–11.2). Other respondents reported exclusive use of pipes, hookah, or smokeless tobacco (11.0%; 95% CI: 10.2–11.7). Nearly a quarter (22.8%; 95% CI: 22.0–23.7) of the sample tried to quit at least one tobacco product within the previous 12 months.

The prevalence of psychological, normative, and environmental barriers, as well as bivariate comparisons by sexual identity stratified by binary sex, are reported in Table 1. Bivariate differences were identified for eight out of the ten outcomes examined for men and 7 of 10 outcomes for women. For psychological barriers, internalizing problems were particularly common—reported by more than a quarter of the subsamples—for gay and bisexual men and women. Externalizing problems were most commonly reported by bisexual men and women. Perceived injunctive norms regarding tobacco use were primarily negative. Bisexual women reported the highest

Table 1. Psychological, Normative, and Environmental Barriers to Tobacco Cessation by Sexual Orientation Among Adults Who Are Current Tobacco Users

	Men					Women				
	Total	Heterosexual	Gay	Bisexual		Total	Heterosexual	Lesbian/gay	Bisexual	
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	*p*	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	*p*
Psychological										
Past-year substance use severity					.010					<.001
No/low	68.9 (67.6–70.2)	68.9 (67.6–70.2)	66.2 (58.3–74.0)	68 (59.4–76.6)		77.6 (76.3–78.9)	79 (77.6–80.4)	69.8 (61.7–77.8)	62.3 (57.2–67.4)	
Moderate	21 (19.9–22.0)	21.1 (20.0–22.2)	16.1 (9.9–22.3)	17.8 (11.7–23.9)		15.1 (14.0–16.2)	14.7 (13.6–15.8)	18.9 (12.2–25.6)	18.6 (14.6–22.6)	
High	10.1 (9.4–10.9)	10 (9.2–10.7)	17.7 (11.4–24.0)	14.2 (7.5–20.9)		7.3 (6.5–8.1)	6.3 (5.5–7.1)	11.3 (7.0–15.6)	19.1 (15.1–23.1)	
Past-year internalizing behavior					<.001					<.001
No/low	61.7 (60.4–63.1)	62.3 (60.9–63.6)	43.7 (35.5–51.9)	44.7 (35.5–53.9)		46.3 (44.7–48.0)	48.2 (46.4–49.9)	39.0 (30.6–47.5)	26.0 (22.3–29.6)	
Moderate	21.4 (20.3–22.5)	21.3 (20.2–22.4)	26.1 (17.8–34.4)	24.7 (16.4–32.9)		26.8 (25.5–28.2)	26.7 (25.2–28.1)	28.3 (21.8–34.7)	28.4 (24.3–32.6)	
High	16.9 (15.9–17.8)	16.5 (15.5–17.4)	30.2 (21.9–38.5)	30.6 (22.1–39.1)		26.8 (25.6–28.1)	25.2 (23.8–26.5)	32.7 (24.2–41.2)	45.6 (41.4–49.8)	
Past-year externalizing behavior					<.001					<.001
No/low	62.9 (61.7–64.1)	63.6 (62.3–64.8)	39.8 (31.8–47.7)	42.2 (31.3–53.1)		56.4 (55.0–57.9)	58.4 (56.8–59.9)	47.4 (39.5–55.3)	35.4 (31.0–39.8)	
Moderate	22.9 (21.7–24.0)	22.6 (21.4–23.7)	35.9 (28.3–43.6)	26.3 (17.7–34.9)		26.3 (25.1–27.5)	26.0 (24.8–27.3)	28.0 (21.2–34.8)	28.5 (23.7–33.4)	
