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Smoking characteristics among lesbian, gay, and bisexual adults☆

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Abstract

Objective—Cigarette smoking is the leading preventable cause of death and disease in the United States. Sexual minorities (lesbians, gay men, and bisexuals), smoke at higher rates than the general population. However, little else is known about sexual minority smokers. Furthermore, the sexual minority population is diverse and little research exists to determine whether subgroups, such as lesbians, gay men, and female and male bisexuals, differ on smoker characteristics. We examine differences in smoking characteristics (advertising receptivity, age of first cigarette, non-daily smoking, cigarettes per day, nicotine dependence, desire to quit and past quit attempts) among lesbians, gay men, and female and male bisexual adults in the United States.

Methods—Secondary analysis of the CDC's 2009–2010 National Adult Tobacco Survey (N = 118,590).

Results—Controlling for age, race, socioeconomic status and geographic region, identifying as a female bisexual was associated with fewer past quit attempts, lower age at first cigarette, and higher nicotine dependence when compared to heterosexual women. There were no differences in desire to quit between male or female sexual minorities and their heterosexual counterparts.

Conclusion—Sexual minority individuals smoke at higher rates than heterosexuals and yet similarly desire to quit. Tailored efforts may be needed to address smoking among bisexual women.

Keywords

LGBT; Smoking; Tobacco control

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Introduction

Cigarette smoking is the leading preventable cause of death and disease in the United States (U.S. Department of Health and Human Services, 2010). It is well documented that sexual minority individuals, such as lesbians, gay men, and bisexuals (LGB), have higher smoking prevalence than the general population (Conron et al., 2010; Gruskin et al., 2007; Lee et al., 2009, 2011; Pizacani et al., 2009). In the 2009–2010 National Adult Tobacco Survey (NATS), 32.8% of lesbians, gay men, bisexual, and transgender (LGBT) individuals reported current smoking, versus 19.5% of heterosexuals (King et al., 2012). In order to design effective interventions to prevent smoking initiation and promote smoking cessation among sexual minority populations, it is important to understand related factors including: advertising receptivity, age of first cigarette, light or nondaily smoking, cigarettes per day, nicotine dependence, desire to quit smoking, and past quit attempts.

To prevent smoking, it is necessary to understand advertising receptivity. Advertising receptivity is a risk factor for tobacco use (Lovato et al., 2011). A Cochrane Review concluded that the literature on the influence of tobacco advertising on adolescents was strong and consistent enough to conclude that such promotion increases the likelihood of uptake of smoking in adolescents (Lovato et al., 2008). Tobacco advertising receptivity and measures of readiness to quit are also seldom measured in sexual minorities. The tobacco industry's targeted marketing to LGB groups is well documented (Ling et al., 2009; Lovato et al., 2008; Stevens et al., 2004). LGB individuals are disproportionately exposed to tobacco marketing (e.g., free sampling) (Dilley et al., 2008). According to one study by Smith and colleagues, LGBT individuals are indeed receptive to tobacco company marketing (Smith et al., 2008), though there are few studies comparing LGBT receptivity to that of heterosexuals. In a small study from Austin and colleagues, “mostly heterosexual” youth were more receptive than heterosexuals, but there were no differences between either of those groups and “mostly” or “completely homosexual” youth (Austin et al., 2004). Dilley and colleagues determined that, among Washington state adults, there were no differences in advertising receptivity among GB and straight men, but LB women were more receptive to tobacco industry marketing (Dilley et al., 2008). It is critical to make these comparisons in larger, more diverse samples in order to determine whether and how interventions in advertising receptivity should be targeted to LGBT youth in order to prevent uptake of tobacco.

In addition to primary prevention, it is necessary to promote smoking cessation to improve population health outcomes. In order to effectively design smoking cessation interventions it is necessary to understand patterns of tobacco use, including age of initiation, nondaily smoking, cigarettes per day, nicotine dependence, and desire/intention to quit. All contribute to the level of effort and assistance required to quit; specifically, nicotine dependence predicts success or difficulty in smoking cessation (Kozlowski et al., 1994) and desire and intention to quit predict quit attempts (Smit et al., 2011). Age of smoking initiation is associated with daily smoking and current frequent smoking (Everett et al., 1999). In addition, there are health risks associated with nondaily smoking; intermittent smoking leads to a risk level nearly as high as daily smoking for cardiovascular events (Schane et al., 2010). Nevertheless, smoking intensity is an important variable to assess, as there is a dose–

response relationship between cigarettes smoked per day and other negative health outcomes, including lung cancer (U.S. Department of Health and Human Services, 2004).

The handful of studies that assess these important characteristics in LGBT samples focuses on adolescents or young adults and/or are limited to state-level or convenience samples. Corliss and colleagues found in a nationally representative sample limited to adolescents and young adults (n = 16,882) that those who chose their identification as “mostly heterosexual,” “bisexual”, or “mostly” or “completely homosexual,” had an earlier age of smoking initiation compared to “completely heterosexual” individuals (Corliss et al., 2013). Several studies have examined light or non-daily smoking in sexual minority women. A population based study in California found self-identified lesbian and bisexual women to be at increased risk for both daily and non-daily smoking compared to heterosexuals (Gruskin et al., 2007). In the Corliss study, female youth smokers identified in categories other than “completely heterosexual” smoked more cigarettes daily compared to heterosexual women (Corliss et al., 2013). In both studies based on the national Growing Up Today adolescent survey, nicotine dependence scores were higher among sexual minority adolescents and young adults as compared to their heterosexual counterparts (Austin et al., 2004; Corliss et al., 2013), although in one study that difference in dependence was true only for girls and not boys (Austin et al., 2004). Additionally, a small intervention study provides evidence that lower nicotine dependence predicts successful smoking cessation among LGBT individuals as in the general population (Matthews et al., 2013).

Research on desire to quit and quit attempts among sexual minority groups is similarly limited mainly to adolescent and young adult populations. In a small, convenience-based sample of adolescents and young adults in Minnesota, Remafedi and colleagues found that LGBT individuals had lower odds of wanting to stop smoking (OR: .6, 95% CI: .5−.8) (Remafedi et al., 2008). In an older population-based survey of adults completing the Behavioral Risk Surveillance Survey in Oregon and Washington, Pizacani and colleagues found that lesbians and bisexual women had a lower quit ratio compared to heterosexual women, and gay men had a lower quit ratio compared to heterosexual men (Pizacani et al., 2009).

