Original Investigation

Associations of Discrimination and Violence With Smoking Among Emerging Adults: Differences by Gender and Sexual Orientation

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Received November 30, 2010; accepted July 18, 2011

Abstract

Introduction: Lesbian, gay, and bisexual (i.e., sexual minority) populations have higher smoking prevalence than their heterosexual peers, but there is a lack of empirical study into why such disparities exist. This secondary analysis of data sought to examine associations of discrimination and violence victimization with cigarette smoking within sexual orientation groups.

Methods: Data from the Fall 2008 and Spring 2009 National College Health Assessments were truncated to respondents of 18–24 years of age ($n = 92,470$). Since heterosexuals comprised over 90% of respondents, a random 5% subsample of heterosexuals was drawn, creating a total analytic sample of 11,046. Smoking status (i.e., never-, ever-, and current smoker) was regressed on general (e.g., not sexual orientation-specific) measures of past-year victimization and discrimination. To examine within-group differences, two sets of multivariate ordered logistic regression analyses were conducted: one set of models stratified by sexual orientation and another set stratified by gender-by-sexual-orientation groups.

Results: Sexual minorities indicated more experiences of violence victimization and discrimination when compared with their heterosexual counterparts and had nearly twice the current smoking prevalence of heterosexuals. After adjusting for age and race, lesbians/gays who were in physical fights or were physically assaulted had higher proportional odds of being current smokers when compared with their lesbian/gay counterparts who did not experience those stressors.

Conclusions: When possible, lesbian/gay and bisexual groups should be analyzed separately, as analyses revealed that bisexuals had a higher risk profile than lesbians/gays. Further research is needed with more nuanced measures of smoking (e.g., intensity), as well as examining if victimization may interact with smoking cessation.

Introduction

Decades of research demonstrate staggering human and monetary costs caused by cigarette smoking, which is currently hailed as the most preventable source of morbidity and mortality (Dube, Asman, Malarcher, & Caraballo, 2009). Literature also clearly documents disparities in smoking among lesbian, gay, and bisexual populations (i.e., sexual minorities) in the United States, suggesting 50%–70% higher prevalence than the general population (Austin et al., 2004; Garofalo, Wolf, Kessel, Palfrey, & DuRant, 1998; Gruskin, Greenwood, Matevia, Pollack, & Bye, 2007; Lee, Griffin, & Melvin, 2009; McCabe, Boyd, Hughes, & d'Arcy, 2003; Skinner, 1994; Stall, Greenwood, Acree, Paul, & Coates, 1999; Tang et al., 2004). Moreover, the American Lung Association (2010) published a special report of tobacco disparities among sexual minorities, harkening a call for more research.

Despite overall concordance of higher smoking prevalence, knowledge remains relatively underdeveloped about factors driving this disparity. A few risk factors have been empirically tested and significantly associated with smoking outcomes, such as internalized homophobia (Amadio & Chung, 2004), alcohol abuse and depression (McKirnan, Tolou-Shams, Turner, Dyslin, & Hope, 2006), issues involving disclosure of sexual minority status (Rosario, Schrimshaw, & Hunter, 2009), and early sexual experience (Lombardi, Silvestre, Janosky, Fisher, & Rinaldo, 2008). Socially based stressors, such as discrimination and violence victimization, are also identified risk factors salient to negative health outcomes among sexual minority men and women (Herek, Gillis, & Cogan, 1999; Mays & Cochran, 2001; Meyer, 1995).

The diversity among sexual minority people notwithstanding, they report notably similar experiences related to discrimination, stigma, rejection, and violence (Herek, 2009). Research consistently demonstrates that fear of victimization, including discrimination and violence, affects overall health and well-being

doi: 10.1093/ntr/ntr183

Advance Access published on October 12, 2011

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across many types of minority populations (Mays, Cochran, & Barnes, 2007; Meyer, 2003b; Williams, Neighbors, & Jackson, 2003). In fact, certain types of victimization, such as intimate partner violence, sexual assault, and traumatic events, can be independent risk factors for continued smoking (Amstadter et al., 2009; Roberts, Fuemmeler, McClernon, & Beckham, 2008; Stueve & O'Donnell, 2007). Prior work with adolescent and young adult racial minorities demonstrates associations between racial- and ethnic-based discrimination and smoking (Guthrie, Young, Williams, Boyd, & Kintner, 2002; Landrine & Klonoff, 2000; Wiehe, Aalsma, Liu, & Fortenberry, 2010). Although smoking was not assessed, Mays and Cochran (2001) found support that discrimination moderated the relationship between sexual orientation differences in psychiatric problems, including alcohol and illicit drug use.

A unifying theme through minority health disparities research suggests that elevated risk results from socially based stressors (e.g., discrimination and victimization). From an ecological perspective, Krieger (1994, 2001) maintains that socially derived factors bear critical importance for examining health outcomes, that social context matters to circumspectly understand individual health behaviors, and that health inequities are largely socially produced. The ecosocial framework has been used widely in conceptualizing how social factors—from victimization, to targeted advertising, to racism—associate with health and health risk behaviors—such as risk of sexually transmitted infections (Buffardi, Thomas, Holmes, & Manhart, 2008), alcohol use (Kwate & Meyer, 2009), poor mental and physical health (Sanders-Phillips, Settles-Reaves, Walker, & Brownlow, 2009), and smoking (Barbeau, Wolin, Naumova, & Balbach, 2005).