High	14.2 (13.4–15.1)	13.8 (13.0–14.7)	24.3 (16.9–31.7)	31.5 (22.5–40.4)		17.3 (16.2–18.4)	15.6 (14.5–16.6)	24.7 (16.3–33.0)	36.0 (31.6–40.5)	
Normative										
Tobacco opinions among people who are important to you					.016					<.001
Positive	11.2 (10.4–11.9)	11.3 (10.5–12.1)	4.6 (1.5–7.6)	12.3 (4.6–20.0)		9.5 (8.7–10.3)	9.4 (8.6–10.2)	12.2 (6.9–17.6)	10.5 (7.1–13.9)	
Neutral	31.1 (29.9–32.4)	31.0 (29.7–32.2)	33.4 (25.3–41.6)	42.6 (32.0–53.2)		31.3 (29.9–32.7)	30.6 (29.1–32.2)	30.9 (23.2–38.5)	39.9 (36.0–43.8)	
Negative	57.7 (56.4–59.0)	57.8 (56.4–59.1)	62.0 (53.6–70.4)	45.1 (34.1–56.2)		59.2 (57.6–60.7)	60.0 (58.4–61.6)	56.9 (49.2–64.6)	49.6 (45.2–53.9)	
Most of the people I spend time with are tobacco users					.705					<.001
Not true of me	80.7 (79.5–81.8)	80.7 (79.6–81.9)	79.4 (71.8–87.0)	77.7 (69.7–85.6)		74.3 (72.8–75.7)	75.2 (73.8–76.6)	74.0 (67.4–80.6)	62.0 (57.6–66.4)	
Extremely true of me	19.3 (18.2–20.5)	19.3 (18.1–20.4)	20.6 (13.0–28.2)	22.3 (14.4–30.3)		25.7 (24.3–27.2)	24.8 (23.4–26.2)	26.0 (19.4–32.6)	38.0 (33.6–42.4)	
Environmental										
Received e-mail promotions, %					<.001					.001
No	80.7 (79.8–81.7)	81.0 (80.0–81.9)	67.0 (58.9–75.1)	80.6 (72.9–88.2)		77.0 (75.7–78.3)	77.6 (76.2–79.0)	71.3 (64.4–78.2)	72.1 (67.8–76.5)	
Yes	19.3 (18.3–20.2)	19.0 (18.1–20.0)	33.0 (24.9–41.1)	19.4 (11.8–27.1)		23.0 (21.7–24.3)	22.4 (21.0–23.8)	28.7 (21.8–35.6)	27.9 (23.5–32.2)	
Received mail promotions, %					<.001					.324
No	73.7 (72.5–74.9)	73.9 (72.7–75.1)	59.1 (50.1–68.0)	77.6 (69.9–85.3)		65.1 (63.7–66.6)	65.4 (63.8–67.0)	66.4 (57.7–75.1)	61.4 (56.7–66.1)	
Yes	26.3 (25.1–27.5)	26.1 (24.9–27.3)	40.9 (32.0–49.9)	22.4 (14.7–30.1)		34.9 (33.4–36.3)	34.6 (33.0–36.2)	33.6 (24.9–42.3)	38.6 (33.9–43.3)	
Exposure to tobacco in the workplace in past year (subset to employed part or full time), %[a]					.253					.011
No	31.6 (30.0–33.2)	31.7 (30.1–33.4)	31.3 (22.5–40.2)	22.8 (12.9–32.6)		48.6 (46.9–50.4)	49.7 (47.7–51.6)	42.7 (30.5–54.9)	38.3 (31.7–45.0)	
Yes	68.4 (66.8–70.0)	68.3 (66.6–69.9)	68.7 (59.8–77.5)	77.2 (67.4–87.1)		51.4 (49.6–53.1)	50.3 (48.4–52.3)	57.3 (45.1–69.5)	61.7 (55.0–68.3)	
Exposure to tobacco at home, % Yes[b]					.030					.806
No	45.8 (44.3–47.3)	46.1 (44.6–47.6)	34.2 (24.6–43.7)	37.7 (25.6–49.8)		33.8 (32.2–35.5)	34.0 (32.2–35.8)	34.3 (25.9–42.6)	32.2 (27.3–37.2)	
Yes	54.2 (52.7–55.7)	53.9 (52.4–55.4)	65.8 (56.3–75.4)	62.3 (50.2–74.4)		66.2 (64.5–67.8)	66.0 (64.2–67.8)	65.7 (57.4–74.1)	67.8 (62.8–72.7)	

CI = confidence interval.

[a]Asked of those who were employed at the time of the survey, $N = 5467$.