The six studies comparing smoking correlates between LGBT and non-LGBT groups are limited to young adults (Austin et al., 2004; Corliss et al., 2013) which rely on older data, or are limited to one or two states (Gruskin et al., 2007; Pizacani et al., 2009). All assessed sexual orientation in slightly different ways, making it difficult to compare and generalize results. In addition, few studies are adequately powered to determine differences in smoker characteristics among subgroups of sexual minorities, such as lesbians, gay men, bisexual women, and bisexual men (Blosnich et al., 2013). Taken together, these limitations of prior studies emphasize the need for nationally representative samples to more accurately estimate and describe smoking characteristics in the contemporary LGB population. The purpose of this study was to examine advertising receptivity, age of first cigarette, nondaily smoking, cigarettes per day, nicotine dependence, desire to quit smoking and past quit attempts among sexual minorities using a large nationally representative sample.

Methods

Our study is a secondary analysis of data from the NATS (King et al, 2012), a randomized, national sample stratified by landline and cellular telephone listings. A detailed description of the survey design and sampling procedures is provided elsewhere (King et al., 2012). Overall, 110,643 landline users and 7947 cellular users completed the survey (response rate 40.4% for landline, 24.9% for cell phone).

Measures

Measures were designed through multiple rounds of consultation with experts and stakeholders in tobacco use and health. Sexual orientation status was defined based on the question “Do you consider yourself to be… ?” (choices: heterosexual, gay or lesbian, bisexual, transgender, don't understand, don't know, refused, other).

Current smoking was assessed based on two questions: (1) “Have you smoked at least 100 cigarettes in your entire life?” (choices: yes/no); and (2) “Do you now smoke cigarettes every day, some days, or not at all?” (choices: everyday, some days, not at all). A current smoker was defined as someone who had smoked at least 100 cigarettes in their life and reported smoking “every day” or “some days.”

Tobacco advertising receptivity

Advertising receptivity was assessed with the question, “How likely is it that you would ever use or wear something—such as a lighter, t-shirt, hat or sunglasses—that has a tobacco company name or picture on it?” (choices: very likely, somewhat likely, somewhat unlikely, very unlikely). Respondents were categorized as receptive to advertising if they reported “somewhat” or “very likely” to use or wear something with a tobacco company name or picture on it and were categorized as not receptive to advertising if they reported “somewhat” or “very unlikely.” This measure of advertising receptivity has been used in previous studies and is associated with smoking behaviors.

Age of first cigarette

Age at first cigarette was determined based on the question, “How old were you when you smoked a whole cigarette for the first time?”

Non-daily smoking

Nondaily smoking was assessed using the question: “Do you now smoke cigarettes every day, some days, or not at all?” (answer choices: everyday, some days, not at all). Nondaily smokers were defined as individuals who reported that they smoke “some days”.

Smoking intensity (cigarettes per day)

Mean cigarettes smoked per day was determined based on the question, “On the average, about how many cigarettes a day do you now smoke?”

Nicotine dependence

Nicotine dependence was based on the question, “How soon after you wake up do you have your 1st cigarette?” (choices: within 5 min, from 6 to 30 min, from more than 30 min to 1 h, and after more than 1 h). Respondents were divided into whether they smoked their first cigarette within 30 min or less, or over 30 min.

Desire to quit

Desire to quit was based on the question, “Do you want to quit smoking cigarettes for good?” (choices: yes/no).

Quit attempts

Past quit attempts were based on the question, “In your whole life, how many times have you stopped smoking for one day or longer because you were trying to quit smoking cigarettes for good?”

Statistical analysis

Frequencies for sexual orientation status and current smoking by sexual orientation status were calculated (Table 1), as were frequencies for all smoking behavior variables and covariates (Tables 2a and 2b). Bivariate testing was conducted using chi square tests for categorical variables and Student's t-test for continuous variables. Lesbian females were compared with heterosexual females and bisexual females were also compared with heterosexual females, then lesbian females were compared with bisexual females. This strategy was repeated for comparing gay and bisexual males with heterosexual males. We chose to separate the analyses by gender due to the known differences in smoking between men and women. Due to a limited sample size, transgender individuals and respondents selecting other sexual orientations were excluded from analyses. (See Tables 3 and 4.)

Sampling weights provided by the CDC for landline and cellular telephone responses were applied for the multivariate analyses according to previously published weighting methodology (Office of Smoking and Health, 2010). Multivariate analyses were conducted using logistic regression for the model specifications with the following binary dependent variables: advertising receptivity, nondaily smoking, nicotine dependence, and desire to quit. Linear regression (ordinary least squares) was employed for the model specifications with the continuous dependent variables age at first cigarette and smoking intensity. The dependent variable past quit attempts was found to be over-dispersed count data; thus, negative binomial regression was specified. Analyses were conducted separately for female and male respondents and robust standard errors were calculated for each model specification (not shown). All specifications were constructed with sexual orientation as the primary independent variables with the following covariates: age, race, income, education, and geographic region. Covariates were selected based on their relationship to smoking as reported in the literature (Centers for Disease Control and Prevention, 2010). Covariates were used to adjust for respondent demographic and state characteristics in the multivariate model and weighting by sexual orientation was not conducted due to a lack of agreement in the literature on sexual minority prevalence (Gates, 2011). Analyses were conducted in Stata v11.0.

Results

Sexual minority men and women had a higher prevalence of current smoking than their heterosexual peers (Table 1). Among women, bisexual women had the highest proportion of current smokers, followed by lesbian women, and heterosexual women at the lowest proportion ($p < 0.001$). Results among men followed the same pattern.

We found that sexual minority women differed in advertising receptivity, with advertising receptivity increasing from a very low proportion of heterosexual women, to a higher level in lesbians ($p = 0.03$ comparing lesbian to heterosexual) to the highest proportion in bisexual women ($p < 0.001$ comparing bisexual to heterosexual). Sexual minority women smokers differed in age of first cigarette, with the bisexuals having started at the youngest age, followed by lesbians, followed by heterosexuals at the oldest age. Both bisexuals and lesbians were significantly different from heterosexuals ($p < 0.001$). Differences in nondaily smoking, cigarettes smoked per day, nicotine dependence, quit attempts, and desire to quit were not significant.

