



Published in final edited form as:

J Stud Alcohol. 2005 September ; 66(5): 620–629.

Assessment of Difference in Dimensions of Sexual Orientation: Implications for Substance Use Research in a College-Age Population*

SEAN ESTEBAN McCABE, PH.D., M.S.W.[†], TONDA L. HUGHES, PH.D., R.N., F.A.A.N.[†], WENDY BOSTWICK, M.P.H.[†], and CAROL J. BOYD, PH.D., R.N., F.A.A.N.

Substance Abuse Research Center, University of Michigan, 2025 Traverwood, Suite C. Ann Arbor. Michigan 48105-2194

Abstract

Objective—The present research examines the associations between three distinct dimensions of sexual orientation and substance use in a random sample of undergraduate students.

Method—A Web-based survey was administered to students attending a large, midwestern research university in the spring of 2003. The sample consisted of 9,161 undergraduate students: 56% female, 68% white, 13% Asian, 6% black, 4% Hispanic and 9% other racial categories. Using multivariate logistic regression analyses, several measures of alcohol and other drug use were compared across three dimensions of sexual orientation: sexual identity, sexual attraction and sexual behavior.

Results—All three dimensions of sexual orientation were associated with substance use, including heavy episodic drinking, cigarette smoking and illicit drug use. Consistent with results of several other recent studies, “nonheterosexual” identity, attraction or behavior was associated with a more pronounced and consistent risk of substance use in women than in men.

Conclusions—Study findings suggest substantial variability in substance use across the three dimensions of sexual orientation and reinforce the importance of stratifying by gender and using multiple measures to assess sexual orientation. Study results have implications for future research and for interventions aimed at reducing substance use among college students.

In the past two decades, health research has increasingly focused on the relationship between sexual orientation and health. In the past 5 years alone, a number of major publications have signaled the movement of lesbian, gay and bisexual (LGB) health issues from the margins into the mainstream. Examples include the Institute of Medicine’s report, *Lesbian Health: Current Assessment and Directions for the Future* (Solarz, 1999) and the Substance Abuse and Mental Health Services Administration’s publication, *A Provider’s Introduction to Substance Abuse Treatment for Lesbian, Gay, Bisexual, and Transgender Individuals* (SAMHSA, 2001).

As with any nascent field of inquiry, researchers conducting studies on LGB health must grapple with a number of methodological issues. Of particular importance is the definition and measurement of sexual orientation. Like race/ethnicity and socioeconomic status, sexual

*This study was supported by the University of Michigan. The development of this manuscript was supported by funding from the National Institutes of Health grant R01 AA13328 to Tonda L. Hughes and by National Research Service Award T32 DA07293 to Wendy Bostwick.

[†]Correspondence may be sent to Sean Esteban McCabe at the above address, or via, plus@umich.edu.

Tonda L. Hughes is at the College of Nursing, National Center of Excellence in Women’s Health, University of Illinois at Chicago, Chicago, IL. Wendy Bostwick is at the University of Illinois at Chicago, Chicago, IL.

orientation is a complex construct that is difficult to measure. Despite a growing consensus that sexual orientation includes behavioral, affective (attraction or desire) and cognitive (identity) dimensions (Diamond, 2000; Hughes, 2005; Hughes and Eliason, 2002; Laumann et al., 1994; Solarz, 1999), researchers and others define and use these terms in an inconsistent manner. The lack of standard definitions and measures makes comparisons across studies difficult. For instance, a strictly behavioral measure of sexual orientation may be associated with different health risks than a measure of sexual identity or sexual attraction. The manner in which sexual orientation is defined and measured has important implications for health research and practice.

Alcohol and other drug (AOD) use represents the greatest cause of preventable death and injury among U.S. college students from 18 to 24 years of age (Hingson et al., 2002; Hingson et al., 2005; Perkins, 2002; Wechsler et al., 1994), and researchers recognize that the relationship between sexual orientation and substance use needs much more attention (e.g. Abbey, 2002; Dowdall and Wechsler, 2002; Perkins, 2002). Previous studies suggest that LGB college students are at higher risk than their heterosexual counterparts for substance use (e.g., Boyd et al., 2003; DeBord et al., 1998; Eisenberg and Wechsler, 2003; McCabe et al., 2003, 2004; Pope et al., 2001). To date, most college-based research has used a single measure of sexual orientation (sexual identity, sexual attraction or sexual behavior) or has not assessed sexual orientation at all. Although prior research shows a correlation between same-sex attraction, behavior and identity (Laumann et al., 1994; Meyer et al., 2002), findings also suggest different risks or levels of risk between samples recruited or analyzed based on different dimensions of sexual orientation (Chng and Geliga-Vargas, 2000; Gomez et al., 1996; Markovic et al., 2001; Scheer et al., 2003). Such findings emphasize the importance of better understanding the measurement of this construct.

