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Sexual orientation disparities in smoking vary by sex and household smoking among US adults: Findings from the 2003–2012 National Health and Nutrition Examination Surveys

Kristi E. Gamarel [a,*], Christopher W. Kahler [b,c], Ji Hyun Lee [b], Sari L. Reisner [e,f,g], Ethan H. Mereish [c], Alicia K. Matthews [d], Don Operario [b,c]

[a] Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University, Providence, RI, USA
[b] Department of Behavioral and Social Sciences, School of Public Health, Brown University, Providence, RI, USA
[c] Center for Alcohol and Addiction Studies, School of Public Health, Brown University, Providence, RI, USA
[d] Department of Health Systems Sciences, College of Nursing, University of Illinois at Chicago, Chicago, IL, USA
[e] Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, MA, USA
[f] The Fenway Institute, Fenway Health, Boston, MA, USA
[g] Division of General Pediatrics, Boston Children's Hospital/Harvard Medical School, Boston, MA, USA

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ABSTRACT

Objective. This study examined whether sexual orientation-related smoking disparities in males and females varied by household smoking behaviors in a nationally representative sample of American adults.

Methods. Data were drawn from the 2003–2012 National Health and Nutrition Examination Surveys, which assessed 14,972 individuals ages 20 to 59 years for sexual orientation, current smoking status, and household smoking. Weighted multivariable logistic models were fit to examine whether differences in current smoking status among sexual minority adults compared to heterosexuals was moderated by household smoking and sex, adjusting for covariates.

Results. The main effects of identifying as a sexual minority, being male, and living with a household smoker were all associated with a significantly higher odds of being a current smoker. However, there also was a significant three-way interaction among these variables (adjusted odds ratio = 3.75, 95% confidence interval: 1.33, 10.54). Follow-up analyses by sex indicated that the interaction between sexual identity and household smoking was significant for both males (AOR = 6.40, 95% confidence interval: 1.27, 32.28) and females (AOR = 0.43, 95% confidence interval: 0.23, 0.81) but was in the opposite direction. Among males, living with a smoker was associated more strongly with greater odds of smoking among gay and bisexual males, compared to heterosexual males. In contrast, among females, living with a smoker was more strongly associated with greater odds of smoking for heterosexuals compared to lesbians and bisexuals.

Conclusions. Future research is warranted to examine characteristics of households, including smoking behaviors and composition, to guide more effective and tailored smoking cessation interventions for males and females by sexual orientation.

Introduction

The smoking prevalence estimates for sexual minority individuals (i.e., lesbian, gay or bisexual; LGB), are nearly double those for heterosexual populations (Lee et al., 2009; Cochran et al., 2013; Gruskin et al., 2007). In the 2009–2010 National Adult Tobacco Survey (NATS), 32.8% of LGB individuals reported current smoking, compared to 19.5% of heterosexuals (King et al., 2012). Such disproportionate smoking prevalence estimates have made sexual minorities a public health priority population for smoking prevention and cessation research (Anon., 2010; Institute of Medicine, 2011).

A range of factors are associated with smoking behaviors among sexual minority populations, including younger age, lower socioeconomic status, and greater prevalence of depressive symptoms (Matthews et al., 2014a). Sexual minority populations also experience unique stressors, such as discrimination and rejection based on their sexual minority status, which have been associated with smoking behaviors (McKirnan et al., 2006; Balsam et al., 2012; Hatzenbuehler et al., 2014; Pachankis et al., 2011). While many sexual minority individuals want to quit smoking, success rates have been low. Furthermore, evidence suggests less than 0.1% of LGB smokers use existing LGBT-tailored smoking cessation groups (Lee et al., 2014). Additional research is

* Corresponding author at: Department of Psychiatry and Human Behavior, Brown University, 121 South Main Street, Providence, RI 02910, USA.
E-mail address: Kristi_Gamarel@brown.edu (K.E. Gamarel).

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needed to identify other factors that help explain sexual minorities' risk for smoking.

Despite a fairly robust literature on the importance of social networks as a determinant of tobacco use (Christakis and Fowler, 2008a; Mermelstein et al., 1986; Mercken et al., 2010), there is a paucity of research on the role of such networks in explaining sexual orientation-related disparities in tobacco use (Hatzenbuehler et al., 2015). Social networks, in particular household members, have been identified as a critical aspect of smoking initiation, continued use, cessation, and relapse (Christakis and Fowler, 2008b; Head et al., 2013). For example, research indicates that there is homophily, or similarity, of individuals to their friend and families members in terms of smoking (Hoffman et al., 2007), and LGB individuals are more likely to live with a smoker than the general population (Cochran et al., 2013; Matthews et al., 2014b). However, it remains unknown whether living with a household smoker represents a more potent risk factor for smoking in sexual minority adults compared to heterosexuals.

Although historically prevalence of smoking is higher for males than females in the general U.S. population (Centers for Disease Control Prevention, 2010), sexual orientation disparities in smoking have been more pronounced in females than in males (Lee et al., 2009; Boehmer et al., 2011). Research demonstrates that females' smoking behaviors are more influenced by their social networks' smoking behaviors than males (Homish and Leonard, 2005; Daly et al., 1993; Westmaas et al., 2002); however, these patterns of influence may operate differently in sexual minorities. Sexual minority males and females are more likely engage in unhealthy behaviors compared to their heterosexual counterparts (Lee et al., 2009), and research with same-sex couples suggests that both partners have the potential to negatively influence each other's health behaviors (Reczek, 2012).