Sexual minority males also had a higher prevalence of smoking than their heterosexual counterparts. Gay male smokers were older at the time of smoking their first cigarette when compared to their heterosexual counterparts ($p = 0.034$). There was a significant difference between bisexual men and gay men in that gay men were less receptive to advertising ($p < 0.001$), and between bisexual men and heterosexual men in terms of increased odds for bisexuals of current smoking ($p < 0.001$) and receptivity to advertising ($p < 0.001$).There were no statistically significant differences between gay men and heterosexual men, or bisexual men and heterosexual men on nondaily smoking, cigarettes per day, nicotine dependence, desire to quit, or past quit attempts.

When controlling for age, race, education, income, and geographic region, being a bisexual woman versus heterosexual woman was significantly associated with younger age at first cigarette, smoking intensity, decreased past quit attempts and increased nicotine dependence. Bisexual women were approximately 1.4 years younger when they smoked their first cigarette. Bisexual women smoked 6.7 cigarettes more per day than heterosexual women, and lesbians had 2.3 times increased odds of being nicotine dependent when compared to heterosexual women. In the regression analysis, gay men and bisexual men did not differ from heterosexual men on any of the smoking characteristics.

Discussion

Consistent with a large body of literature (Conron et al., 2010; Gruskin et al., 2007; Lee et al., 2009, 2011; Pizacani et al., 2009), we confirmed that LGB individuals have higher prevalence of smoking than their heterosexual peers. Adding to the literature, we examined not only smoking prevalence in LGB subgroups but also smoking characteristics and behaviors related to smoking initiation and cessation. We found that bisexual women smokers are at particularly high risk, with younger age of first cigarette, more cigarettes smoked per day, and fewer past quit attempts compared to heterosexual women. This finding complements the work of Trocki and colleagues, who demonstrated in a subgroup of

the year 2000 National Alcohol Survey that compared to completely heterosexual women, heterosexually identified women with female partners and bisexual women both had increased odds of smoking. In that population-based study the odds ratio for lesbian women versus heterosexual women were not significant (Trocki et al., 2009). Similarly, Tang et al. reported on smoking prevalence in the population-based California Health Interview Study, and found that current smoking was highest among bisexuals, intermediate among lesbians and gay men, and lowest among heterosexuals without comparing the minority groups to each other (Tang et al., 2004). Our study adds to the literature by confirming this finding with more recent data, by directly comparing sexual minority subgroups, and by including several correlates of smoking behavior and health effects. The finding of highest odds of smoking behaviors among bisexual women also complements other studies that demonstrate increased risk for other types of risky health behaviors (Busseri et al., 2008; Corliss et al., 2013; Kann et al., 2011; Tornello et al.). For example, in a longitudinal study of U.S. adolescents, bisexual females were the most likely to report illicit drug use (Corliss et al., 2013) compared to completely heterosexual females.

Our study emphasizes the need to understand reasons behind health disparities of bisexual women in order to effectively tailor interventions to this unique population. It is theorized that bisexual individuals may face both unique internal stressors (e.g., internalized homophobia) and external stressors (e.g., lack of membership in heterosexual or LGB communities) (Hatzenbuehler, 2009). In contrast with women, bisexual men in this study did not have higher odds for smoking when controlling for other factors. This finding is consistent with other studies that differentiate between bisexual men and women and find a lower magnitude of behavioral health differences between bisexual and heterosexual men as compared to bisexual and heterosexual women (Conron et al., 2010; Trocki et al., 2009). There are multiple theories exploring bisexual disparities, generally based on the minority stress model (Meyer, 2003), which suggests that discrimination and stigmatization directly harm mental health and contribute to risky health behaviors among sexual minorities (Blosnich et al., 2013; Meyer, 2003). Differences in bisexual risk factors between men and women could have a number of contributing factors (e.g., that men's sexual orientation may be less ambiguous than women's and/or less fluid over the lifespan) (Vrangalova and Savin-Williams, 2012), and this dynamic experience of sexuality may result in bisexual women's lack of identification with either lesbians or heterosexual women. These differences, however, remain theoretical. Although the sexual identity development of women has a strong research basis (Brooks and Quina, 2009; Diamond, 2000, 2008), studies of sexual development focusing on men and boys (Floyd and Bakeman, 2006) are sparse, making the interpretation of bisexual gender differences problematic. Few data exist on the recruitment or retention rates of sexual minority individuals in cessation services. One published study has reported secondary data analysis results from two non-tailored cessation treatment programs suggesting that sexual minority smokers are as likely to quit or abstain as heterosexual smokers (Grady et al., 2014). The present study addresses this gap by providing the first national examination of smoker characteristics among sexual minority subgroups.

These findings also have implications for tobacco control practice. Interventions are needed to prevent smoking initiation and promote smoking cessation among LGB individuals. Anti-

tobacco industry messages tailored to this population could help reduce advertising receptivity. It is also necessary to support current LGB smokers in their efforts to quit. In our study, despite the much higher smoking prevalence among lesbian, gay and bisexual men and women as compared to their heterosexual peers, there was no difference between lesbian, gay and heterosexual individuals in their attempts to quit smoking. There is a small but growing body of literature on tailoring smoking cessation services to LGB smokers (Levinson et al., 2012; Matthews et al., 2013). The results of this study indicate that it may be necessary to specifically target and/or tailor smoking cessation services for bisexual women.

Study limitations

The results of this study should be interpreted in light of several limitations. The NATS survey contained only one measure of sexual orientation. While this single self-report orientation item is commonly used in other studies, some researchers suggest that this measure is limited for categorizing sexual minority groups (Austin et al., 2007; Brooks and Quina, 2009; McCabe et al., 2012). The NATS also does not separate the question of transgender identity from the sexual orientation measure, meaning that transgender participants had to choose whether to report their gender identity or their sexual orientation. Given the small sample size of transgender participants, we were unable to reliably include transgender individuals in any analyses. Similarly, these data do not include measures of other LGB characteristics, such as “outness” (degree to which others are aware of one's sexual orientation), that could provide additional context for understanding differences across LGB groups (Meyer, 2003; Rosario et al., 2009). However, to our knowledge, this is the first nationally representative study with comparisons of LGB participants on these smoking characteristics.