Harkening elements of an ecosocial perspective, a growing body of research, has demonstrated associations between discrimination and poor mental and physical health outcomes among racial/ethnic minority populations (Williams, Neighbors, & Jackson, 2003). However, stress is also associated with health risk behaviors, such as smoking. Generally, research with smokers consistently shows that individuals who smoke cite stress as a reason for both why they smoke (i.e., trigger for smoking) and the amount of cigarettes they smoke (Kassel, Stroud, & Paronis, 2003; McClernon & Gilbert, 2010; Pomerleau & Pomerleau, 1991). Literature has documented positive associations between racial- and ethnic-based discrimination and smoking behaviors among Black (Bennett, Wolin, Robinson, Fowler, & Edwards, 2005), Hispanic (Wiehe et al., 2010), and Asian American (Chae, Takeuchi, Barbeau, Bennett, Lindsey, & Krieger, 2008) populations. However, research examining discrimination (either general discrimination or sexual orientation-specific discrimination) and smoking among sexual minority populations is relatively limited. In a probability-based sample of adults in Minnesota, Burgess, Lee, Tran, and van Ryn (2007) found that sexual minority respondents reported more instances of discriminatory events in the past year, regardless of whether the discrimination was perceived to be based on sexual orientation or some other characteristic (e.g., gender, race, or religion). Moreover, although discrimination was associated with smoking among the sample in general, discrimination did not mediate the relationship between sexual orientation and smoking.

Most investigations examining stress and health among sexual minorities focus on explaining mental health disparities,

such as depression and anxiety (Burgess et al., 2007; Hatzenbuehler, McLaughlin, Keyes, & Hasin, 2010; Meyer, 1995, 2003). Few investigations examine how socially based stressors may also associate with health risk behaviors, such as smoking (Hamilton & Mahalik, 2009). Among a probability-based sample of adolescent school students, Bontempo and D'Augelli (2002) found that lesbian, gay, and bisexual students' elevated risk behaviors, which included smoking, were attributable to at-school victimization, which was defined as having their property vandalized or being threatened or injured with a weapon in the past 12 months; discrimination was not assessed. Furthermore, at least two qualitative studies with sexual minorities reported emergent themes of stress management cited by participants as reasons for their smoking (Gruskin, Byrne, Altschuler, & Dibble, 2008; Remafedi, 2007), but quantitative investigations are needed to empirically investigate these associated risk factors.

Recent work by Ortiz-Hernandez, Gomez Tello, and Valdes (2009) tested whether family violence, sexual orientation-based discrimination, and being a victim of crime mediated the relationship between smoking and three different measures of sexual orientation (i.e., same-sex attraction, sexual minority identity, and same-sex sexual behavior) among a probability-based sample of Mexican adolescents and young adults. It is important to note that the family violence and crime victimization items in the survey were assessed with single items and asked in general (i.e., not specific to sexual orientation), whereas the discrimination question was a single item that was sexual orientation-specific. The authors found that the three stressor variables, together, mediated the relationship between same-sex attraction and current smoking and the relationship between self-identified sexual minority status and lifetime smoking. Importantly, however, the stressors did not mediate the relationships between sexual orientation and smoking intensity (smoking ≥ 6 cigarettes/day). These results also suggest that the associations between victimization/discrimination and health risk behaviors, such as smoking, are likely complex and may not follow linear paths for all outcomes.

This study aimed to test independent associations of past-year experiences of socially based stressors (i.e., general measures of discrimination and victimization) with smoking status among sexual minority young adults. We use the term *socially based stressor* to indicate that the stressor was interpersonal and originated from the social environment, rather than a biologically based stressor (e.g., genetic or hormonal factors). There is substantial evidence demonstrating higher smoking prevalence among sexual minority men and women when compared with heterosexual men and women (Lee et al., 2009), and our initial hypotheses test whether these differences in smoking prevalence endure with our sample (i.e., compared with their heterosexual peers, significantly more sexual minority individuals will report smoking).

While testing differences between sexual orientation groups presents an aggregate perspective of disparity, between-group analyses do not reveal potential within-group differences that could contribute to differential risk among subsets within a population (e.g., bisexual women, gay men). Consequently, our second set of hypotheses focus on questions of *heterogeneity* within each sexual orientation category. To those ends, we stratified analyses by gender and sexual orientation group, which allowed us to test research questions such as "Do gay men who

experience discrimination have increased odds of smoking when compared with their gay male counterparts who do not experience discrimination?”

Methods

This project used the National College Health Assessment (NCHA) data, collected by the American College Health Association. Each fall and spring semester, post-secondary educational institutions choose to purchase and administer the NCHA with their students. To form national datasets, the [American College Health Association \(2009c\)](#) combines data from institutions that used either a random or a census sample design and gained institutional review board approval to implement the survey. As a secondary analysis of de-identified data, the authors' institutional review board considered this project nonhuman subjects research.

