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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

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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 US 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 (AOR=3.75, 95% CI: 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% CI: 1.27, 32.28) and females (AOR=0.43, 95% CI: 0.23, 0.81) but was in the opposite direction. Among male, living with a smoker was associated more strongly with greater odds of smoking among gay and

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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.

Keywords

Sexual minority; sex difference; smoking; social networks

INTRODUCTION

The smoking prevalence estimates for sexual minority individuals (i.e., lesbian, gay or bisexual; LGB), are nearly double those for heterosexual populations (1–3). In the 2009–2010 National Adult Tobacco Survey (NATS), 32.8% of LGB individuals reported current smoking, compared to 19.5% of heterosexuals (4). Such disproportionate smoking prevalence estimates have made sexual minorities a public health priority population for smoking prevention and cessation research (5, 6).

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 (7). 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 (8–11). 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-tailor smoking cessation groups (38). Additional research is 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 (12–14), there is a paucity of research on the role of such networks in explaining sexual orientation-related disparities in tobacco use (15). Social networks, in particular household members, have been identified as a critical aspect of smoking initiation, continued use, cessation, and relapse (16, 17). For example, research indicates that there is homophily, or similarity, of individuals to their friend and families members in terms of smoking (18), and LGB individuals are more likely to live with a smoker than the general population (2, 19). 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 (20), sexual orientation disparities in smoking have been more pronounced in females than in males (1, 21). Research demonstrates that females' smoking behaviors are more influenced by their social networks' smoking behaviors than males (22–24); 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 (1), and research with same-sex couples suggests that both partners have the potential to negatively influence each other's health behaviors (25).

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 (2, 26). 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 (27). A full description of the demography of sexual orientation in NHANES has been described in detail elsewhere (2).

Sociodemographic characteristics—The NHANES assesses a number of demographic variables known to be associated with tobacco use (20). 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’ (1) 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 (28). 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, 7,355 (49.1%) self-identified as male. In total, 606 (4%) were 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 (56.9%, 95% CI: 53.2, 60.1%) and live with a household smoker (32.4%, 95% CI: 26.4%, 38.9%) compared to their heterosexual counterparts.

Table 3 presents the results of the weighted hierarchal logistic regression model predicting smoking status. In Step 1, identifying as sexual minority (AOR=1.53, 95% CI: 1.20, 1.94) and living with a household smoker (AOR=14.74, 95% CI: 12.64, 17.20) were associated with an increased odds of smoking; females had a reduced odds of smoking compared to males (AOR =0.72, 95% CI: 0.68, 0.77). In Step 2, there was a significant interaction between household smoking by sex (AOR = 0.65, 95% CI: 0.50, 0.85) indicating that the effect of living with a household smoker was weaker in females compared to males. As anticipated, Step 3 illustrates that there was a significant three-way interaction between sexual minority identity, living with a household smoker, and sex (AOR = 3.75, 95% CI: 1.33, 10.54), which indicated that the two-way interactions between sexual minority identity and living with a household smoker differed by sex. As shown in Table 4, when the model was restricted to males, there was significant interaction between household smoking and sexual minority, such that the effect of household smoking was significantly greater for sexual minority males compared to heterosexual males (AOR= 6.40, 95% CI: 1.27, 32.28). A series of weighted multivariable logistic regressions, adjusting for covariates, were fit to better understand the nature of the two-way interaction between living with a household smoker and sexual identity on smoking status (data available upon request). Among males who did live with a household smoker, sexual minority males had an increased odds of smoking compared to heterosexual males (AOR = 7.65, 95% CI: 1.58, 36.96). In males not living with a household smoker, sexual minority males did not differ in smoking status relative to heterosexual males (AOR = 1.20, 95% CI: 0.61, 2.36). Sexual minority males who lived with a smoker had an increased odds of smoking compared to sexual minority males who did not live with a smoker (AOR = 13.22, 95% CI: 11.41, 15.20), and the magnitude of this association was greater than that observed in heterosexual males (AOR = 10.44, 95% CI: 7.73, 14.02).