To date, research is limited on whether there are differences in the impact of living with a smoker on current smoking status for sexual minorities compared heterosexual adults and whether these associations operate similarly or differently among sexual minority females and males. The purpose of the present study was to: 1) investigate whether household smoking has a stronger association with smoking behaviors among sexual minority adults, compared to heterosexuals; and 2) examine whether these associations differ by sex. The a priori hypotheses were that both sexual minority females and males who lived with a household smoker would have an increased odds of smoking compared to their heterosexual counterparts.

Methods

Sample

This study conducted secondary cross-sectional analyses of publically available data from six waves (2003–2012) of the National Health and Nutrition Examination Survey (NHANES). The NHANES continuously selects a cross-sectional nationally representative sample of US civilian, non-institutionalized population by using a multistage, complex sampling design. Between 2003 and 2010, the NHANES directly assessed sexual orientation identity (see below for description). In 2003 to 2004, sexual orientation was only assessed in participants ages 18 years or older, and smoking questions were asked only of participants ages 20 years and older. Given the variability in restrictions on publicly released data by survey years, the data analytic sample was restricted to respondents between ages 20 to 59 years who had complete information at each wave. Detailed description of the NHANES study design and sample has been published elsewhere (Cochran et al., 2013; Prevention CDC, 2014). The final analytic sample consisted of 14,972 participants ages 20 to 59 years.

Measures

Sexual orientation

The NHANES measured participants' current sexual orientation identity. Participants were asked: "Do you think yourself as: heterosexual or straight (attracted to the opposite sex); homosexual or gay/lesbian (attracted to the same sex); bisexual (attracted to men and women); something else; or not sure?" Participants who chose the response homosexual or gay/lesbian and bisexual were combined to create a sexual minority category, as the number of participants in each of these categories was insufficient to analyze separately. In order to reduce the potential for misclassification, we excluded participants who responded "something else" or "not sure" given evidence indicating that individuals who identify as "something else" and "don't know" often do not understand the meaning of the question (Miller and Ryan, 2011). A full description of the demography of sexual orientation in NHANES has been described in detail elsewhere (Cochran et al., 2013).

Sociodemographic characteristics

The NHANES assesses a number of demographic variables known to be associated with tobacco use (Centers for Disease Control Prevention, 2010). These included self-reported sex (male, female), age, race/ethnicity (Mexican American, Other Hispanic, non-Hispanic White, non-Hispanic Black, Other Race), education, marital status (married, widowed, divorced, separated, never married, living with partner), and survey year. Race/ethnicity were coded into 4 groups: Hispanic, non-Hispanic White, non-Hispanic Black, and non-Hispanic other. Participant's marital status was re-coded into two categories: married/living with partner versus never married/widowed/divorced/separated.

Cigarette smoking

Self-reported cigarette smoking behavior was assessed with two questions. Participants were asked whether they had smoked 100 or more cigarettes in their lifetime and those who reported yes were then asked: "Do you now smoke?" Responses were coded as 'yes' (Lee et al., 2009) if participants answered 'everyday/some days' and 'no' (0) if they answered 'not at all'.

Household smoker

Participants were asked whether any person who lived in their household smoked tobacco products inside the home (cigarettes, cigars, or pipes). Responses were dichotomous yes versus no.

Statistical analysis

Data were analyzed with STATA version 13.0. Sampling weights were created in NHANES to account for the complex survey design, including oversampling, survey non-response, and post-stratification (Centers for Disease Control and Prevention, 2014). First, bivariate sexual orientation-related differences were investigated in sociodemographic characteristics, cigarette smoking behavior, and household smoking. Next, weighted multivariable hierarchical logistic regression models were fit with two- and three-way interactions among sex, sexual minority status, and living with a household smoker to examine whether sexual orientation related differences in smoking were moderated by participant sex and living with a smoker; models adjusted for age, education, survey year, and marital/cohabitation status. Given a significant 3-way sex by sexual minority status by household smoker interaction, weighted logistic regression models stratified by sex were then fit to better understand how sexual orientation and living with a household smoker interacted in predicting the odds of being a smoker within males and females separately. All significance tests were based on the criterion of $p < 0.05$ and all confidence intervals (CIs) were estimated with 95% certainty.

Results

Of the 14,972 participants, 7355 (49.1%) self-identified as male. In total, 606 (4%) self-identified as sexual minority (lesbian, gay, bisexual). As shown in Table 1, sexual minority males were more likely to have college degree or above (45.8%, 95% CI: 36.4%, 55.5%), and less likely to be married or living with a partner (37.8%, 95% CI: 30.4%, 45.7%). There were no statistically significant differences in cigarette smoking behavior or household smoking between sexual minority males and heterosexual males. Among females (Table 2), sexual minorities were younger in age (M = 34.7, SE = 0.76), were more likely to self-identify as Non-Hispanic White (71.2%, 95% CI: 64.9%, 76.9%), were less likely to be married or living with a partner (40.7%, 95% CI: 34.5%, 47.1%) compared to their heterosexual counterparts. In addition, sexual minority females were more likely to self-report current smoking