Conclusion

Sexual minorities, and bisexual women in particular, face unique risk factors for cigarette smoking. Sexual minority individuals smoke at higher rates than heterosexuals and yet similarly desire to quit. Further research is needed to determine how tobacco prevention and cessation efforts might be tailored to address particular needs of sexual minority smokers.

References

Austin SB, Ziyadeh N, Fisher LB, Kahn JA, Colditz GA, Frazier AL. Sexual orientation and tobacco use in a cohort study of US adolescent girls and boys. JAMA Pediatr. 2004; 158:317–322.

Austin SB, Conron K, Patel A, Freedner N. Making sense of sexual orientation measures: findings from a cognitive processing study with adolescents on health survey questions. J LGBT Health Res. 2007; 3:55–65. [PubMed: 18029316]

Blosnich J, Lee JGL, Horn K. A systematic review of the aetiology of tobacco disparities for sexual minorities. Tob Control. 2013; 22:66–73. [PubMed: 22170335]

Brooks KD, Quina K. Women's sexual identity patterns: differences among lesbians, bisexuals, and unlabeled women. J Homosex. 2009; 56:1030–1045. [PubMed: 19882425]

Busseri MA, Willoughby T, Chalmers H, Bogaert AF. On the association between sexual attraction and adolescent risk behavior involvement: examining mediation and moderation. Dev Psychol. 2008; 44:69–80. [PubMed: 18194006]

Centers for Disease Control Prevention. Vital signs: current cigarette smoking among adults age > or = 18 years–United States, 2009. Morb Mortal Wkly Rep. 2010; 59:1135–1140.

Conron KJ, Mimiaga MJ, Landers SJ. A population-based study of sexual orientation identity and gender differences in adult health. Am J Public Health. 2010; 100:1953–1960. [PubMed: 20516373]

Corliss HL, Wadler BM, Jun HJ, et al. Sexual-orientation disparities in cigarette smoking in a longitudinal cohort study of adolescents. Nicotine Tob Res. 2013; 15:213–222. [PubMed: 22581940]

Diamond LM. Sexual identity, attractions, and behavior among young sexual-minority women over a 2-year period. Dev Psychol. 2000; 36:241–250. [PubMed: 10749081]

Diamond LM. Female bisexuality from adolescence to adulthood: results from a 10-year longitudinal study. Dev Psychol. 2008; 44:5–14. [PubMed: 18194000]

Dilley JA, Spigner C, Boysun MJ, Dent CW, Pizacani BA. Does tobacco industry marketing excessively impact lesbian, gay and bisexual communities? Tob Control. 2008; 17:385–390. [PubMed: 18723561]

Everett SA, Warren CW, Sharp D, Kann L, Husten CG, Crossett LS. Initiation of cigarette smoking and subsequent smoking behavior among U.S. high school students. Prev Med. 1999; 29:327–333. [PubMed: 10564623]

Floyd FJ, Bakeman R. Coming-out across the life course: implications of age and historical context Arch. Sex Behav. 2006; 35:287–296.

Gates, G. How Many People Are Lesbian, Gay, Bisexual, and Transgender. The Williams Institute; 2011.

Grady E, Humfleet G, Delucchi J, Resu V, Munoz R, Hall S. Smoking cessation outcomes among sexual and gender minority and nonminority smokers in extended smoking treatments. Nicotine Tob Res. 2014; 16:1207–1215. [PubMed: 24727483]

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; 97:1496–1502. [PubMed: 17600265]

Hatzenbuehler ML. How does sexual minority stigma “get under the skin”? A psychological mediation framework Psychol Bull. 2009; 135:707–730.

Kann L, Olsen EO, McManus T, et al. Sexual identity, sex of sexual contacts, and health-risk behaviors among students in grades 9–12—youth risk behavior surveillance, selected sites, United States, 2001-2009. MMWR Morb Mortal Wkly Rep. 2011; 60:1–133.

King BA, Dube SR, Tynan MA. Current tobacco use among adults in the United States: findings from the National Adult Tobacco Survey. Am J Public Health. 2012; 102:e93–e100. [PubMed: 22994278]

Kozlowski LT, Porter CQ, Orleans CT, Pope MA, Heatherton T. Predicting smoking cessation with self-reported measures of nicotine dependence: FTQ, FTND, and HSI. Drug Alcohol Depend. 1994; 34:211–216. [PubMed: 8033758]

Lee JGL, Griffin GK, Melvin CL. Tobacco use among sexual minorities in the USA, 1987 to May 2007: a systematic review. Tob Control. 2009; 18:275–282. [PubMed: 19208668]

Lee JGL, Goldstein AO, Ranney LM, Crist J, McCullough A. High tobacco use among lesbian, gay, and bisexual populations in West Virginian bars and community festivals. Int J Environ Res Public Health. 2011; 8:2758–2769. [PubMed: 21845157]

Levinson AH, Hood N, Mahajan R, Russ R. Smoking cessation treatment preferences, intentions, and behaviors among a large sample of Colorado gay, lesbian, bisexual, and transgendered smokers. Nicotine Tob Res. 2012; 14:910–918. [PubMed: 22259147]

Ling PM, Neilands TB, Glantz SA. Young adult smoking behavior: a national survey. Am J Prev Med. 2009; 36:389–394. e2. [PubMed: 19269128]

Lovato, C.; Linn, G.; Stead, LF.; Best, A. Impact of Tobacco Advertising and Promotion on Increasing Adolescent Smoking Behaviours. The Cochrane Collaboration: 2008. Review

Lovato, C.; Watts, A.; Stead, LF. Impact of Tobacco Advertising and Promotion on Increasing Adolescent Smoking Behaviours. The Cochrane Collaboration: 2011. Review

Matthews AK, Li CC, Kuhns LM, Tasker T, Cesario JA. Results from a community-based smoking cessation treatment program for LGBT smokers. J Environ Public Health. 2013:1–9.