[b]Asked of those who did not live alone at the time of the survey, $N = 6946$.

prevalence of spending time with other tobacco users. Tobacco promotional material were more commonly received via mail with gay men reporting the highest prevalence of receiving both mail and e-mail promotions. Exposure to tobacco in the home and workplace were common in both men and women and across sexual identity groups. Bivariate differences by sexual identity in workplace exposure were identified for women, whereas differences in home exposure were identified for men.

In regression models adjusted for all covariates, the odds of psychological barriers were significantly higher for some sexual minority men and women compared with their heterosexual counterparts (Table 2). Among men, severe substance use was higher for gay men (adjusted odds ratio [AOR] = 1.64; 95% CI: 1.01–2.65), as were internalizing (AOR = 2.50; 95% CI: 1.64–3.83) and externalizing (AOR = 2.34; 95% CI: 1.47–3.73) problems. The odds of internalizing (AOR = 2.26; 95% CI: 1.43–3.57) and externalizing (AOR = 3.04; 95% CI: 1.85–4.99) problems were similarly high among bisexual men. Among women, there were higher odds of substance use (AOR = 2.40; 95% CI: 1.70–3.38) and internalizing (AOR = 2.38; 95% CI: 1.88–3.01) and externalizing (AOR = 2.57; 95% CI: 2.01–3.30) problems for bisexual women. No significant differences in psychological barriers were found between lesbian/gay and heterosexual identified women.

There were significant differences in perceived disapproval of tobacco use in bisexual men and women compared with their heterosexual counterparts. Bisexual men (AOR = 1.79 95% CI: 1.11–2.88) and women (AOR = 1.29; 95% CI: 1.07–1.56) perceived more neutral, rather than negative, opinions from people close to them. Bisexual women, compared with heterosexual women, were significantly more likely to spend time with other tobacco users (AOR = 1.45; 95% CI: 1.20–1.77).

No environmental differences remained statistically significant among women after adjusting for the demographic covariates; however, there were differences among men. Gay men had higher odds of receiving e-mail promotions (AOR = 1.97; 95% CI: 1.35–2.89), mail promotions (AOR = 2.03; 95% CI: 1.40–2.96) and being exposed to tobacco at home (AOR = 1.92; 95% CI: 1.20–3.07).

Discussion

The findings reported here identify psychological, normative, and environmental barriers to tobacco cessation in sexual minority tobacco users compared with their heterosexual counterparts; however, there was significant variability in the specific barriers across sexual minority subgroups. Thus, this study adds to the extant literature on tobacco use disparities and provides further empirical support to the growing body of literature that identifies important heterogeneity among sexual minority subgroups defined by identity.[4,6,7,30]

Psychological Barriers

Relative differences in psychological barriers were identified among gay and bisexual men, as well as bisexual women. Co-occurring substance use was found to disproportionally affect gay men and bisexual women (relative to heterosexual tobacco users). Similarly, bisexual women, as well as gay and bisexual men, were found to have more severe internalizing and externalizing problems than heterosexual women and men, respectively. These findings are generally consistent with previous research demonstrating that bisexual identity is associated with unique stressors that may increase susceptibility to problematic substance use and poor mental health.[31–34] Also similar to previous research is the higher relative risk of psychological distress experienced by gay compared with heterosexual men.[33,35] Where our findings diverge from existing evidence is the lack of differences between gay/lesbian and heterosexual women. One explanation is that in this sample of tobacco users, the higher prevalence of psychological issues in the reference group (ie, tobacco using heterosexual women) may minimize differences by sexual orientation.[36]

Normative Barriers

In this study, bisexual men and women perceived more neutral attitudes toward tobacco use (ie, less negative). Bisexual women were also more likely to describe their social networks as consisting primarily of other tobacco users. Differences in perceived norms may reflect actual differences in social networks, including the density of tobacco users within those networks. Socializing primarily with other tobacco users, as we found in our sample of bisexual women, is likely to result in a social environment more favorable (or at least less negative) of tobacco use. While not statistically significant, nearly a quarter of bisexual men in this sample reported spending time with mostly tobacco users. It is possible this analysis was underpowered to detect small differences, as the bisexual men subgroup was the smallest group in the current study. Previous research suggests that bisexual identified men engage in different types of substance use subcultures,[37] which may influence norms around tobacco use regardless of the density of tobacco users within one's proximate social network.