A few studies have examined the relationship between sexual behavior and substance use among college students (e.g., Boyd et al., 2003; Eisenberg and Wechsler, 2003; Pope et al., 2001; Teter et al., 2003). For example, Eisenberg and Wechsler (2003) compared substance use in a nationally representative sample of college students based on self-reports of sexual behavior with same-gender, both-gender and other-gender partners. Among sexually active students, 94% reported having sex with other-gender partners only, 4% with both male and female partners and 2% with same-gender partners only. Undergraduate women who reported both male and female sexual partners were significantly more likely than women with only male partners to report heavy episodic drinking, cigarette smoking and marijuana use. Substance use did not differ between female students who reported exclusively same-gender partners and exclusively male partners. Neither male students who reported same-gender partners only nor those who reported both-gender partners were at higher risk for substance use than those with female partners only. In fact, men with only female partners were significantly more likely than those with both female and male partners to report heavy episodic drinking.

The relationship between sexual identity and substance use has also been examined in several college-based studies (e.g., Boyd et al., 2003; DeBord et al., 1998; McCabe et al., 2003, 2004). For example, DeBord and colleagues (1998) surveyed a random sample of college students over 4 years and found LGB students had higher levels of alcohol involvement than a matched comparison group of heterosexual students. Measures in DeBord et al.'s study included the Negative Alcohol Consequence scale, the Alcohol Dependence Symptoms scale, the quantity and frequency of alcohol intake in the past 30 days and a Heavy Drinking Composite score. Although alcohol use differed between LGB and heterosexual students, no differences were found between the two groups in illicit drug use. In a later study that analyzed findings by gender, McCabe and colleagues (2003) found no differences in alcohol use and heavy episodic drinking rates between college women who

identified as lesbian and bisexual, and those who identified as heterosexual. Lesbian and bisexual women were, however, significantly more likely than heterosexual women to smoke cigarettes in the past month and to use marijuana (before college, in the past month and in the past year), ecstasy (past year) and other illicit drugs (past month and past year). Gay and bisexual men were significantly *less* likely than heterosexual men to report heavy episodic drinking in the past 2 weeks but *more* likely to report marijuana use in the past year and ecstasy use before college.

Compared with research examining either identity-related or behavioral dimensions of sexual orientation, substantially less college-based substance use research has examined the role of sexual attraction among college students. However, Russell et al.'s (2002) study provides useful information about the association between sexual attraction and substance use among adolescents. In this nationally representative sample, substance use was compared in 13- to 18-year-old adolescents, based on reported lifetime romantic attraction (Russell et al., 2002). Adolescent males and females who were attracted to both genders were more likely than those with only other-gender attractions to report cigarette smoking, heavy drinking, alcohol-related problems, and marijuana and other illicit drug use. Adolescent females with same-gender attraction were more likely than females with only other-gender attractions to report getting drunk and using marijuana or other illicit drugs. In contrast, adolescent males with same-gender attraction were not at increased risk for substance use relative to males with only other-gender attractions.

A few studies of young women and men not in college have assessed more than one dimension of sexual orientation (e.g., Bontempo and D'Augelli, 2002; Scheer et al., 2003). Scheer and colleagues (2003) found that the AOD use behaviors among heterosexual women with both male and female partners were more similar to those of self-identified bisexuals than to heterosexual women with male partners only. These findings caution against drawing conclusions about sexual behavior based solely on a respondent's sexual identity or presuming that sexual behavior can be used as a satisfactory proxy for sexual identity.

Recent work suggests that all three dimensions of sexual orientation should be assessed whenever possible (Saewyc et al., 2004; Scheer et al., 2003). To date, no college-based studies have compared substance use behaviors across all three measures of sexual orientation. Although data regarding sexual orientation and substance use in noncollege student populations is helpful, research suggests that substance use differs between college students and their same-age peers not attending college (Johnston et al., 2003). To understand better how sexual orientation relates to substance use among college students, various measures of substance use were compared across three dimensions of sexual orientation: sexual identity, sexual attraction and sexual behavior. A large random sample of undergraduate students attending a midwestern public university was randomly selected and surveyed about their sexual orientation and substance use behaviors using a Web-based instrument.