From the total combined sample of 113,790 participants, we first selected only those respondents of 18–24 years old ($n = 92,470$) in order to comprise a young adult-only sample ([Park, Mulye, Adams, Brindis, & Irwin, 2006](#)). Sexual orientation was measured with an item asking respondents to self-identify as heterosexual ($n = 85,710$), gay/lesbian ($n = 1,825$), bisexual ($n = 2,545$), or unsure ($n = 1,545$). For the purposes of this project, we defined sexual minority as persons who identified as lesbian, gay, or bisexual. Persons who were unsure of their sexual orientation were analyzed as a separate group. Since analyses were stratified by sexual orientation and heterosexuals comprised over 90% of the sample, to keep the heterosexual analyses from being statistically overpowered, a random 5% subsample was drawn from the original heterosexual young adult sample ($n = 4,286$). Using chi-square tests of independence, comparisons were made between the random 5% heterosexual subsample and the original heterosexual sample on demographics (i.e., sex, race, and age) and found no statistically significant differences (data not shown). Consequently, the final analytic sample for all analyses was 11,046.

Participating institutions administered the survey via either the Internet or paper-and-pencil. Overall, paper-and-pencil surveys generated higher mean response rates than Web-based formats (Paper₂₀₀₈ = 63%; Web₂₀₀₈ = 22%; Paper₂₀₀₉ = 82%; Web₂₀₀₉ = 20%). Globally, the mean response rates among participating institutions in the Fall 2008 and Spring 2009 semesters were 27% and 30%, respectively ([American College Health Association, 2009a, 2009b](#)). Detailed analyses of the NCHA II survey reliability and validity are available from the [American College Health Association \(n.d.\)](#).

The NCHA assessed race/ethnicity in one item, in which participants could indicate more than one racial/ethnic category (i.e., “How do you usually describe yourself? White, non-Hispanic [includes Middle Eastern]; Black, non-Hispanic; Hispanic or Latino/a; Asian or Pacific Islander; American Indian, Alaska Native, or Native Hawaiian; Biracial or Multiracial; Other”). Hispanic ethnicity was recoded separately from race, in that anyone who indicated Hispanic ethnicity—regardless of race—was coded as Hispanic. The racial categories were recoded into White (non-Hispanic), Black (non-Hispanic), Asian (non-Hispanic), and “Other” (non-Hispanic) race. The “Other” race category included those respondents who indicated being

biracial or multiracial or marked more than one racial category. Due to small sample size, American Indian, Alaska Native, or Native Hawaiian (0.35%) was also recoded into the “Other” race category.

Past-year, general measures of violence victimization and discrimination were considered two separate indicators of socially based stressors. Participants completed questions with dichotomous responses (yes/no) about general experiences of the following in the past 12 months: verbally threatened with harm, physical fight, physical assault, sexually touched without consent, attempted sexual penetration without consent, and sexually penetrated without consent; the latter three items were combined to form one variable of any sexual assault.

Participants were asked about various experiences in the context of their academics (i.e., “Within the last 12 months, have any of the following affected your academic performance?”), with one of those experiences being “discrimination (e.g., homophobia, racism, sexism).” Participants indicated one response from the following options: this did not happen to me/not applicable; I have experienced this issue but my academics have not been affected; received a lower grade on an examination or important project; received lower grade in the course; received an incomplete or dropped the course; significant disruption in thesis, dissertation, research, or practicum work. To operationalize discrimination, the response categories were dichotomized into those who reported no discrimination and those who reported some experience of discrimination. Interactions for race/ethnicity and discrimination and gender and discrimination were tested in multivariate models but were not statistically significant ($p = .07-.84$).

A key covariate of smoking behaviors among young adults is binge drinking ([Weitzman & Chen, 2005](#)). Thus, a variable was included for binge drinking in the previous two weeks (0 = *no binge drinking in past two weeks*/1 = *at least one episode of binge drinking in past two weeks*). Analyses were also adjusted for region of the country (Northeast, Midwest, South, West, Outside United States; West as reference), given regional differences in smoking prevalence across the United States and the West having the lowest smoking prevalence ([Dube et al., 2010](#)). All models were adjusted for race (White as reference), and aggregate models were adjusted for sex (female as reference).

Finally, the outcome of interest was gleaned from a question asking about cigarette use in the past 30 days, to which respondents could answer: never use, have used but not in the last 30 days; 1–2 days; 3–5 days; 6–9 days; 10–19 days; 20–29 days; used daily. These responses were combined into smoking statuses of never-smokers (i.e., never used cigarettes), ever-smokers (have used but not in the last 30 days), and current smokers (those who reported any smoking in the past 30 days); this definition of current smoking has been used with other national studies of youth and young adult smoking ([Ling, Neilands, & Glantz, 2009](#); [Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998](#)). The smoking status recoding process was based on an iterative category reduction process through assessment of the parallel regression assumption for ordered logistic regression analyses (see below).

Bivariate differences were assessed using chi-square tests of independence by sexual orientation (e.g., bisexual vs. heterosexual) and by gender and sexual orientation (lesbians vs. heterosexual

women). Based both on significant bivariate differences within the sample and a robust literature that documents gender and sexual orientation differences in violence victimization (Faulkner & Cranston, 1998; FBI, n.d.; Herek, 2009; Russell, Franz, & Driscoll, 2001) and discrimination (Hatzenbuehler et al., 2010; Mays & Cochran, 2001), a series of stratified multivariate models were conducted based on sexual orientation and gender by sexual orientation. Moreover, stratified models allowed to better answer the driving research question of examining the heterogeneity within sexual orientation groups.