Table 5 presents weighted hierarchal multivariable regression models for females. Sexual minority females had increased odds of being a smoker compared to heterosexual females (AOR = 1.71, 95% CI: 1.05, 2.77). There was a significant interaction between household smoking and sexual minority identity, such that the effect of household smoking was significantly lower among sexual minority females compared to heterosexual females (AOR = 0.21, 95% CI: 0.07, 0.68). Follow-up weighted multivariable logistic regression models, adjusting for covariates, were fit to better understand the nature of the interaction (data available upon request). Among those who did live with a smoker, sexual minority females had a reduced odds of smoking (AOR = 0.10, 95% CI: 0.07, 0.13) compared to heterosexual females. Sexual minority females who lived with a smoker also had an increased odds of smoking compared to those who did not (AOR = 22.32, 95% CI: 19.12, 26.05), but the magnitude of the association between living with a household smoker and smoking was stronger among heterosexual females (AOR = 25.59, 95% CI: 20.16, 43.42).

DISCUSSION

Consistent with prior research (1), this study found sexual orientation-related disparities in smoking among females such that sexual minority females had a higher prevalence of smoking and living with a household smoker than their heterosexual female counterparts. Notably, sexual minority males had a higher odds of smoking if they were living with a household smoker compared to heterosexual males; whereas, sexual minority females had a lower odds of smoking if they were living with a household smoker compared to heterosexual females. This study adds to prior research documenting sex differences in the influence of social networks on smoking behaviors, and in particular suggests how household smoking may be a unique contributing factor to disparities in smoking among sexual minority populations.

This study emphasizes the need to understand household compositions, as well as how these compositions may differ by sex, in order to elucidate disparities in smoking behaviors. Sexual minority males who lived with a smoker had an increased odds of smoking compared to heterosexual males; whereas, females had the opposite pattern. Scholars have long attempted to understand the mechanisms through which social networks influence health behaviors (29), and have identified the importance of household partners as a proximal form of social network influence on health (30). Household members' may seek out individuals with concordant health behaviors (31) and health behaviors with significant others may become more concordant overtime (32). These findings are consistent with recent data which indicated that partners' smoking status was a robust predictor of smoking status, over and above existing correlates of smoking including internalized heterosexism among HIV-infected same-sex male couples (33). Future research is warranted to examine these complex and interrelated relationship to fully understand the influence of significant others smoking behaviors in explaining disparities in smoking among sexual minority males.

While sexual minority females were significantly more likely smoke and to live with a smoker compared to their heterosexual counterparts, heterosexual females who lived with smoker were at an increased risk of smoking compared to sexual minority females who lived with a smoker. Initiation of smoking among adolescent females, when compared to adolescent males, has been shown to be more influenced by others smoking behaviors, such as parents (39, 40). Thus, household smoking may have a stronger influence on heterosexual females smoking behaviors compared to sexual minority females due to gender normative patterns of influence. Future research aimed understanding the ways in which social networks (i.e., significant others, friends, coworkers) influence smoking behaviors and cessation attempts comparing sexual minority and heterosexual individuals is warranted.

Limitations

Given the limited sample size of sexual minority individuals, this study was unable to examine whether marital status/cohabitation moderated the associations found. Further, NHANES does not ascertain questions about relationship status irrespective of marital status or cohabitation. Household compositions vary by sexual orientation (34), and may be comprised of different types of significant others including spouses, romantic partners, friends, or roommates. Importantly, the NHANES household smoker variable only included

whether the participant lived with a smoker who smoked in the home, which may underestimate the impact of significant others impact on smoking behaviors. Thus, future research is necessary to identify how the smoking status of different types of significant others in the home impact smoking behaviors by sexual orientation. An additional limitation is the cross-sectional nature of these data which limits the ability to infer causal relationships between living with a smoker and disparities in smoking among sexual minority males. Given the small cell sizes within the sexual minority group as a whole, analyses were not able to examine the associations within specific subgroups of stigmatized minority groups, such as bisexual individuals or racial/ethnic minorities.

Conclusions

Despite these limitations, this study is among the first to examine the role of living with a smoker among male and female adults by sexual orientation. Study findings provide valuable information about the importance of sex-related differences and social network dynamics in smoking cessation research. While social networks are a major barrier to smoking cessation among adults in general (35–37), results from this study suggest that living with a household smoker may be even more common for sexual minority females than heterosexual females, and may contribute to elevated smoking prevalence in sexual minority males compared to heterosexual males.

To date, there are few targeted smoking cessation interventions for sexual minority populations. Group interventions have been the most common format attempted; however, they have been limited in reach and uptake (38). This underutilization may be a result of household members and other social network members who curtail efforts to seek smoking cessation. The development of dyadic- and family-based smoking cessation interventions which include significant others who also smoke may be particularly useful for sexual minority males and heterosexual females. Research is warranted to examine aspects of social networks and their influence on smoking behaviors in order to guide more effective and sustained cessation interventions for males and females that are attentive to differences by sexual orientation.