Method

The Institutional Review Board approved the protocol for the present study, and all respondents gave informed consent prior to participation. The study was conducted during a 1-month period in March and April of 2003, drawing on a total population of 21,294 full-time undergraduate college students (10,860 women and 10,434 men). A random sample of 19,378 full-time undergraduate students was drawn from the Registrar's Office. The entire sample was sent an email message describing the study and inviting them to self-administer the Student Life Survey (SLS) by clicking on a link to access the Web survey using a unique

password. All participants were informed that a research firm unaffiliated with the University was contracted to set up the Web survey and to store and maintain data. University officials, faculty or staff were unable to access any contact information connected with the data of any respondent. The Web survey was maintained on a hosted secure Web site running under the secure sockets layer protocol to ensure respondent data were safely transmitted between the respondent's browser and the server. Finally, all respondents were sent information to clarify that participation was voluntary and to explain the relevance of the study and that responses would be kept confidential. Nonrespondents were sent up to three reminder emails. By participating in the survey, students became eligible for a sweepstakes that included several cash prizes ranging from \$100 to \$1,000. The final response rate was 47.3%, which is similar to the response rate obtained in a national study of 4-year colleges and universities (Wechsler et al., 2002).

To ensure that a Web-based mode of administration would not compromise either participation or the quality of the data, a randomized experiment was conducted in 2001. The experiment examined possible survey mode effects for self-reporting sexual orientation and substance use by comparing prevalence estimates between a Web-based survey and a U.S. mail-based survey; no differences were found (McCabe, 2004; McCabe et al., 2002, 2003). In addition, a telephone follow-up survey of 727 randomly selected nonrespondents from both survey modes was conducted to examine the reasons for nonresponse. The telephone follow-up study revealed that <1% of nonrespondents in each of the survey modes had concerns regarding confidentiality or anonymity (McCabe, 2004). Additional information regarding the study design and procedures for the Web-based survey is available elsewhere (McCabe, 2002, 2004; McCabe et al., 2002, 2003, 2004).

Instrument and measures

The 2003 SLS was developed and pilot tested in 1993 and contained substance use measures adapted from the Monitoring the Future study (Johnston et al., 2001), the CORE Alcohol and Drug Survey (Presley et al., 1996) and the College Alcohol Study (Wechsler et al., 2002). The SLS also included several sociodemographic questions, including three sexual orientation items adapted from the Chicago Health and Life Experiences of Women Study (e.g., Hughes, 2003; Hughes et al., 2001, 2005).

Sexual orientation

Sexual identity was measured with the following question: "How do you define your sexual identity? Would you say that you are ..." The response scale was as follows: (1) only homosexual/lesbian/gay, (2) mostly homosexual/lesbian/gay, (3) bisexual, (4) mostly heterosexual, (5) only heterosexual and (6) other (specify).

Sexual attraction was assessed using the following question: "Which of the following best describes who you are sexually attracted to?" The response scale was as follows: only women, (2) mostly women, (3) equally men and women, (4) mostly men and (5) only men.

Sexual behavior was defined based on the following question: "With whom have you had sex in your lifetime?" The response scale was as follows: (1) not sexually active, opposite sex, (3) same sex and (4) both sexes.

Substance use

Heavy episodic drinking was defined using the following question: "Over the past two weeks, on how many occasions have you had five or more drinks in a row (four or more for women)?" A drink was defined as a glass of wine, a bottle of beer or wine cooler, a shot glass of distilled spirits or a mixed drink. The response scale included the following: (1)

none, (2) once, (3) twice, (4) 3–5 occasions, (5) 6–9 occasions and (6) 10 or more occasions (Wechsler et al., 1995).

Monthly cigarette smoking was assessed using responses to the following question: “How many cigarettes did you smoke during the past 30 days?” The response scale included the following: (1) none, (2) less than 1 cigarette per day, (3) 1–5 cigarettes per day, (4) about 0.5 pack per day, (5) about 1 pack per day, (6) about 1.5 packs per day and (7) 2 or more packs per day (Johnston et al., 2001).