Environmental Barriers

Gay men had more environmental barriers to cessation compared with heterosexual men, such as living with another tobacco user. No environmental factors differed among women despite previous evidence to suggest that secondhand smoke exposure is more common among sexual minority compared with heterosexual women in the home and workplace.[22] However, in that study, exposure was characterized among nonsmokers, whereas in our sample, we examined exposure among smokers. Some evidence suggests that people, on average, choose partners who are similar to them on their smoking status.[38] In other words, regular tobacco users are more likely to partner with, and ultimately cohabitate with, regular tobacco users. It is currently unknown to what extent social network theoretical constructs like assortativity vary by sexual identity—particularly as it relates to cohabitation and long-term partnerships.[39]

It is commonly reported that the tobacco industry specifically targets sexual minorities,[40] and while receiving tobacco promotions was common among women in this study, there were no differences by sexual identity. However, gay men in this study were more likely to receive tobacco promotion materials than their heterosexual counterparts. These differences may be explained by the systematic residential segregation of gay males into urban "gayborhoods," which increases vulnerability to targeted tobacco marketing.[23,41] Evidence suggests that gay men and gay/lesbian women are residentially segregated not only from their heterosexual counterparts, but also from each other in cities across the United States.[23] Furthermore, gay men—compared with heterosexual men and gay/lesbian women—are less likely to live with a partner or have children in the household.[3] Living with

Table 2. Psychological, Normative, and Environmental Barriers to Tobacco Cessation Regressed on Sexual Identity

	Men		Women	
	Gay	Bisexual	Gay/lesbian	Bisexual
Outcome variables	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Psychological				
Past-year substance use severity				
No/low	1.00	1.00	1.00	1.00
Moderate	0.69 (0.43–1.13)	0.81 (0.52–1.27)	1.15 (0.72–3.38)	1.19 (0.89–1.59)
High	**1.64 (1.01–2.65)**	1.30 (0.72–2.34)	1.42 (0.72–1.82)	**2.40 (1.70–3.38)**
Past-year internalizing severity				
No/low	1.00	1.00	1.00	1.00
Moderate	**1.67 (1.04–2.69)**	1.50 (0.93–2.41)	1.18 (0.82–1.70)	**1.65 (1.30–2.11)**
High	**2.50 (1.64–3.83)**	**2.26 (1.43–3.57)**	1.33 (0.86–2.07)	**2.38 (1.88–3.01)**
Past-year externalizing severity				
No/low	1.00	1.00	1.00	1.00
Moderate	**2.21 (1.51–3.24)**	1.63 (1.00–2.65)	1.21 (0.87–1.68)	**1.48 (1.12–1.95)**
High	**2.34 (1.47–3.73)**	**3.04 (1.85–4.99)**	1.59 (0.98–2.58)	**2.57 (2.01–3.30)**
Normative				
Tobacco opinions among people who are important to you				
Negative	1.00	1.00	1.00	1.00
Neutral	1.17 (0.80–1.72)	**1.79 (1.11–2.88)**	1.01 (0.68–1.50)	**1.29 (1.07–1.56)**
Positive	0.55 (0.25–1.19)	1.48 (0.69–3.15)	1.21 (0.69–2.14)	1.24 (0.84–1.85)
Most of the people I spend time with are tobacco users				
Extremely true of me	1.39 (0.83–2.33)	1.21 (0.74–1.96)	0.99 (0.68–1.43)	**1.45 (1.20–1.77)**
Environmental				
Received e-mail promotions, % Yes (reference = No/Don't know)	**1.97 (1.35–2.89)**	0.99 (0.60–1.63)	1.39 (0.97–1.99)	1.23 (0.96–1.57)
Received mail promotions, % Yes (reference = No/Don't know)	**2.03 (1.40–2.96)**	0.82 (0.52–1.30)	1.06 (0.71–1.58)	1.14 (0.92–1.42)
Exposure to tobacco in the workplace in past year (subset to employed part- or full time), % Yes (reference = No/ Don't know)[a]	1.24 (0.81–1.91)	1.65 (0.89–3.07)	1.19 (0.68–2.10)	1.26 (0.94–1.69)
Exposure to tobacco at home, % Yes (reference = No/ Don't know)[b]	**1.92 (1.20–3.07)**	1.35 (0.81–2.26)	0.97 (0.66–1.45)	0.93 (0.73–1.20)

All models are adjusted for age, race/ethnicity, poverty, education, census region, and urbanicity. Bolded odds ratios are statistically significant, $P < 0.05$. AOR = adjusted odds ratios; CI = confidence interval.