McCabe S, Hughes T, Bostwick W, Morales M, Boyd C. Measurement of sexual identity in surveys: implications for substance abuse research. Arch Sex Behav. 2012; 41:649–657. [PubMed: 21573706]

Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. Psychol Bull. 2003; 129:674–697. [PubMed: 12956539]

Office of Smoking and Health. 2009-2010 National Adult Tobacco Survey weighting methodology report. National Center for Chronic Disease Prevention, Centers for Disease Control and Prevention. RTI International; 2010.

Pizacani BA, Rohde K, Bushore C, et al. Smoking-related knowledge, attitudes and behaviors in the lesbian, gay and bisexual community: a population-based study from the U.S. Pacific Northwest. Prev Med. 2009; 48:555–561. [PubMed: 19306893]

Remafedi G, Jurek AM, Oakes JM. Sexual identity and tobacco use in a venue-based sample of adolescents and young adults. Am J Prev Med. 2008; 35:S463–S470. [PubMed: 19012840]

Rosario M, Schrimshaw EW, Hunter J. Disclosure of sexual orientation and subsequent substance use and abuse among lesbian, gay, and bisexual youths: critical role of disclosure reactions. Psychol Addict Behav. 2009; 23:175–184. [PubMed: 19290704]

Schane RE, Ling PM, Glantz SA. Health effects of light and intermittent smoking: a review. Circulation. 2010; 121:1518–1522. [PubMed: 20368531]

Smit ES, Fidler JA, West R. The role of desire, duty, and intention in predicting attempts to quit smoking. Addiction. 2011; 106:844–851. [PubMed: 21205048]

Smith EA, Thomson K, Offen N, Malone RE. “If you know you exist, it's just marketing poison”: meanings of tobacco industry targeting in the lesbian, gay, bisexual, and transgender community. Am J Public Health. 2008; 98:996–1003. [PubMed: 18445800]

Stevens P, Carlson LM, Hinman JM. An analysis of tobacco industry marketing to lesbian, gay, bisexual, and transgender (LGBT) populations: strategies for mainstream tobacco control and prevention. Health Promot Pract. 2004; 5:129S–134S. [PubMed: 15231106]

Tang H, Greenwood GL, Cowling DW, Llyod JC, Roeseler AG, Bal DG. Cigarette smoking among lesbians, gays, and bisexuals: how serious a problem? Cancer Causes Control. 2004; 15:797–803. [PubMed: 15456993]

Tornello SL, Riskind RG, Patterson CJ. Sexual orientation and sexual and reproductive health among adolescent young women in the United States. Journal of Adolescent Health.

Trocki KF, Drabble LA, Midanik LT. Tobacco, marijuana, and sensation seeking: comparisons across gay, lesbian, bisexual, and heterosexual groups. Psychol Addict Behav. 2009; 23:620–631. [PubMed: 20025368]

U.S. Department of Health and Human Services. 2004 Surgeon General's Report—the health consequences of smoking. Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion; Atlanta, GA: 2004.

U.S. Department of Health and Human Services. 2010 Surgeon General's Report—How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking Attributable Disease. Public Health Service, Office of the Surgeon General; Rockville, MD: 2010.

Vrangalova Z, Savin-Williams R. Mostly heterosexual and mostly gay/lesbian: evidence for new sexual orientation identities. Arch Sex Behav. 2012; 41:85–101. [PubMed: 22327566]

Table 1

Self-reported sexual orientation of female and male smokers in the National Adult Tobacco Survey, 2010.

Sexual orientation	Females		Males	
	Total n = 71,256	Smokers n = 9422	Total n = 45,984	Smokers n = 7363
	n (% of total)	n (% of orientation)	n (% of total)	n (% of orientation)
Heterosexual[a]	65,739 (92.96%)	8691 (13.22%)	42,663 (92.78%)	6773 (15.88%)
Lesbian or gay male[a]	692 (0.97%)	155 (22.40%)	876 (1.91%)	227 (25.91%)
Bisexual[a]	491 (0.69%)	157 (31.98%)	276 (0.60%)	93 (33.70%)
Transgender	45 (0.06%)	5 (11.11%)	50 (0.11%)	13 (26.00%)
Don't understand	407 (0.57%)	19 (4.67%)	203 (0.44%)	38 (18.72%)
Don't know/not sure	393 (0.55%)	30 (7.63%)	196 (0.43%)	30 (15.31%)
Refused	3398 (4.77%)	351 (10.33%)	1677 (3.65%)	184 (10.97%)
Other	91 (0.13%)	14 (15.38%)	43 (0.09%)	5 (11.63%)
Total study population	66,922	9003 (13.45%)	43,815	7093 (16.19%)

[a]Indicates inclusion in the study population.

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Table 2a

Smoking and demographic characteristics by sexual orientation of female smokers in the United States, 2010.

Characteristics	Lesbian n = 692 n (%) or mean (SD)	Bisexual n = 491 n (%) or mean (SD)	Heterosexual n = 65,739 n (%) or mean (SD)	Lesbian vs. heterosexual	Bisexual vs. heterosexual	Lesbian vs. bisexual
Age group						
18–24	40 (5.78%)	121 (24.64%)	2353 (3.58%)	**	***	***
25–34	83 (11.99%)	112 (22.81%)	6749 (10.27%)	ns	***	***
35–54	344 (49.71%)	158 (32.18%)	22,489 (34.21%)	***	ns	***
55 and older	220 (31.79%)	93 (18.94%)	32,764 (49.84%)	***	***	***
Race/ethnicity						
White, non-Hispanic	556 (80.35%)	340 (69.25%)	54,680 (83.18%)	ns	*	ns
Black, non-Hispanic	56 (8.09%)	43 (8.76%)	5032 (7.65%)	ns	ns	ns
Hispanic	34 (4.91%)	42 (8.55%)	2310 (3.51%)	ns	***	*
Other race and multiple races, non-Hispanic	38 (5.49%)	60 (12.22%)	3235 (4.92%)	ns	***	***
Annual income						
Less than $30,000	125 (18.06%)	153 (31.16%)	13,845 (21.06%)	ns	***	***
$30,000 to $49,999	137 (19.80%)	120 (24.45%)	14,028 (21.34%)	ns	ns	ns
$50,000 or more	398 (57.51%)	176 (35.85%)	30,454 (46.33%)	**	**	***
Highest education attained						
Less than high school	21 (3.03%)	42 (8.55%)	4190 (6.37%)	**	ns	***
High school	83 (11.99%)	106 (21.59%)	14,759 (22.45%)	***	ns	***
Some college	97 (14.02%)	100 (20.37%)	10,989 (16.72%)	ns	ns	*
College degree or more	491 (70.95%)	243 (49.49%)	35,801 (54.46%)	***	ns	***
Region						
Northeast	184 (26.59%)	98 (19.96%)	11,772 (17.91%)	***	ns	*
Midwest	97 (14.02%)	91 (18.53%)	13,433 (20.43%)	***	ns	ns
South	236 (34.10%)	161 (32.79%)	26,899 (40.92%)	*	*	ns
West	175 (25.29%)	141 (28.72%)	13,635 (20.74%)	*	**	ns
Current smoking[a]	155 (22.40%)	157 (31.98%)	8691 (13.22%)	***	***	**
Advertising receptivity[e]	13 (1.88%)	32 (6.52%)	445 (0.68%)	***	***	***