Marijuana use was assessed using the following question: “On how many occasions have you used marijuana ... a) in the past 30 days ... b) in the past 12 months?” The response scale for each of the two time frames included the following: (1) never, (2) 1–2 occasions, (3) 3–5 occasions, (4) 6–9 occasions, (5) 10–19 occasions, (6) 20–39 occasions and (7) 40 or more occasions (Johnston et al., 2001). The same question format and response scale were used to assess illicit use of prescription stimulant medication (e.g., Ritalin, Dexedrine, Adderall, Concerta) and prescription pain medication (e.g., Vicodin, OxyContin, Tylenol with codeine).

Other illicit drug use was assessed by summing the total number of illicit drugs, other than marijuana, used in the past year. Illicit drugs included cocaine, LSD, other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, GHB and Rohypnol.

Data analysis

The relationship between each sexual orientation measure (i.e., sexual identity, sexual attraction and sexual behavior) and substance use was examined separately for men and women using chi-square tests (Tables 1 and 3) and multivariate logistic regression (Tables 2 and 4). Continuous AOD use measures were collapsed to create dichotomous variables, such that “none” or “no occasions” were coded “0,” and all other responses were coded “1.” Although we describe the AOD use variables as outcomes and compare these variables across groups of students based on their responses to the sexual orientation questions, we do not intend to imply that these relationships are causal. For all multivariate logistic regression analyses, we adjusted for race and class year, with the largest category for each measure of sexual orientation serving as the reference group (i.e., “only heterosexual” for sexual identity, “only other gender” for sexual attraction and “other gender” for sexual behavior). We used logistic regression to test for gender interactions to determine whether the effects of sexual orientation differed. Because differences were identified, all models were stratified by gender. Thus, we present separate logistic regression models for men and women.

Sample

The final sample consisted of 9,161 undergraduate students, with demographic characteristics that closely resembled the characteristics of the overall student population with respect to race and class year. The sample contained a higher proportion of women (56%) than the university’s undergraduate student population (51%). The racial distribution of the sample was 68% white, 13% Asian, 6% black, 4% Hispanic and 9% other racial categories. Approximately 46% of the students lived in a house or apartment near the university, 44% in a university residence hall, 5% in a fraternity or sorority house and 5% in some other living arrangement.

Results

Table 1 summarizes the prevalence rates of AOD use for women based on sexual identity, sexual attraction and sexual behavior. Prevalence rates of AOD use were compared using

chi-square tests. In the bivariate analyses focusing on women, statistically significant differences were found among groups on all three sexual orientation measures.

Women: Sexual identity and substance use

Table 2 summarizes multivariate substance use results for women based on the three sexual orientation measures. In comparisons of groups based on responses to the sexual identity questions, “mostly heterosexual” identity was associated with higher rates of AOD use than the “only heterosexual” reference group. As shown in Table 2, adjusted odds ratios (adj. ORs) for the mostly heterosexual group ranged from 1.35 to 3.91, and all were significantly different from the only heterosexual group. In contrast, with the exception of monthly cigarette smoking, there were no differences between the only lesbian and only heterosexual groups on any of the measures. No differences were found between bisexual and only heterosexual women in heavy episodic drinking; however, the odds of cigarette smoking and illicit drug use were significantly higher for bisexual women (adj. ORs = 1.92–7.12).

Women: Sexual attraction and substance use

Women who were sexually attracted to mostly men had significantly higher odds than those attracted to only men on all of the measures assessed in the study (adj. ORs = 1.38–4.28; see Table 2). In contrast, results showed no statistically significant differences between women sexually attracted to only women and those attracted to only men. With a few exceptions, women who were attracted to men and women equally were more likely than those attracted to only men to report use of illicit drugs. For example, these women were eight times more likely to report using illicit drugs other than marijuana (adj. OR = 8.56, $p < .001$) in the past year. Women attracted to mostly women were more likely to report smoking cigarettes and using marijuana, opioid analgesics and other illicit drugs.