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REFERENCES

1. Lee JGL, Griffin GK, Melvin CL. Tobacco use among sexual minorities, USA, 1987–2007 (May): A Systematic Review. *Tob Contr* 2009;tc. 2008.028241.
2. 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. [PubMed: 23948019]

3. Gruskin EP, Greenwood GL, Matevia M, Pollack LM, Bye LL. Disparities in smoking between the lesbian, gay, and bisexual population and the general population in California. *Am J Public Health*. 2007; 97(8):1496–1502. [PubMed: 17600265]
4. King BA, Dube SR, Tynan MA. Current tobacco use among adults in the United States: findings from the National Adult Tobacco Survey. *American Journal of Public Health*. 2012; 102(11):e93–e100. [PubMed: 22994278]
5. Smoking Out a Deadly Threat: Tobacco Use in the LGBT Community. Washington, DC: American Lung Association; 2010.
6. Institute of Medicine. The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding. Washington, DC: National Academies Press; 2011.
7. Matthews AK, Riley B, Everett B, Hughes TL, Aranda F, Johnson T. A longitudinal study of the correlates of persistent smoking among sexual minority women. *Nic Tob Res*. 2014; 16(9):1199–1206.
8. McKirnan DJ, Tolou-Shams M, Turner L, Dyslin K, Hope B. Elevated risk for tobacco use among men who have sex with men is mediated by demographic and psychosocial variables. *Subs Use Misuse*. 2006; 41(8):1197–1208.
9. Balsam KF, Beadnell B, Riggs KR. Understanding Sexual Orientation Health Disparities in Smoking: A Population-Based Analysis. *Am J Orthopsychiatry*. 2012; 82(4):482–493. [PubMed: 23039346]
10. Hatzenbuehler ML, Jun HJ, Corliss HL, Austin SB. Structural stigma and cigarette smoking in a prospective cohort study of sexual minority and heterosexual youth. *An Behav Med*. 2014; 47(1):48–56.
11. Pachankis JE, Westmaas JL, Dougherty LR. The influence of sexual orientation and masculinity on young men's tobacco smoking. *J Cons Clin Psychol*. 2011; 79(2):142.
12. Christakis NA, Fowler JH. Quitting in Doves: Collective Dynamics of Smoking Behavior in a Large Social Network. *New England J Med*. 2008; 358(1):2249–2258. [PubMed: 18499567]
13. Mermelstein R, Cohen S, Lichtenstein E, Baer JS, Karnack T. Social support and smoking cessation and maintenance. *J Cons Clin Psychol*. 1986; 54(4):447–453.
14. Mercken L, Snijders TAB, Steglich C, Vartiainen E, de Vries H. Dynamics of adolescent friendship networks and smoking behavior. *Social Networks*. 2010; 32(1):72–81.
15. Hatzenbuehler ML, McLaughlin KA, Xuan Z. Social networks and sexual orientation disparities in tobacco and alcohol use. *J Stud Alcohol Drugs*. 2015; 76:117–126. [PubMed: 25486400]
16. Christakis NA, Fowler JH. The collective dynamics of smoking in a large social network. *New England J Med*. 2008; 358(21):2249–2258. [PubMed: 18499567]
17. Head KJ, Noar S, Iannarino NT, Grant Harrington N. Efficacy of text messaging-based interventions for health promotion: A meta-analysis. *Soc Sci Med*. 2013; 97(41–48)
18. Hoffman BR, Monge PR, Chou C, Valente TW. Perceived peer influence and peer selection on adolescent smoking. *Add Behav*. 2007; 32:1546–1554.
19. Matthews AK, Vargas M, Kuhns L, Shappiva N, King AC. A Qualitative Examination of Barriers and Motivators to Smoking Cessation among HIV positive African American MSM Smokers. *J Health Disp Res Pract*. 2014; 7(2):4.
20. Centers for Disease Control Prevention. Vital signs: current cigarette smoking among adults aged ≥ 18 years—United States, 2009. *MMWR. Morbidity and mortality weekly report*. 2010; 59(35):1135. [PubMed: 20829747]
21. Boehmer U, Miao X, Linkletter C, Clark MA. Adult health behaviors over the life course by sexual orientation. *Am J Public Health*. 2011; 102(2):292–300. [PubMed: 22390443]
22. Homish GG, Leonard KE. Spousal influence on smoking behaviors in a US community sample of newly married couples. *Soc Sci Med*. 2005; 61(12):2557–2567. [PubMed: 15978712]
23. Daly KA, Lund EM, Harty KC, Ersted SA. Factors Associated with Late Smoking Initiation in Minnesota Women. *Am J Public Health*. 1993; 83(9):1333. [PubMed: 8363013]
24. Westmaas JL, Wild TC, Ferrence R. Effects of gender in social control of smoking cessation. *Health Psychol*. 2002; 21(4):368–376. [PubMed: 12090679]