Characteristics	Lesbian n = 692 n (%) or mean (SD)	Bisexual n = 491 n (%) or mean (SD)	Heterosexual n = 65,739 n (%) or mean (SD)	Lesbian vs. heterosexual	Bisexual vs. heterosexual	Lesbian vs. bisexual
Mean age at first cigarette[f]	15.36 (SD = 4.41)	14.61 (SD = 4.76)	16.57 (SD = 5.00)	**	***	ns
Nondaily smoking[d]	34 (21.94%)	35 (22.29%)	1781 (20.49%)	ns	ns	ns
Mean cigarettes per day[c]	16.14 (SD = 10.44)	16.27 (SD = 10.30)	15.88 (SD = 9.30)	ns	ns	ns
Nicotine dependence (time to first cigarette)[b]	77 (49.68%)	88 (56.05%)	4339 (49.93%)	ns	ns	ns
Wants to quit smoking for good	100 (64.52%)	92 (58.60%)	5503 (63.32%)	ns	ns	ns
Mean past quit attempts	8.59 (SD = 14.19)	7.41 (SD = 13.75)	7.46 (SD = 12.17)	ns	ns	ns

Note: chi square and t-tests for significance were conducted to examine the association between smoker characteristics and sexual orientation. ns = not significant

[a] Current smoker = smoked at least 100 cigarettes in their entire life and report smoking “every day” or “some days.”

[b] Nicotine dependence = time to first cigarette is ≤30 min after waking.

[c] Nondaily smokers were asked the number of cigarettes per day on the days cigarettes were smoked.

[d] Nondaily smoking = smoking on “some days.”

[e] Advertising receptivity was defined as whether smokers were very or somewhat likely to use a tobacco company promotional item. Only those aged 18–29 were asked this item, therefore results only include respondents in this age range.

[f] Age in years at which the participant smoked first whole cigarette.

* p < .05.

** p<.01.

*** p<.001.

Table 2b

Smoking and demographic characteristics by sexual orientation of male smokers in the United States, 2010.

Characteristics	Gay male n = 876 n (%) or mean (SD)	Bisexual n = 276 n (%) or mean (SD)	Heterosexual n = 42,663 n (%) or mean (SD)	Gay male vs. heterosexual	Bisexual vs. heterosexual	Gay male vs. bisexual
Age group						
18–24	53 (6.05%)	39 (14.13%)	2316 (5.43%)	ns	***	***
25–34	85 (9.70%)	27 (9.78%)	4459 (10.45%)	ns	ns	ns
35–54	435 (49.66%)	79 (28.62%)	15,146 (35.50%)	***	ns	***
55 and older	299 (34.13%)	129 (46.74%)	20,326 (47.64%)	***	ns	*
Race/ethnicity						
White, non-Hispanic	706 (80.59%)	197 (71.38%)	35,509 (83.23%)	ns	ns	ns
Black, non-Hispanic	60 (6.85%)	35 (12.68%)	2671 (6.26%)	ns	***	**
Hispanic	62 (7.08%)	18 (6.52%)	1594 (3.74%)	***	*	ns
Other race and multiple races, non-Hispanic	40 (4.57%)	24 (8.70%)	2466 (5.78%)	ns	ns	*
Annual income						
Less than $30,000	143 (16.32%)	73 (26.45%)	6462 (15.15%)	ns	***	**
$30,000 to $49,999	181 (20.66%)	71 (25.72%)	8887 (20.83%)	ns	ns	ns
$50,000 or more	517 (59.02%)	108 (39.13%)	24,166 (56.64%)	ns	**	**
Highest education attained						
Less than high school	22 (2.51%)	31 (11.23%)	2775 (6.50%)	***	**	***
High school	141 (16.10%)	60 (21.74%)	9779 (22.92%)	***	ns	ns
Some college	129 (14.73%)	47 (17.03%)	6065 (14.22%)	ns	ns	ns
College degree or more	584 (66.67%)	138 (50.00%)	24,044 (56.36%)	**	ns	***
Region						
Northeast	208 (23.74%)	62 (22.46%)	7849 (18.40%)	**	ns	ns
Midwest	120 (13.70%)	42 (15.22%)	8911 (20.89%)	***	ns	ns
South	359 (40.98%)	102 (36.96%)	16,228 (38.04%)	ns	ns	ns
West	189 (21.58%)	70 (25.36%)	9675 (22.68%)	ns	ns	ns
Current smoking[a]	227 (25.91%)	93 (33.70%)	6773 (15.88%)	***	***	ns
Advertising receptivity[e]	9 (1.03%)	13 (4.71%)	710 (1.66%)	ns	***	***
Mean age at first cigarette[f]	16.12 (SD = 4.80)	15.80 (SD = 4.98)	15.46 (SD = 4.60)	*	ns	ns

Characteristics	Gay male n = 876 n (%) or mean (SD)	Bisexual n = 276 n (%) or mean (SD)	Heterosexual n = 42,663 n (%) or mean (SD)	Gay male vs. heterosexual	Bisexual vs. heterosexual	Gay male vs. bisexual
Nondaily smoking[d]	66 (29.07%)	21 (22.58%)	1502 (22.18%)	ns	ns	ns
Mean cigarettes per day[c]	18.38 (SD = 9.70)	19.09 (SD = 12.27)	18.78 (SD = 10.73)	ns	ns	ns
Nicotine dependence (time to first cigarette)[b]	124 (54.63%)	49 (52.69%)	3424 (50.55%)	ns	ns	ns
Wants to quit smoking for good	152 (66.96%)	54 (58.06%)	4075 (60.17%)	ns	ns	ns
Mean past quit attempts	9.30 (SD = 15.60)	8.64 (SD = 16.96)	8.86 (SD = 14.15)	ns	ns	ns

Note: chi square and t-tests for significance were conducted to examine the association between smoker characteristics and sexual orientation. ns = not significant

[a] Current smoker = smoked at least 100 cigarettes in their entire life and report smoking “every day” or “some days.”