Women: Sexual behavior and substance use

Women who had *not been sexually active* in their lifetime were significantly less likely to report AOD use than women who had sex with only men. In contrast, women who reported sex with both men and women (the behaviorally bisexual group) reported significantly higher rates of AOD use than behaviorally heterosexual women (Table 2). For example, the behaviorally bisexual group was more likely to report heavy episodic drinking (adj. OR = 1.72, $p < .01$), monthly cigarette smoking (adj. OR = 2.81, $p < .001$) and other illicit drugs in the past year (adj. OR = 4.50, $p < .001$). Women whose sex partners were only women (the behaviorally lesbian group) did not differ from women who had sex with only men.

Table 3 summarizes the prevalence rates of AOD use for men based on sexual identity, sexual attraction and sexual behavior. Results of chi-square tests revealed that, although differences were found in most of the bivariate comparisons of male participants in each of the three sexual orientation groups, differences tended to be smaller and less consistent than in comparisons of female students.

Men: Sexual identity and substance use

Table 4 summarizes multivariate substance use results for men based on the three sexual orientation measures. Overall, associations between sexual identity and AOD use were less variable for men than women. For example, very few differences were found between bisexual and only heterosexual men; bisexual men were significantly less likely than only heterosexual men to report heavy episodic drinking in the past 2 weeks (adj. OR = 0.50, $p < .05$).

Men who identified as mostly heterosexual were more likely than the only heterosexual reference group to report three of the four illicit drugs assessed in the study; the only

nonsignificant difference was past year illicit use of prescription opioids. In addition, the mostly homosexual men had higher odds than the only heterosexual men on each of the four illicit drug-use measures. Finally, neither the bisexual nor the only homosexual men differed significantly from the reference group (only heterosexual men) with respect to any of the illicit drug use measures.

Men: Sexual attraction and substance use

Men attracted to mostly men were less likely than those attracted to only women to report heavy episodic drinking (adj. OR = 0.52, $p < .05$) but more likely to report past month cigarette smoking. With respect to cigarette smoking, men attracted to only men were more than two times as likely as those attracted to only women to report monthly smoking (adj. OR = 2.38, $p < .001$). No consistent patterns were found in illicit drug use based on sexual attraction. However, men attracted to only women were generally less likely to report use of these drugs. For example, men attracted to only men were approximately two times as likely as those attracted to only women to report past month marijuana use (adj. OR = 1.82, $p < .05$). Men attracted to both men and women were nearly three times as likely to report use of other illicit drugs in the past year (adj. OR = 2.89, $p < .01$).

Men: Sexual behavior and substance use

Similar to comparisons on sexual behavior within the female sample, men who had not been sexually active had lower odds of AOD use than college men who had sex with only women. In contrast, with the exception of heavy episodic drinking and monthly cigarette smoking, no differences in substance use were found for men with only female sex partners and those with only male partners. Men who had only male sex partners were *more* likely to report monthly cigarette smoking (adj. OR = 1.79, $p < .05$) but *less* likely to report heavy episodic drinking (adj. OR = 0.60, $p < .05$). Men whose sex partners were both women and men (behaviorally bisexual men) were also significantly less likely than behaviorally heterosexual men to report heavy episodic drinking (adj. OR = 0.44, $p < .01$). However, behaviorally bisexual men were more than two times as likely to report past year opioid analgesic use (adj. OR = 2.49, $p < .01$), stimulant use (adj. OR 2.55, $p < .01$) and other illicit drug use (adj. OR = 2.84, $p < .001$).

Finally, similar to research that has combined “mostly” and “only” sexual identity categories into a single group, we collapsed the live-category sexual identity measure into a three-category measure (i.e., lesbian/gay, bisexual and heterosexual). The AOD use measures were regressed on the collapsed sexual identity variable. Overall, the effects were generally lessened for bisexual students and increased for lesbian/gay students relative to heterosexual students.

Discussion

Findings from this study emphasize the importance of using multiple measures of sexual orientation and of using care when collapsing data across categories of sexual orientation dimensions. In addition, study findings emphasize the importance of analyzing data by gender. In general, we found that nonheterosexual identity, attraction and behavior were associated with a more pronounced and consistent risk of substance use in women than in men.

Our results support previous findings of increased risk for substance use among women who self-identify as bisexual, compared with self-identified lesbian and heterosexual women (e.g., Diamant et al., 2000; Jorm et al., 2002; Koh, 2000). Whereas risk for alcohol use, cigarette smoking and illicit drug use was no greater for women who identified as “only

lesbian” than for “only heterosexual” women, bisexual women were at substantially heightened risk for cigarette smoking and every measure of illicit drug use included in the analyses. This finding contrasts sharply with findings for men in the study.