Multivariate ordered logistic regression models were used to test the association between key independent variables and the proportional odds of smoking status (never-smoker, ever-smoker, and current smoker). Ordered logistic regression procedures assert that an outcome with more than two categories has a hypothesized, but unquantifiable, hierarchical order among categories (Long & Freese, 2006). The outcome of smoking status in this analysis maintains that never-smokers would represent an absolute zero use, that ever-smokers represent at least some use that is greater than never-smokers but less than current smokers, and that current smokers represent the most use. The proportional odds ratios are interpreted as the likelihood of being in one of the three smoking status categories that indicates more smoking according to the aforementioned three-category ordinal structure (e.g., whether respondents who indicate victimization have increased odds of being in a category representative of more smoking when compared with a reference group of respondents who do not indicate victimization).

All multivariate ordered logistic models used the Brant test as a diagnostic of the parallel regression assumption, which stipulates that the specified model holds for all equations for $k-1$ ordered categories of the dependent variable, that is, requiring the same slope for $k-1$ ordered categories but allowing for intercepts to vary. Thus, a nonsignificant Brant test indicates that the model exhibits the same slope but allows the intercepts to vary across $k-1$ equations of the dependent variable categories (Long & Freese, 2006). If violation of the Brant test occurred or small cell sizes precluded calculation of Brant diagnostics, the categories of the dependent variable were collapsed to better fit the data, which ultimately resulted in a three-category dependent variable that fit nearly all the stratified models.

Proportional odds ratios are reported with 95% CIs. Missing data analysis showed that, on all variables germane to the models, none were missing more than 5%, thus listwise deletion was used (Tabachnick & Fidell, 2007). All analyses were conducted using Stata/SE version 11.1 (Stata Corp, 2009).

Results

The analytic sample tended to be female (62.1%) and non-Hispanic White (66.0%). The mean age was 20.1 years ($SD = 1.6$), recalling that the sample was truncated to only include those in the age range of young adulthood (i.e., 18–24 years). Since a random 5% subsample of heterosexual individuals was used for this analysis, the percentages of sexual orientation groups were made more equivalent than the original dataset that included all heterosexual persons; however, they still comprised the largest percent (42%) within the analytic sample (see Table 1). Significantly more men than women identified as gay,

while significantly more women than men identified as bisexual, a finding that is typical among studies using sexual identity measures of sexual orientation (Chandra, Mosher, Copen, & Sionean, 2011; Laumann, Gagnon, Michael, & Michaels, 1994).

Bivariate analyses revealed that, globally, among sexual orientation categories, significantly greater proportions of sexual minority individuals indicated experiences of victimization and discrimination when compared with their heterosexual counterparts (see Table 1). Of particular note is that more than 37% of gay/lesbian respondents indicated experiencing some form of discrimination in the past 12 months compared with approximately 4% of heterosexual respondents. Furthermore, gay/lesbian and bisexual respondents differed on some stressors. For instance, gay/lesbian individuals reported significantly more discrimination than their bisexual peers ($p < .01$), and bisexual respondents reported significantly more fights and physical assault ($p < .01$, respectively) than gay/lesbian respondents.

Table 1 also illustrates numerous differences in smoking. Significantly fewer sexual minority individuals were never-smokers when compared with their heterosexual peers, and, conversely, more sexual minority individuals than heterosexual individuals reported being ever-smokers and current smokers. Gay and bisexual men did not differ in their smoking status categories, but significantly less bisexual women than lesbians reported never smoking ($p < .05$; see Table 2). From the high prevalence of both smoking and victimization among sexual minorities shown in Table 1, we constructed Figure 1 to depict differences in experiences of victimization and discrimination across smoking status among sexual minority individuals only. Sexual minority current smokers experienced significantly more fights, physical assault, verbal threats of harm, and sexual assault than sexual minority never-smokers.

Adjusted ordered logistic models, stratified by sexual orientation, showed that many stressors were associated with increased proportional odds of smoking status (see Table 3). However, despite having a much higher prevalence of experiencing discrimination, gay/lesbian respondents who experienced discrimination, when compared with lesbian/gay respondents who did not experience discrimination, did not have significantly increased odds of being in the current smoker category versus being either in the never-smoker or ever-smoker categories. Being involved in a physical fight had the strongest association with smoking status across all groups except for the bisexual group, and being physically assaulted was significant across all groups, though the finding was not as robust among heterosexual individuals. Additionally, model fit for heterosexual individuals violated the parallel regression assumption, thus estimates for that group should be viewed with caution.

Additionally, models stratified by sexual orientation gender groups revealed distinct associations. Interestingly, for gay men, no stressors were significantly associated with increased proportional odds of being in the current smoker versus ever- or never-smoker categories. After adjusting for race and binge drinking, lesbians who were involved in a fight had twice the proportional odds of being a current smoker compared with lesbians who were not involved in a physical fight. Moreover, bisexual women who were verbally threatened with harm or who were sexually assaulted had a 57% and 37% increase in proportional odds, respectively, of being a current smoker

Table 1. Demographic Characteristics, Smoking Status, and Victimization by Sexual Orientation