[a]Asked of those who were employed at the time of the survey, $N = 5467$.

[b]Asked of those who did not live alone at the time of the survey, $N = 6946$.

non-familial adults may be related to fewer home smoking restrictions and increased environmental exposure among gay men specifically.[42]

Implications for Policy and Practice

Tobacco control interventions targeting sexual minorities should address multiple barriers to tobacco cessation to be responsive to the specific and varied needs of these populations. As there was substantial heterogeneity in the barriers identified between sexual minority subgroups, targeted cessation interventions by gender and sexual identity may be most effective. Existing culturally adapted smoking cessation programs may benefit from content and delivery targeted by gender and sexual identity.[43] Similar cessation programs may be able to increase efficacy by addressing some of the psychological barriers identified here, such as co-occuring substance use and other externalizing behaviors. Also, responding to the normative influence of tobacco use for bisexual men and women specifically may help to strengthen interventions targeting these populations. Multilevel interventions may be particularly effective for sexual minorities subgroups in that they can be used to promote successful cessation attempts by simultaneously improving coping strategies focused on minority stressors,[44] directly addressing co-occurring substance use issues, changing normative perceptions of tobacco use, and negotiating household smoking restrictions. In addition, as indicated by our findings, general population interventions focused on policy change (eg, regulation of tobacco marketing, availability of mental health treatment) may positively affect sexual minorities.

Limitations

This study is limited by the smaller sample size among some sexual minority subgroups possibly resulting in less-reliable estimates due to large SE. Findings need to be replicated in other samples. In addition, there are likely important interactions between sexual identity and other demographic factors such as race. Given the sample size, we were unable to test these interactions. Furthermore, in the PATH study wave 1, sex was measured by asking respondents to report

their current sex (male/female) and gender identity was not assessed, which may have resulted in the misclassification of transgender respondents. Tobacco use was operationalized as adults using cigarettes, e-cigarettes, cigars, cigarillos, pipes, hookah, dissolvable snus, and smokeless. This broad operational definition of tobacco user limits the precision of these findings to address specific and unique barriers to cessation across tobacco product types (eg, combustible cigarettes compared with e-cigarettes).

Conclusion

Several important psychological, normative, and environmental barriers to tobacco cessation were identified that disproportionally affect sexual minorities. There was considerable heterogeneity in the prevalence and relative difference of these barriers across sexual minority subgroups, suggesting that community-based tobacco cessation programs should be responsive to differences in gay and bisexual men and women. These findings reiterate the need for comprehensive socioecological approaches in the design of tobacco cessation programs targeting sexual minority populations.

Supplementary Material

A Contributorship Form detailing each author's specific involvement with this content, as well as any supplementary data, are available online at https://academic.oup.com/ntr.

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Declaration of Interests

None declared.