Previous research has also found that adolescent males and females *attracted* to both genders are more likely to report smoking cigarettes, drinking alone, getting drunk and using marijuana and other illicit drugs (Russell et al., 2002). We found that women equally attracted to both genders were more likely than those with only opposite gender attraction to smoke cigarettes and to use marijuana, prescription stimulants and other illicit drugs; women with only same-gender attraction were not at heightened risk for substance use. Similarly, whereas college men attracted to both women and men were more likely than those attracted to only women to have used illicit drugs other than marijuana in the past year, the two groups did not differ in heavy drinking. Although Russell and colleagues (2002) found that adolescent males with only same-gender attraction were not at increased risk for substance use relative to males with only other-gender attractions, we found that college men with same-gender attraction were more likely than college men with only other-gender attractions to report monthly cigarette smoking, marijuana use and past year use of other illicit drugs.

Our findings regarding the association between sexual behavior and substance use have striking similarities to previous work conducted with a national college sample (Eisenberg and Wechsler, 2003). In particular, our findings lend further evidence that women who report having sex with both men and women are at considerably higher risk for cigarette smoking, heavy episodic drinking and marijuana use. In contrast, men who reported having sex with both genders were *not* at greater risk for cigarette smoking or marijuana use—and were at *lower* risk for heavy episodic drinking—an important finding, considering the adverse consequences associated with this pattern of drinking behavior among U.S. college students (Hingson et al., 2002; Hingson et al., 2005; Perkins, 2002; Wechsler et al., 1994). Adding further support to earlier findings related to sexual orientation and substance use, we found that undergraduate men and women who reported having sex with both genders were at increased risk for nonmedical use of prescription stimulants and opioid analgesics, and other illicit drugs. Finally, similar to Boyd et al. (2003) and Teter et al. (2003), we found that nonsexually active students were significantly less likely than sexually active students to report AOD use. The increased risk of substance use among sexually active students may be related to a common underlying personality characteristic (such as sensation-seeking) that is associated with both substance use and sexual activity.

Of particular interest were findings related to substance use among individuals who reported either that they were attracted “mostly” to the same or other gender, or who indicated in response to the sexual identity question that they were mostly heterosexual or mostly homosexual. Recent work recommends using a mostly heterosexual category in studies that assess sexual identity in adolescents and young adults (Saewyc et al., 2004); however, very little research has examined the association between this category and substance use. In the present study, results show a clear trend toward heightened risk for substance use among these respondents, and this trend is stronger in women. In fact, women who identified as mostly heterosexual were at higher risk than their only heterosexual counterparts on *every* substance use measure. It is possible that young women in our study who identified as mostly heterosexual were in an identity exploration stage at the time of the survey and had not yet committed to a particular sexual identity (Cass, 1979, 1996; Marcia, 1966). Such exploration may extend to a number of realms, including experimentation with AOD, and this may contribute to high-risk substance use behaviors among these women (Bishop et al., 1997). In addition, research on minority identity in general (e.g., Crocker and Major, 1989), and on sexual minority identity in particular (see Meyer [2003] for review), suggests the importance of group identity for social support, affiliation and coping. Given the data

available, we are unable to determine whether or to what extent the choice of “mostly” heterosexual or homosexual reflects the absence of a solidified and integrated identity. It seems reasonable, however, to posit that students who selected these descriptors lack a “recognized” group sexual identity and that this may contribute to their heightened risk for AOD use.

More research using qualitative methods is needed to better understand the meaning attributed to the “mostly” label and to determine whether it is a valid measure of sexual identity. For example, cognitive or “think aloud” interviews, in which respondents share the thought process involved in answering a specific question with an interviewer, may be useful (e.g., Aday, 1996; Czaja and Blair, 1996). It is important to note that, when Likert-scaled sexual identity measures are used, the “mostly” and “only” categories are usually collapsed. As described previously, we also conducted analyses using the combined mostly and only categories. Based on our findings, collapsing groups may lead to an underestimation of risk for lesbian/gay students and an inflation of risk for bisexual students. Therefore, researchers should exercise caution before combining the “mostly” and “only” responses when analyzing such data.