	Sexual orientation			
	Gay/lesbian (<i>n</i> = 1,825), <i>n</i> (%)	Bisexual (<i>n</i> = 2,545), <i>n</i> (%)	Unsure (<i>n</i> = 1,545), <i>n</i> (%)	Heterosexual (<i>n</i> = 4,286), <i>n</i> (%)
Demographics				
Sex				
Female	683 (37.9)	1,925 (76.9)	1,034 (68.4)	2,818 (65.9)
Male	1,117 (62.1)	578 (23.1)	477 (31.6)	1,455 (34.1)
Race/ethnicity ^a				
White	1,213 (72.2)	1,682 (70.7)	910 (63.2)	3,112 (77.1)
Black	112 (6.7)	131 (5.5)	85 (5.9)	189 (4.7)
Asian	145 (8.6)	192 (8.1)	197 (13.7)	402 (10.0)
Other race	159 (9.5)	286 (12.0)	202 (14.0)	254 (6.3)
Hispanic	183 (10.2)	218 (8.7)	133 (8.8)	278 (6.6)
Smoking status ^b				
Never smoked	956 (52.7)*	1,209 (47.6)*	955 (62.1)*	2,895 (67.9)
Ever smoked	368 (20.3)*	564 (22.2)*	257 (16.7)	676 (15.9)
Currently smoke	491 (27.1)*	769 (30.1)*	327 (21.3)*	695 (16.3)
Victimization ^b				
Fight	128 (7.0)	294 (11.6)*	136 (8.8)	354 (8.3)
Physical assault	101 (5.6)	225 (8.9)*	98 (6.4)	228 (5.3)
Verbal threat of harm	552 (30.4)*	829 (32.6)*	369 (24.0)	970 (22.7)
Sexual assault	206 (11.4)*	408 (16.1)*	181 (11.9)*	334 (7.9)
Discrimination	676 (37.4)*	490 (19.5)*	216 (14.1)*	178 (4.2)

Note. ^aRacial categories are non-Hispanic.

^bHeterosexual is reference category for pair-wise comparisons (e.g., gay/lesbian vs. heterosexual).

**p* < .05.

when compared with bisexual women who did not experience verbal threats of harm or sexual assault.

Conclusions

First, consistent with prior research, we found that sexual minorities in our sample had significantly higher (nearly two-fold) current smoking status than heterosexuals (Lee et al., 2009). For the year the NCHA sample data were collected, the national

current smoking (i.e., smoked ≥ 100 cigarettes in lifetime and smoked every day or some days), prevalence was 21.8% for people aged 18–24 years, with approximately 28.0% of men and 15.6% of women being current smokers within the age range of 18–24 years (Dube et al., 2010). In our original full sample, the global current smoking prevalence (i.e., smoked in the last 30 days) was 16.3%, with 19.7% of men and 14.7% of women being current smokers. Although direct comparison is not possible due to differences in definition of current smoking, we

Table 2. Smoking Status and Victimization by Sexual Orientation and Gender

	Smoking status			Victimization				
	Never smoked, <i>n</i> (%)	Ever smoked, <i>n</i> (%)	Currently smoke, <i>n</i> (%)	Fight	Physical assault	Verbal threat of harm	Sexual assault	Discrimination
Sexual orientation and gender								
Lesbians	351 (51.8)*	150 (22.1)*	177 (26.1)*	65 (9.5)*	50 (7.4)*	216 (31.8)*	65 (9.6)	270 (39.8)*
Bisexual women	887 (46.1)*	431 (22.4)*	605 (31.5)*	202 (10.5)*	154 (8.0)*	595 (30.9)*	328 (17.2)*	353 (18.5)*
Unsure women	642 (62.4)*	185 (18.0)	202 (19.6)*	75 (7.3)*	60 (5.8)*	232 (22.5)*	127 (12.5)*	129 (12.6)*
Heterosexual women ^a	1,955 (69.8)	441 (15.7)	406 (14.5)	119 (4.2)	117 (4.2)	485 (17.3)	273 (9.8)	115 (4.1)
Gay men	595 (53.5)*	211 (19.0)	306 (27.5)*	61 (5.5)*	51 (4.6)*	328 (29.5)	137 (12.4)*	392 (35.5)*
Bisexual men	303 (52.5)*	121 (21.0)*	153 (26.5)*	82 (14.2)	65 (11.3)*	215 (37.2)	74 (12.9)*	119 (21.0)*
Unsure men	295 (62.0)	66 (13.9)	115 (24.2)*	52 (10.9)*	33 (6.9)	121 (25.5)*	47 (9.9)*	73 (15.5)*
Heterosexual men ^a	933 (64.3)	232 (16.0)	286 (19.7)	233 (16.0)	110 (7.6)	480 (33.1)	59 (4.1)	63 (4.4)

Note. ^aReference category for pair-wise comparisons (e.g., gay men vs. heterosexual men, lesbians vs. heterosexual women, etc.).

**p* < .05.

Figure 1. Victimization and discrimination by smoking status, sexual minority, and heterosexual. 1 = Sexual minority includes lesbian, gay, bisexual, and unsure. a = sexual minority, b = heterosexual.

expected smoking prevalence to be lower than the general population since respondents were enrolled in higher education, which is known to protect against smoking (Escobedo, Anda, Smith, Remington, & Mast, 1990).