References

1. Cochran SD, Mays VM. Physical health complaints among lesbians, gay men, and bisexual and homosexually experienced heterosexual individuals: results from the California Quality of Life Survey. *Am J Public Health*. 2007;97(11):2048–2055.
2. Cochran SD, Mays VM. Risk of breast cancer mortality among women cohabiting with same sex partners: findings from the national health interview survey, 1997–2003. *J Womens Health*. 2012;21(5):528–533.
3. Fredriksen-Goldsen KI, Kim HJ, Shui C, Bryan AEB. Chronic health conditions and key health indicators among lesbian, gay, and bisexual older US adults, 2013–2014. *Am J Public Health*. 2017;107(8):1332–1338.
4. Wheldon CW, Kaufman AR, Kasza KA, Moser RP. Tobacco use among adults by sexual orientation: findings from the population assessment of tobacco and health study. *LGBT Health*. 2018;5(1):33–44.
5. Johnson SE, Holder-Hayes E, Tessman GK, King BA, Alexander T, Zhao X. Tobacco product use among sexual minority adults: findings from the 2012–2013 national adult tobacco survey. *Am J Prev Med*. 2016;50(4):e91–e100. doi:10.1016/j.amepre.2015.07.041
6. Hoffman L, Delahanty J, Johnson SE, Zhao X. Sexual and gender minority cigarette smoking disparities: an analysis of 2016 Behavioral Risk Factor Surveillance System data. *Prev Med*. 2018;113:109–115.
7. Emory K, Kim Y, Buchting F, Vera L, Huang J, Emery SL. Intragroup variance in lesbian, gay, and bisexual tobacco use behaviors: evidence that subgroups matter, notably bisexual women. *Nicotine Tob Res*. 2016;18(6):1494–1501.
8. Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull*. 2003;129(5):674–697.
9. Lick DJ, Durso LE, Johnson KL. Minority stress and physical health among sexual minorities. *Perspect Psychol Sci*. 2013;8(5):521–548.
10. Jabson JM, Farmer GW, Bowen DJ. Stress mediates the relationship between sexual orientation and behavioral risk disparities. *BMC Public Health*. 2014;14:401.
11. Moolchan ET, Fagan P, Fernander AF, et al. Addressing tobacco-related health disparities. *Addiction*. 2007;102(Suppl 2):30–42.
12. U.S. National Cancer Institute. *A Socioecological Approach to Addressing Tobacco- Related Health Disparities. National Cancer Institute Tobacco Control Monograph 22. NIH Publication No. 17-CA-8035A*. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2017.
13. Goldbach JT, Tanner-Smith EE, Bagwell M, Dunlap S. Minority stress and substance use in sexual minority adolescents: a meta-analysis. *Prev Sci*. 2014;15(3):350–363.
14. Kassel JD, Stroud LR, Paronis CA. Smoking, stress, and negative affect: correlation, causation, and context across stages of smoking. *Psychol Bull*. 2003;129(2):270–304.
15. Farris SG, Zvolensky MJ, Beckham JC, Vujanovic AA, Schmidt NB. Trauma exposure and cigarette smoking: the impact of negative affect and affect-regulatory smoking motives. *J Addict Dis*. 2014;33(4):354–365.
16. Mereish EH, Goldbach JT, Burgess C, DiBello AM. Sexual orientation, minority stress, social norms, and substance use among racially diverse adolescents. *Drug Alcohol Depend*. 2017;178:49–56.
17. Fishbein M, Ajzen I. *Predicting and Changing Behavior*. New York, NY: Psychology Press; 2010.
18. Hanhardt CB. *Safe Space: Gay Neighborhood History and the Politics of Violence*. Durham, NC: Duke University Press; 2013.
19. Croff JM, Hubach RD, Currin JM, Frederick AF. Hidden rainbows: gay bars as safe havens in a socially conservative area since the pulse nightclub massacre. *Sex Res Soc Policy*. 2017;14(2):233–240.
20. Nguyen N, McQuoid J, Ramo D, Holmes LM, Ling PM, Thrul J. Real-time predictors of smoking among sexual minority and heterosexual young adults: an ecological momentary assessment study. *Drug Alcohol Depend*. 2018;192:51–58.
21. Stevens P, Carlson LM, Hinman JM. An analysis of tobacco industry marketing to lesbian, gay, bisexual, and transgender (LGBT) populations: strategies for mainstream tobacco control and prevention. *Health Promot Pract*. 2004;5(3 Suppl):129S–134S.
22. Cochran SD, Bandiera FC, Mays VM. Sexual orientation-related differences in tobacco use and secondhand smoke exposure among US adults aged 20 to 59 years: 2003–2010 National Health and Nutrition Examination Surveys. *Am J Public Health*. 2013;103(10):1837–1844.
23. Baumle AK, Compton D, Poston DL. *Same-Sex Partners: The Social Demography of Sexual Orientation*. Albany, NY: State University Press of New York Press; 2009.
24. Hyland A, Ambrose BK, Conway KP, et al. Design and methods of the Population Assessment of Tobacco and Health (PATH) Study. *Tob Control*. 2017;26(4):371–378.
25. United States Department of Health and Human Services. National Institutes of Health. National Institute on Drug Abuse and USD of H and HSF and DA. *Population Assessment of Tobacco and Health (PATH) Study [United States] Restricted-Use Files*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research; 2019.
26. Dennis ML, Chan YF, Funk RR. Development and validation of the GAIN Short Screener (GSS) for internalizing, externalizing and substance use disorders and crime/violence problems among adolescents and adults. *Am J Addict*. 2006;15(Suppl. 1):80–91.
27. Conway KP, Green VR, Kasza KA, et al. Co-occurrence of tobacco product use, substance use, and mental health problems among youth: findings from wave 1 (2013–2014) of the Population Assessment of Tobacco and Health (PATH) study. *Addict Behav*. 2018;76:208–217.