[b] Nicotine dependence = time to first cigarette is ≤30 min after waking.

[c] Nondaily smokers were asked the number of cigarettes per day on the days cigarettes were smoked.

[d] Nondaily smoking = smoking on “some days.”

[e] Advertising receptivity was defined as whether smokers were very or somewhat likely to use a tobacco company promotional item. Only those aged 18–29 were asked this item, therefore results only include respondents in this age range.

[f] Age in years at which the participant smoked first whole cigarette.

* p < .05.

** p<.01.

*** p<.001.

Table 3

Associations between sexual orientation and smoker characteristics among female smokers in the United States, 2010.

Independent variables	Logistic regressions Adjusted odds ratio (95% confidence interval)				Linear regressions Coefficient (95% CI)		Negative binomial regression Coefficient (95% CI)
	Advertising receptivity	Nondaily smoking	Nicotine dependence	Wants to quit	Age at first cigarette	Smoking intensity	Past quit attempts
Sexual orientation							
Lesbian	0.455 (0.027–7.732)	0.402* (0.189–0.855)	2.303* (1.038–5.110)	0.524 (0.254–1.084)	0.208 (−1.085–0.501)	0.557 (−2.845–3.959)	0.017 (−0.343–0.377)
Bisexual	6.368 (1.467–27.780)	1.070 (0.308–3.721)	1.672 (0.668–4.183)	0.480 (0.214–1.079)	−1.402** (−2.45 to −0.345)	6.715** (2.523–10.907)	−0.617*** (−0.897 to −0.338)
Heterosexual	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Age group							
18 to 24	0.927 (0.475–1.808)	1.707* (1.044–2.792)	0.439** (0.272–0.711)	0.564* (0.363–0.876)	−1.552*** (−2.175 to −0.929)	−1.958* (−3.609 to −0.306)	−0.263* (−0.492 to −0.035)
25 to 34	Omitted	1.210 (0.860–1.702)	0.647** (0.489–0.856)	0.984 (0.709–1.365)	−0.479* (−0.937 to −0.020)	−3.109*** (−4.426 to −1.791)	−0.101 (−0.290–0.088)
35 to 54	Referent	Referent	Referent	Referent	Referent	Referent	Referent
55 and older	Omitted	1.187 (0.921–1.528)	0.944 (0.767–1.164)	0.703** (0.565–0.874)	2.194*** (1.708–2.679)	0.709 (−0.398–1.815)	0.027 (−0.149–0.202)
Race/ethnicity							
White, non-Hispanic	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Black, non-Hispanic	0.494 (0.186–1.310)	1.592** (1.123–2.257)	0.963 (0.668–1.389)	2.455*** (1.664–3.623)	2.465*** (1.892–3.038)	−3.156*** (−4.691 to −1.621)	−0.309** (−0.517–0.101)
Hispanic	0.266 (0.040–1.762)	1.396 (0.679–2.871)	0.788 (0.386–1.608)	0.891 (0.416–1.911)	0.644 (−0.696–1.984)	−1.792* (−5.377–1.793)	0.029 (−0.364–0.423)
Other race and multiple races, non-Hispanic	1.066 (0.228–4.981)	1.239 (0.783–1.963)	0.884 (0.569–1.373)	0.752 (0485–1.167)	0.827 (−0.145–1.798)	−2.100 (−4.711–0.512)	−0.132 (−0.364–0.423)
Annual income							
Less than $30,000	1.749 (0.864–3.541)	0.925 (0.655–1.305)	1.182 (0.907–1.539)	0.651** (0.485–0.875)	−0.126 (−0.562–0.309)	0.374 (−0.769–1.517)	−0.026 (−0.237–0.185)
$30,000 to $49,999	Referent	Referent	Referent	Referent	Referent	Referent	Referent
$50,000 or more	1.350 (0.605–3.011)	1.236 (0.923–1.654)	0.713** (0.558–0.911)	0.924 (0.703–1.216)	0.268 (−0.129–0.665)	−0.428 (−1.485–0.628)	0.031 (−0.151–0.213)
Highest education attained							
Less than high school	0.855 (0.344–2.124)	0.700 (0.455–1.077)	1.254 (0.890–1.766)	0.988 (0.679–1.438)	−0.858** (−1.414–0.303)	2.071* (0.406–3.736)	−0.061 (−0.340–0.218)
High school	0.565 (0.235–1.363)	0.648** (0.485–0.865)	1.271* (1.007–1.604)	0.891 (0.694–1.144)	−0.304 (−0.703 to −0.095)	0.756 (−0.375–1.888)	−0.127 (−0.282 to −0.028)
Some college	0.441 (0.158–1.229)	0.786 (0579–1.068)	1.321* (1.013–1.723)	1.136 (0.844–1.529)	−0.116 (−0.554–0.322)	0.299 (−0.918–1.516)	−0.026 (−0.180–0.128)
College degree or more	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Region							

Independent variables	Logistic regressions Adjusted odds ratio (95% confidence interval)				Linear regressions Coefficient (95% CI)		Negative binomial regression Coefficient (95% CI)
	Advertising receptivity	Nondaily smoking	Nicotine dependence	Wants to quit	Age at first cigarette	Smoking intensity	Past quit attempts
Northeast	0.392* (0.156–0.986)	0.893 (0.627–1.270)	1.282 (0.940–1.749)	1.169 (0.836–1.636)	−0.300 (−0.770–0.169)	−0.195 (−1.606–1.216)	−0.061 (−0.289–0.167)
Midwest	Referent	Referent	Referent	Referent	Referent	Referent	Referent
South	0.694 (0.332–1.454)	0.631 (0.682–1.261)	1.231 (0.967–1.556)	0.907 (0.697–1.179)	0.159 (−0.259–0.576)	1.372* (0.155–2.59)	−0.118 (−0.288–0.053)
West	1.028 (0.411–2.570)	0.974 (0.624–1.518)	0.787 (0.538–1.153)	0.815 (0.558–1.190)	−0.109 (−0.699–0.482)	-1.993* (-3.572 to -0.414)	−0.076 (−0.354–0.202)
N	1586	8059	7960	7707	8034	6557	6918

* p < .05.