By separating out gay/lesbian and bisexual groups, analyses revealed a significantly higher risk profile among bisexuals, suggesting variability between lesbian/gay and bisexual groups. Not only did bisexual individuals report the highest prevalence of all forms of violence victimization, they also had the highest prevalence of being ever- and current smokers and the lowest prevalence of being never-smokers. By analyzing data from the California Health Interview Survey, Tang et al. (2004) found that bisexual women had the highest prevalence of current smoking among females, but bisexual men's current smoking prevalence was slightly less than gay men. Our results indicate a similar pattern of smoking behaviors among this sample of young adult bisexuals. Furthermore, literature suggests that bisexual people may experience increased stress from being stigmatized by both their heterosexual and gay/lesbian peers (Ross, Dobinson, & Eady, 2010; Zinik, 2000). Consequently, salient group differences between gay/lesbian and bisexual groups may be overlooked as a consequence of combining them.

Interestingly, despite previous research with racial and ethnic minority youth that demonstrates an association between discrimination and smoking (Bennett et al., 2005; Wiehe et al., 2010), discrimination was not significantly associated with smoking among sexual minority groups in multivariate models, even among the gay/lesbian group in which nearly 40% reported past-year experiences of discrimination.

We hypothesize three potential reasons for this. First, as a secondary analysis of data, measurement of discrimination was limited to a single item and may have introduced measurement error on at least two key areas of discrimination research: severity

and specificity. In terms of severity, Meyer (2003) outlines that measuring discriminatory and prejudicial events is a difficult task for multiple reasons, including recall bias, reference period for the participant, framing the questions to adequately assess research needs, and the subjective interpretation of discriminatory events. That is, assessing the characteristics of a discriminatory event may be more salient than simply *whether* or not an event occurred, as well as assessing the perceived impact or distress the incident caused a person. Thus, the unknown nuances of a discriminatory event (e.g., severity, frequency, personal distress) may better quantify the association of said discrimination with health risk behaviors, such as smoking.

In terms of specificity, various operational definitions of discrimination have been used among research with sexual minority populations. For instance, some studies have used measures of personal experiences of specific sexual orientation-based discrimination, ranging from multiple-item inventories (Mays & Cochran, 2001; Meyer, Schwartz, & Frost, 2008) to single questions (Huebner, Rebshook, & Kegeles, 2004; Meyer, 1995; Ortiz-Hernandez et al., 2009). Yet another way of defining discrimination was developed in recent work by Hatzenbuehler et al. (2010), who used presence of state-level constitutional bans on gay marriage as a measure of discrimination. The present analysis used a single item that asked about discrimination in general, without the ability to assess either the specific sexual orientation-based discrimination (e.g., gender-based, sexual orientation-based, race-based, etc.) or the potential additive effects of multiple forms of discrimination (e.g., someone who has both racial and sexual minority statuses). For example, Mays and Cochran (2001) found that, among sexual minority persons in their sample who reported discrimination, only 25% reported that they perceived the discrimination was solely due to their sexual orientation, whereas nearly 60% reported that the discrimination was due to reasons other than their sexual orientation. The lack

Table 3. Aggregate and Gender-Stratified Adjusted Proportional Odds of Smoking Status by Sexual Orientation

	Sexual orientation			
	Gay/lesbian, AOR (95% CI)	Bisexual, AOR (95% CI)	Unsure, AOR (95% CI)	Heterosexual, AOR (95% CI)
Overall	<i>n</i> = 1,578	<i>n</i> = 2,247	<i>n</i> = 1,331	<i>n</i> = 3,846
Victimization ^a				
Verbally threatened	1.21 (0.97–1.54)	1.55 (1.28–1.88)*	1.13 (0.85–1.51)	1.47 (1.23–1.75)*
Fight	1.86 (1.19–2.91)*	1.28 (0.96–1.71)	1.83 (1.16–2.89)*	1.82 (1.39–2.40)*
Physically assaulted	1.65 (1.03–2.67)*	1.48 (1.07–2.05)*	1.68 (1.02–2.78)*	1.39 (1.00–1.92)*
Sexually assaulted	1.22 (0.90–1.67)	1.28 (1.03–1.61)*	1.27 (0.88–1.82)	1.52 (1.19–1.95)*
Discrimination	1.15 (0.93–1.40)	.95 (0.77–1.17)	1.17 (0.83–1.66)	1.27 (0.88–1.82)
Model diagnostics				
Brant test, χ^2 (df), <i>p</i>	17.4 (15), .30	11.7 (15), .70	8.7 (15), .89	30.5 (15), .01
Males	<i>n</i> = 1,084	<i>n</i> = 509	<i>n</i> = 421	<i>n</i> = 1,308
Victimization ^b				
Verbally threatened	1.32 (0.98–1.78)	1.56 (1.03–2.37)*	1.18 (0.69–2.02)	1.49 (1.14–1.95)*
Fight	1.50 (0.80–2.81)	1.15 (0.62–2.11)	1.39 (0.63–3.05)	2.23 (1.58–3.16)*
Physically assaulted	1.36 (0.70–2.63)	1.55 (0.83–2.89)	2.06 (0.87–4.88)	1.20 (0.75–1.91)
Sexually assaulted	1.15 (0.78–1.70)	1.80 (0.93–3.50)	2.12 (0.97–4.65)	1.61 (0.93–2.79)
Discrimination	1.21 (0.93–1.58)	.86 (0.54–1.36)	1.23 (0.64–2.36)	1.30 (0.72–2.33)
Model diagnostics				
Brant test, χ^2 (df), <i>p</i>	17.3 (14), .24	24.0 (14), .05	– ^c	11.4 (14), .65
Females	<i>n</i> = 600	<i>n</i> = 1,738	<i>n</i> = 910	<i>n</i> = 2,538
Victimization ^b				
Verbally threatened	1.05 (0.72–1.53)	1.57 (1.26–1.95)*	1.09 (0.77–1.55)	1.42 (1.12–1.81)*
Fight	2.33 (1.22–4.43)*	1.30 (0.93–1.82)	2.19 (1.22–3.95)*	1.26 (0.79–2.01)
Physically assaulted	2.03 (1.01–4.07)*	1.38 (0.94–2.02)	1.47 (0.78–2.75)	1.71 (1.08–2.70)*
Sexually assaulted	1.34 (0.79–2.30)	1.37 (1.07–1.76)*	1.11 (0.73–1.68)	1.51 (1.14–2.00)*
Discrimination	1.12 (0.80–1.55)	0.98 (0.77–1.24)	1.06 (0.70–1.62)	1.29 (0.81–2.04)
Model diagnostics				
Brant test, χ^2 (df), <i>p</i>	12.6 (14), .56	9.8 (14), .77	5.6 (14), .98	42.7 (14), <.00