25. Reczek C. The promotion of unhealthy habits in gay, lesbian, and straight intimate partnerships. *Soc Sci Med*. 2012; 74(11):1783–1790. [PubMed: 22227238]
26. Prevention CDC. National Health and Nutrition Examination Survey Data. Hyattsville: US Department of Health and Human Services; 2014.
27. Miller, K.; Ryan, JM. Design, development and testing of the NHIS sexual identity questions. Laboratory, QDR., editor. 2011.
28. Centers for Disease Control and Prevention. National Health and Nutrition Examination Survey Data. Hyattsville, US: US Department of Health and Human Services; 2014.
29. Umberson D, Montez JK. Social relationships and health. *J Health Soc Behav*. 2010; 51:S54. [PubMed: 20943583]
30. Chandola T, Head J, Bartley M. Socio-demographic predictors of quitting smoking: how important are household factors? *Addiction*. 2004; 99(6):770–777. [PubMed: 15139875]
31. Meyler D, Stimpson JP, Peek MK. Health concordance within couples: A systematic review. *Soc Sci Med*. 2007; 64:2297–2310. [PubMed: 17374552]
32. Lewis MA, et al. Understanding health behavior change among couples: An interdependence and communal coping approach. *Soc Sci Med*. 2006; 62:1369–1380. [PubMed: 16146666]
33. Gamarel KE, Neilands TB, Dilworth SE, Taylor JM, Johnson MO. Smoking, internalized heterosexism, and HIV disease management among male couples. *AIDS care*. 2014:1–6. (ahead-of-print).
34. Carpender C, Gates GJ. Gay and lesbian partnerships: Evidence from California. *Demography*. 2008; 45(3):573–590. [PubMed: 18939662]
35. Ferguson J, Bauld L, Chesterman J, Judge K. The English smoking treatment services: one-year outcomes. *Addiction*. 2005; 100(Suppl 2):59–69. [PubMed: 15755262]
36. Garvey AJ, Bliss RE, Hitchcock JL, Heinold JW, Rosner B. Predictors of smoking relapse among self-quitters: a report from the Normative Aging Study. *Add Behav*. 1992; 17(4):367–377.
37. Palmer, CA.; Baucom, DH.; McBride, CM. Couple approaches to smoking cessation. In: Schmalting, KB., editor. *The psychology of couples and illness: Theory, research, & practice*. Washington DC: American Psychological Association, xvi; 2000. p. 407
38. Lee JGL, Matthews AK, McCullen CA, Melvin CL. Promotion of Tobacco Use Cessation for Lesbian, Gay, Bisexual, and Transgender People: A Systematic Review. *Am J Prev Med*. 2014; 47(6):823–831. [PubMed: 25455123]
39. Ashley OS, Penne MA, Loomis KM, Kan M, Bauman KE, Gfroerer JC, et al. Moderation of the association between parent and adolescent cigarette smoking by selected sociodemographic variables. *Add Behav*. 2008; 33(9):1227–1230.
40. Botvin GJ, Griffin KW, Diaz T, Miller N, Ifill-Williams M. Smoking initiation and escalation in early adolescent girls: One-year follow-up of a school-based prevention intervention for minority youth. *J Am Med Women Assoc*. 1999; 54:139–143.

Demographic Characteristics of US Adults Aged 20 to 59 Years by Sexual Orientation among Males NHANES 2003–2012