28. Eliason MJ, Streed CG Jr. Choosing "something else" as a sexual identity: evaluating response options on the national health interview survey. *LGBT Health*. 2017;4(5):376–379.
29. Judkins D. Fay's method for variance estimation. *J Off Stat*. 1990;6(3):223–239.
30. Johnson SE, O'Brien EK, Coleman B, Tessman GK, Hoffman L, Delahanty J. Sexual and gender minority U.S. youth tobacco use: Population Assessment of Tobacco and Health (PATH) study wave 3, 2015–2016. *Am J Prev Med*. 2019;57(2):256–261.
31. Green KE, Feinstein BA. Substance use in lesbian, gay, and bisexual populations: an update on empirical research and implications for treatment. *Psychol Addict Behav*. 2012;26(2):265–278.
32. McCabe SE, Hughes TL, Bostwick W, Boyd CJ. Assessment of difference in dimensions of sexual orientation: implications for substance use research in a college-age population. *J Stud Alcohol*. 2005;66(5):620–629.
33. Plöderl M, Tremblay P. Mental health of sexual minorities. A systematic review. *Int Rev Psychiatry*. 2015;27(5):367–385.
34. Persson TJ, Pfaus JG. Bisexuality and mental health: future research directions. *J Bisex*. 2015;15(1):82–98.
35. Cochran SD, Mays VM, Sullivan JG. Prevalence of mental disorders, psychological distress, and mental health services use among lesbian, gay, and bisexual adults in the United States. *J Consult Clin Psychol*. 2003;71(1):53–61.
36. Wilkinson AL, Halpern CT, Herring AH. Directions of the relationship between substance use and depressive symptoms from adolescence to young adulthood. *Addict Behav*. 2016;60:64–70.
37. Card KG, Armstrong HL, Carter A, et al. A latent class analysis of substance use and culture among gay, bisexual and other men who have sex with men. *Cult Health Sex*. 2018;20(12):1424–1439.
38. Agrawal A, Heath AC, Grant JD, et al. Assortative mating for cigarette smoking and for alcohol consumption in female Australian twins and their spouses. *Behav Genet*. 2006;36(4):553–566.
39. Schwartz CR. Trends and variation in assortative mating: causes and consequences. *Annu Rev Sociol*. 2013;39:451–470.
40. Dilley JA, Spigner C, Boysun MJ, Dent CW, Pizacani BA. Does tobacco industry marketing excessively impact lesbian, gay and bisexual communities? *Tob Control*. 2008;17(6):385–390.
41. Fanning JM, Ruther M. Gayborhoods: economic development and the concentration of same-sex couples in neighborhoods within large American cities. In: *Regional Science Matters: Studies Dedicated to Walter Isard*. Switzerland: Springer; 2015.
42. Soliman S, Pollack HA, Warner KE. Decrease in the prevalence of environmental tobacco smoke exposure in the home during the 1990s in families with children. *Am J Public Health*. 2004;94(2):314–320.
43. Matthews AK, Steffen AD, Kuhns LM, et al. Evaluation of a randomized clinical trial comparing the effectiveness of a culturally targeted and nontargeted smoking cessation intervention for lesbian, gay, bisexual, and transgender smokers. *Nicotine Tob Res*. 2018;21(11):1506–1516.
44. Ross LE, Doctor F, Dimito A, Kuehl D, Armstrong MS. Can talking about oppression reduce depression? *J Gay Lesbian Soc Serv*. 2007;19(1):1–15.