Note. AOR = adjusted proportional odds ratio.

^aModels adjusted for sex, race, binge drinking, and region of the United States.

^bModels adjusted for race, binge drinking, and region of the United States.

^cBrant test diagnostic could not be calculated due to small sample size.

**p* < .05

of specificity notwithstanding, the fact that nearly 40% of gay/lesbian respondents—versus 4% of heterosexual respondents—reported discrimination, is a notable difference despite the fact that we could not assess the perceived cause of the discrimination.

Second, the mechanisms through which discrimination impact health and health behaviors are likely very complex and may vary depending on the outcome. For example, [Hatzenbuehler et al. \(2010\)](#), who used presence of state-level constitutional bans on gay marriage to operationalize discrimination, found significant associations with some, but not all, mental health disorders. The authors found that discrimination was significantly associated with having any mood disorder but not with having any anxiety disorder. Discrimination did not relate to smoking status in the present study; however, discrimination may relate with other facets of smoking behaviors, such as

intensity and smoking uptake, neither of which were assessed in the present dataset. Thus, in addition to collecting more nuanced measures of discrimination, collecting multiple measures of smoking behaviors may also help to more clearly understand how discrimination may associate with cigarette use.

Third, this sample of sexual minority young adults may be a particularly resilient sample, even in the face of high prevalence of discrimination. Sexual minority youth bear a disproportionate burden of bullying, harassment, and victimization during primary, middle, and high school and the negative consequences thereof, including depression, truancy, and dropout ([Birkett, Espelage, & Koenig, 2009](#); [Bontempo & D'Augelli, 2002](#)). Sexual minority young people who make it to college may have shown resilience in the face of such adversity, similar to Kimmel's notion of crisis competence, in which enduring injustices at

younger ages may equip a person to handle subsequent incivilities (Kimmel & Garnets, 1993). Thus, even though there was high prevalence of discrimination reported in this sexual minority sample, it is possible that the experiences of discrimination may not have been salient enough stressors to evidence specifically in smoking behaviors.

The victimization measures used to operationalize socially based stressors in this analysis revealed interesting associations with smoking and raise several questions. First, in aggregate models stratified by sexual orientation group, several forms of victimization were associated with increased proportional odds of being a current smoker over being an ever- or never-smoker. These findings lend some support that, from the ecosocial perspective of social production of health disparities (Krieger, 2001), sexual minority persons experiencing some forms of victimization may have increased odds of smoking, and their increased burden of victimization may help to explain disparately higher smoking prevalence. More specifically, these findings can be interpreted under the idea of negative affect regulation among smokers, which posits that people smoke because they believe that it mitigates stressed or distressed emotional states (Carmody, Vieten, & Astin, 2007), and previous research with college smokers has found support for such a theory of smoking (Schleicher, Harris, Catley, & Nazir, 2009). In the present results, victimization may relate with smoking in that these events may increase negative affect. However, interpersonal violence and discrimination are only parts of the larger ecosocial framework, in which there are multiple components creating challenging—if not hostile—environments for sexual minorities (e.g., marriage equality issues, conflict with some religious institutions). Detailed investigation of these multilevel factors, though a complex endeavor, may present more revealing pathways and interactions of how social inequality relates with health risk behaviors, such as smoking.

In gender-stratified models, female sexual minority respondents seemed to be the drivers behind the significant associations found in the aggregate models. Given the general nature of the measures of victimization, it is possible that sexism could have a role in the victimization experienced by sexual minority females; however, we could not specifically assess the perceived causes of discrimination. None of the victimization or discrimination measures were significantly associated with gay/unsure males, and only verbally threatened with harm was significantly associated with smoking among bisexual males. The reason for these null findings could be attributable to multiple reasons, including measurement issues, model specification, sampling bias, or sample size. Lack of direction association between the victimization and discrimination measures in the present study do not necessarily stand as evidence that these factors are irrelevant. As mentioned before with the findings from Hatzenbuehler et al. (2010), the relationship between discrimination and health is complex. It is possible that socially based stressors impact smoking through mediating pathways of depression and anxiety.