Table 1

	Heterosexual Males (n = 7101)			Sexual Minority Males (n = 254)		
	N	%	95% CI	N	%	95% CI
Age (mean ± SE)						
Non-Hispanic White	3198	68.3	(65.1, 71.4)	126	72.8	(66.5, 78.2)
Non-Hispanic Black	1534	10.8	(9.4, 12.4)	52	9.6	(7.1, 13.0)
Hispanic	1852	14.9	(12.7, 17.4)	58	12.1	(8.5, 16.9)
Other including multiracial	517	6.0	(5.2, 6.8)	18	5.6	(2.9, 10.3)
Highest level of education						
Less than high school	1703	16.5	(15.0, 18.0)	31	8.9	(5.7, 13.7)
High school or GED	1826	25.6	(24.0, 27.2)	45	14.5	(10.1, 20.5)
Some college	2081	31.6	(30.3, 33.0)	81	30.8	(24.7, 37.7)
College or above	1487	26.4	(24.4, 28.5)	97	45.8	(36.4, 55.5)
Relationship status						
Married/Living with partner	4497	65.9	(64.0, 67.7)	84	37.8	(30.4, 45.7)
Never Married/Widowed/Divorced/Separated	2600	34.1	(32.3, 36.0)	169	62.3	(54.3, 69.6)
Survey year						
2003–2004	1199	19.4	(17.0, 22.1)	38	18.3	(12.1, 26.9)
2005–2006	1283	20.1	(17.7, 22.6)	55	24.2	(16.2, 34.4)
2007–2008	1523	20.3	(18.0, 22.8)	55	16.6	(9.6, 27.0)
2009–2010	1627	20.1	(18.1, 22.3)	52	15.3	(10.3, 22.3)
2011–2012	1469	20.1	(17.8, 22.6)	54	25.6	(16.2, 38.0)
Current smoker						
Yes	5177	70.1	(68.2, 72.1)	87	63.3	(50.7, 74.3)
No	1412	42.8	(40.6, 45.1)	174	33.3	(25.7, 35.3)
Does anyone smoke inside home						
Yes	1493	19.7	(17.6, 21.9)	61	23.4	(16.2, 32.5)
No	5563	80.4	(78.1, 82.4)	192	76.6	(67.5, 83.8)

Demographic Characteristics of US Adults Aged 20 to 59 Years by Sexual Orientation among Females NHANES 2003–2012

Table 2

	Heterosexual Females (n = 7220)			Sexual Minority Females (n = 352)		
	N	%	95% CI	N	%	95% CI
Age (mean ± SE)			39.8 ± 0.23			34.7 ± 0.76
Race						
Non-Hispanic White	3238	68.4	(65.0, 71.6)	182	71.2	(64.9, 76.9)
Non-Hispanic Black	1595	12.5	(10.7, 14.5)	93	15.1	(11.2, 20.0)
Hispanic	1911	13.2	(11.3, 15.3)	55	9.3	(6.8, 12.6)
Other including multiracial	476	6.0	(5.2, 6.9)	22	4.4	(2.6, 7.3)
Highest level of education						
Less than high school	1487	13.7	(12.4, 15.0)	76	17.4	(13.0, 23.0)
High school or GED	1515	20.9	(19.7, 22.2)	82	21.5	(17.0, 26.8)
Some college	2436	34.9	(33.4, 36.4)	129	38.0	(31.5, 45.1)
College or above	1779	30.5	(28.2, 32.9)	65	23.1	(17.4, 29.9)
Relationship status						
Married/Living with partner	4396	65.0	(63.1, 66.8)	139	40.7	(34.5, 47.1)
Never Married/Widowed/Divorced/Separated	2820	35.0	(33.2, 36.9)	213	59.4	(52.9, 65.5)
Survey year						
2003–2004	1287	19.9	(17.5, 22.5)	44	14.6	(10.6, 19.6)
2005–2006	1471	20.7	(18.3, 23.3)	55	20.3	(15.3, 26.4)
2007–2008	1522	20.4	(17.9, 23.3)	77	21.1	(16.3, 26.8)
2009–2010	1586	19.2	(17.1, 21.5)	98	22.2	(16.6, 29.0)
2011–2012	1354	19.8	(17.5, 22.2)	78	21.8	(16.4, 28.4)
Current smoker						
Yes	1537	20.7	(18.2, 22.4)	162	56.9	(53.2, 60.1)
No	5898	79.3	(76.1, 80.1)	214	43.1	(40.1, 45.8)
Does anyone smoke inside home						
Yes	1269	16.7	(14.9, 18.7)	122	32.4	(26.4, 38.9)
No	5908	83.3	(81.3, 85.1)	230	67.7	(61.1, 73.6)