** p < .01.

*** p < .001.

Table 4

Associations between sexual orientation and smoker characteristics among male smokers in the United States, 2010.

Independent variables	Logistic regressions Adjusted odds ratio (95% confidence interval)				Linear regressions Coefficient (95% CI)		Negative binomial regression Coefficient (95% CI)
	Advertising receptivity	Nondaily smoking	Nicotine dependence	Wants to quit	Age at first cigarette	Smoking intensity	Past quit attempts
Sexual orientation							
Gay	1.865 (0.465–7.480)	1.054 (0.533–2.083)	1.395 (0.768–2.534)	0.767 (0.379–1.551)	−0.446 (−1.462–0.570)	−1.947 (−4.085–0.191)	0.242 (−0.551–1.035)
Bisexual	0.582 (0.077–4.396)	2.039 (0.727–5.722)	1.208 (0.355–4.110)	0.985 (0.269–3.614)	0.886 (−0.379–2.151)	−2.399 (−8.697–3.900)	−0.526 (−1.286–0.234)
Heterosexual	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Age group							
18 to 24	1.382 (0.769–2.482)	1.785* (1.141–2.790)	0.617* (0.405–0.941)	0.427*** (0.284–0.642)	−1.547*** (−2.246–0.847)	−2.051 (−7.928–3.825)	0.280 (−0.045–0.605)
25 to 34	Omitted	1.894*** (1.325–2.705)	0.657* (0.462–0.934)	0.751 (0.530–1.063)	−0.397 (−1.027–0.234)	−4.563*** (−6.169–2.956)	0.034 (−0.182–0.250)
35 to 54	Referent	Referent	Referent	Referent	Referent	Referent	Referent
55 and older	Omitted	1.238 (0.863–1.774)	0.836 (0.640–1.094)	0.834 (0.637–1.092)	−0.354 (−0.901–0.194)	−0.152 (−1.563–1.258)	0.142 (−0.019–0.304)
Race/ethnicity							
White, non-Hispanic	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Black, non-Hispanic	0.545 (0.196–1.515)	2.539*** (1.672–3.856)	0.435*** (0.297–0.636)	1.955** (1.214–3.148)	2.393*** (1.728–3.057)	−7.002*** (−9.180 to −4.825)	0.181 (−0.102–0.464)
Hispanic	0.763 (0.224–2.600)	5.667*** (2.811–11.423)	0.410* (0.176–0.952)	1.085 (0.513–2.294)	0.167 (−1.273–1.607)	1.242 (−8.547–11.031)	−0.571* (−1.060–0.082)
Other race and multiple races, non-Hispanic	0.973 (0.378–2.507)	0.712 (0.430–1.179)	0.875 (0.547–0.952)	0.873 (0.534–1.428)	0.172 (−0.578–0.921)	−0.558 (−3.609–2.494)	0.346 (−0.009–0.701)
Annual income							
Less than $30,000	0.615 (0.293–1.292)	0.855 (0.563–1.298)	1.082 (0.791–1.481)	1.153 (0.816–1.627)	−0.492 (−1.112–0.127)	0.820 (−2.406–4.046)	−0.006 (−0.205–0.217)
$30,000 to $49,999	Referent	Referent	Referent	Referent	Referent	Referent	Referent
$50,000 or more	0.934 (0.490–1.781)	1.425* (1.010–2.010)	0.630* (0.438–0.906)	1.007 (0.714–1.422)	−0.020 (−0.557–0.517)	−0.112 (−1.774–1.549)	0.046 (−0.160–0.252)
Highest education attained							
Less than high school	1.284 (0.485–3.398)	0.432** (0.264–0.707)	1.523* (1.028–2.258)	1.132 (0.738–1.736)	−1.963*** (−2.615 to −1.311)	4.448** (1.794–7.102)	−0.230 (−0.495–0.035)
High school	0.841 (0.387–1.823)	0.677* (0.481–0.953)	1.316 (0.929–1.864)	0.948 (0.670–1.341)	−0.724* (−1.332 to −0.116)	0.865 (−0.923–2.654)	−0.370*** (−0.561 to −0.179)
Some college	1.090 (0.443–2.681)	0.889 (0.616–1.282)	0.934 (0.667–1.306)	1.118 (0.759–1.649)	−0.420 (−0.960 to −0.120)	0.549 (−0.986–2.084)	−0.164 (−0.384 to -0.056)
College degree or more	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Region							
Northeast	1.724 (0.711–4.185)	0.737 (0.469–1.158)	0.876 (0.610–1.258)	1.320 (0.898–1.940)	0.032 (−0.694–0.759)	2.419 (−2.115–6.953)	0.119 (−0.150–0.387)

Independent variables	Logistic regressions Adjusted odds ratio (95% confidence interval)				Linear regressions Coefficient (95% CI)		Negative binomial regression Coefficient (95% CI)
	Advertising receptivity	Nondaily smoking	Nicotine dependence	Wants to quit	Age at first cigarette	Smoking intensity	Past quit attempts
Midwest	Referent	Referent	Referent	Referent	Referent	Referent	Referent
South	0.614 (0.306–1.234)	1.492* (1.053–2.115)	1.066 (0.786–1.446)	0.754 (0.556–1.021)	−0.201 (−0.705–0.303)	1.012 (−0.329–2.353)	−0.007 (−0.217–0.203)
West	0.628 (0.250–1.578)	1.305 (0.828–2.060)	0.740 (0.503–1.088)	1.170 (0.777–1.763)	0.582 (−0.087–1.252)	−3.371* (−5.981–0.761)	0.074 (−0.177–0.324)
N	1792	6528	6430	6254	6483	5291	5493

* p < .05.

** p < .01.

*** p < .001.