Interestingly, sexual assault was not associated with smoking status among the gay/lesbian and unsure groups as it was in the heterosexual group, in spite of significantly more gay/lesbian and unsure individuals experiencing sexual assault than their heterosexual peers. The lack of significant association between sexual assault and smoking could be related to sample size. For instance, gender-stratified models revealed that past-year sexual

assault was associated with smoking status among heterosexual and bisexual women but not lesbians, even though lesbians and heterosexual women had similar prevalence of sexual assault. Given research demonstrating that female survivors of sexual assault have increased risk of smoking (Acierno et al., 2000; Cloutier, Martin, & Poole, 2002; Roberts et al., 2008), this lack of association for lesbians may be an artifact of relatively smaller sample size, as there were over four times as many heterosexual women.

An alternative reason for the lack of significance of sexual assault and other victimization measures may be issues with measurement of exposure to trauma versus measurement of post-traumatic stress disorder (PTSD). Sexual assault is a traumatizing experience, but two reviews of the literature (Feldner, Babson, & Zvolensky, 2007; Fu et al., 2007) noted that the negative sequelae of traumas (i.e., PTSD) is more predictive of smoking than the actual traumatic experience itself. The inability to assess PTSD in our dataset may help explain the differential associations in sexual assault and smoking across the groups. Further research is needed to examine the mechanisms underlying why some forms of victimization may be associated with increased smoking while others may not. Could more severe forms of victimization (e.g., sexual assault) result in use of stronger substances, such as alcohol or illicit drugs rather than cigarette smoking?

The drastically higher prevalence of smoking and victimization among sexual minority young adults in this large national sample clearly identify a population in need of targeted services, yet there remains a paucity of research on the topic of prevention and cessation efforts among sexual minority individuals (Scout, Miele, Bradford, & Perry, 2006). Moreover, persons suffering from PTSD fare worse at quitting smoking (Feldner et al., 2007), and given the disproportionate burden of victimization borne by sexual minority populations, more investigation is needed to adequately assess whether victimization and resultant PTSD may singularly or synergistically impact cessation.

The findings presented here must be qualified in light of several limitations. First, causation between victimization and smoking cannot be established, given the cross-sectional nature of the data. Second, selection bias could be an issue given both the self-selection of institutions to participate in the NCHA and the self-identity measure of sexual orientation, which is more likely to identify respondents who are comfortable to disclose their sexual minority status. Third, the measures of victimization and discrimination were general and did not assess whether respondents associated their victimization as being due to their minority status or other potentially salient factors of victimization, such as gender, personality characteristics, and social environmental context. Moreover, the time limitation of the victimization measures (within the past 12 months), presumably excludes victimization or discriminatory events that occurred earlier (e.g., a physical assault in high school) yet still could have had long-lasting effects on risk behaviors, such as smoking. Lastly, self-reported data—especially about sexual assault—are more likely to be underreported.

It is important to emphasize that the present findings should not be misinterpreted to suggest that sexual orientation is a risk factor for smoking. Rather, our findings support that risks for elevated smoking may stem from stressful events like discrimination and victimization, which sexual minority populations

experience at disparately higher rates than their heterosexual peers (Balsam, Rothblum, & Beauchaine, 2005; Mays & Cochran, 2001). As found in other studies, it is not simply being gay, but the stressful events (e.g., homophobia and heterosexism) and resulting emotional or psychological distress that can be predictive of cigarette smoking (see Kassel et al., 2003).

In order to more confidently qualify and estimate sexual minority tobacco health disparities, measures of sexual orientation must be added to large, national probability-based surveillance projects. Perhaps more importantly, critical questions remain about the health consequences of higher cigarette smoking. Previous research has found that sexual minority young adults may experience increased odds of acute respiratory infections (Blosnich, Jarrett, & Horn, 2010), but little is known if sexual minorities experience increased burdens of smoking-related chronic disease and premature mortality.

As research continues to address smoking disparities in this minority population, the heterogeneity within sexual minority categories is underexplored, and recent studies demonstrate that nuances among sexual minority communities may help to understand disparate health risk behaviors, such as smoking. For instance, Willoughby, Lai, Doty, Mackey, and Malik (2008) found that, in a sample of gay men, self-identified subgrouping categories (e.g., Goths, Twinks, Bears) differentiated prevalence of current (i.e., once in past 30 days) smoking. Rosario, Schrimshaw, and Hunter (2008) noted that among lesbians, women who identified as butch (i.e., more masculine) tended to smoke more than women who identified as femme (i.e., more feminine). Clearly, there are details in the divisions, and future studies should strive to innovatively seize and disentangle critical information from the oft-combined lesbian, gay, and bisexual identities in sexual minority research.

Funding

This work was supported partially by a 2010 Will Rogers Institute doctoral fellowship through the Will Rogers Institute to JRB. The project was also partially supported by a training fellowship in the Summer Institute in LGBT Population Health, under award number R25HD064426 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) to JRB.

Declaration of Interests

None declared.

Acknowledgments

The authors thank the American College Health Association for use of the NCHA dataset. For their feedback on the ideation of this project, the first author (JRB) also thanks dissertation committee members Robert Anderson, Steven Branstetter, Geri Dino, and Cindy Tworek. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NICHD or the National Institutes of Health.

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