Table 3

Hierarchical Multivariable Model Predicting Smoking among Full Sample

	Step 1			Step 2			Step 3		
	AOR	95%CI	AOR	95%CI	AOR	95%CI	AOR	95%CI	AOR
Sexual minority	1.53	(1.20, 1.94)	2.01	(1.47, 2.76)	2.35	(1.70, 3.24)			
Female	0.72	(0.68, 0.77)	0.78	(0.54, 0.87)	0.79	(0.55, 0.90)			
Age	0.99	(0.98, 0.99)	0.99	(0.98, 0.99)	0.99	(0.98, 0.99)			
Education									
Less than high school	0.79	(0.68, 0.93)	0.79	(0.68, 0.93)	0.79	(0.68, 0.93)			
High school or GED	0.56	(0.48, 0.65)	0.57	(0.49, 0.66)	0.57	(0.49, 0.66)			
Some college	0.29	(0.25, 0.35)	0.30	(0.25, 0.36)	0.30	(0.25, 0.36)			
Survey Year									
2005–2006	1.00	(0.86, 1.17)	1.01	(0.86, 1.17)	1.00	(0.86, 1.17)			
2007–2008	0.93	(0.78, 1.11)	0.93	(0.78, 1.11)	0.93	(0.78, 1.11)			
2009–2010	0.89	(0.75, 1.06)	0.89	(0.74, 1.06)	0.89	(0.74, 1.05)			
2011–2012	1.05	(0.86, 1.28)	1.04	(0.85, 1.27)	1.04	(0.85, 1.27)			
In a relationship	0.84	(0.75, 0.93)	0.83	(0.75, 0.92)	0.83	(0.74, 0.92)			
Household smoker	14.74	(12.64, 17.20)	18.80	(15.42, 22.93)	19.51	(15.94, 23.89)			
Household smoker x Sexual minority	--	--	0.73	(0.39, 1.37)	0.43	(0.23, 0.83)			
Female x Sexual minority	--	--	0.69	(0.41, 1.15)	0.48	(0.26, 0.88)			
Household smoker x Female	--	--	0.65	(0.50, 0.85)	0.61	(0.46, 0.81)			
Household smoker x Sexual minority x Female	--	--	--	--	3.75	(1.33, 10.54)			

Note. Education referent=College or above; Survey year referent=2003–2004

Table 4

Hierarchal Multivariable Logistic Regression Predicting Smoking Among Males (N = 7,355)

	Step 1		Step 2	
	AOR	95% CI	AOR	95% CI
Sexual minority	1.34	(0.90, 1.98)	1.19	(0.72, 1.95)
Age	0.99	(0.98, 0.99)	0.99	(0.61, 4.29)
Education				
Less than high school	0.65	(0.53, 0.81)	0.65	(0.53, 0.81)
High school or GED	0.53	(0.43, 0.64)	0.53	(0.43, 0.64)
Some college	0.24	(0.19, 0.30)	0.24	(0.19, 0.30)
Survey Year				
2005–2006	0.99	(0.83, 1.19)	0.99	(0.82, 1.18)
2007–2008	0.91	(0.73, 1.13)	0.91	(0.73, 1.13)
2009–2010	0.74	(0.59, 0.93)	0.74	(0.59, 0.93)
2011–2012	0.98	(0.77, 1.24)	0.98	(0.77, 1.23)
In a relationship	0.90	(0.77, 1.06)	0.90	(0.77, 1.05)
Household smoker	12.08	(9.83, 14.84)	11.86	(9.56, 14.71)
Household smoker x Sexual minority	--	--	6.40	(1.27, 32.28)

Note. Education referent=College or above; Survey year referent=2003–2004

Table 5

Hierarchal Multivariable Logistic Regression Models Predicting Smoking among Females (N = 7,572)

	Step 1		Step 2	
	AOR	95% CI	AOR	95%CI
Sexual minority	1.81	(1.29, 2.55)	2.31	(1.67, 3.20)
Age	0.99	(0.98, 1.00)	0.99	(0.23,0.81)
Education				
Less than high school	1.05	(0.85, 1.30)	1.06	(0.85, 1.31)
High school or GED	0.65	(0.53, 0.80)	0.65	(0.53, 0.80)
Some college	0.41	(0.31, 0.53)	0.41	(0.31, 0.53)
Survey Year				
2005–2006	1.01	(0.79, 1.30)	1.01	(0.79, 1.30)
2007–2008	0.95	(0.74, 1.23)	0.96	(0.75, 1.23)
2009–2010	1.11	(0.87, 1.42)	1.12	(0.88, 1.42)
2011–2012	1.12	(0.81, 1.54)	1.12	(0.81, 1.54)
In a relationship	0.74	(0.65, 0.84)	0.74	(0.65, 0.85)
Household smoker	18.93	(15.42, 23.24)	20.05	(16.39, 24.53)
Household smoker x Sexual minority	--	--	0.43	(0.23, 0.81)

Note. Education referent=College or above; Survey year referent=2003–2004