Strengths, Limitations and Future Directions

This study builds on past college-based research examining the relationship between substance use and sexual orientation and has notable strengths, including the use of multiple measures to assess sexual orientation. The probability-based sample was large enough to permit stratification by gender and comparisons across various subgroups based on sexual orientation. We used a Web-based survey method demonstrated in previous research to be effective in collecting sexual orientation and AOD use data from college students (e.g., Kypri et al., 2004; McCabe, 2002, 2004; McCabe et al., 2002, 2003, 2004; Miller et al., 2002).

Some limitations should be taken into account when considering the study findings. First, although self-report surveys of substance use are considered generally valid when confidentiality is carefully protected (e.g., Harrison and Hughes, 1997; Johnston and O’Malley, 1985; O’Malley et al., 1983), attempting to define the various dimensions of sexual orientation in survey research based on self-report poses additional challenges. For example, closed-ended survey questions to assess sexual orientation assume that it is a stable characteristic. Recent findings suggest that certain dimensions of sexual orientation—especially identity and behavior—are more fluid than can be captured using traditional measures (e.g., Diamond, 2000; Peplau and Garnets, 2000; Rothblum, 2000; Rust, 1993). Furthermore, although the sexual behavior question was adapted from previous college-based work to compare our results to national findings (see Eisenberg and Wechsler, 2003), we recognize that respondents may hold widely different interpretations about the specific behaviors that constitute having “had sex” (Sanders and Reinisch, 1999).

Despite these challenges, the results from the present study mirror those of previous studies, some of which used anonymous data collection approaches. In particular, the percentage of students reporting same-gender partners only (2%) or both-gender partners (4%) were identical to national findings (Eisenberg and Wechsler, 2003). The percentage of self-identified LGB participants in our sample (3%) is consistent with previous studies of adolescents, young adults and adults (e.g., Drabble et al., 2005; Garofalo et al., 1998; Gruskin et al., 2001; Laumann et al., 1994; Mays and Cochran, 2001). The percentages of students who reported same-gender and other-gender attraction were similar to a national study of adolescents (Russell et al., 2001). Consistency between findings in our study and those of previous studies adds to confidence in the validity of the results.

Although our concerns about nonresponse bias were lessened by similarities between the sample and total student population, and similarities between past findings related to sexual orientation and to substance use behaviors, the possibility of underreporting substance use and/or nonheterosexual identity, attraction and behavior cannot be ignored. However, there is little reason to believe that one sexual orientation group would have been more likely than another to underreport substance use. Nevertheless, the small size of the sexual orientation sub-samples is an additional limitation. Despite the large overall random sample, the number of men who identified as only gay ($n = 66$) or women who identified as only lesbian ($n = 16$), was relatively small. These small subsamples limited statistical power to detect differences that may have been apparent in larger samples. Additionally, the sample was relatively homogeneous in that it consisted of predominantly white, full-time undergraduate students 18–24 years of age—a factor that limits generalizability. Finally, because the data are cross-sectional, we cannot make causal assumptions about the associations that we found. Longitudinal studies are needed to investigate time-ordered relationships between substance use and multiple measures of sexual orientation.

Despite these limitations, the study findings have important implications for future practice and research. Staff members who work in college health services need to be educated about potentially heightened risk for substance use among some subgroups of sexual minority students. Health histories should include questions that assess all three major dimensions of sexual orientation, and health providers should be aware that risk might vary depending on sexual identity, sexual behavior and sexual attraction. In addition, college professionals should be cognizant that, although the college environment generally is more open and tolerant of “nonheterosexual” identity and behavior, LGB and questioning students face unique stressors that may increase their risk for substance use. Finally, many national substance use studies have been limited by an absence of questions about sexual orientation; future studies should include these questions.

Acknowledgments

The authors acknowledge Hannah d’Arcy for her assistance with the analysis. The authors would also like to thank Michele Morales, Kerri Covey, Amanda Hsiao and the three anonymous reviewers for their helpful comments on an earlier version of this manuscript. The participation of students in the study is also greatly appreciated.

References

- Abbey A. Alcohol-related sexual assault: A common problem among college students. *J Stud Alcohol*. 2002; (Supplement No. 14):118–128.
- Aday, LA. *Designing and Conducting Health Surveys*. San Francisco, CA: Jossey-Bass; 1996.
- Bishop DI, Macy-Lewis JA, Schneklath CA, Puswella S, Struessel GL. Ego identity status and reported alcohol consumption: A study of first-year college students. *J Adolesc*. 20:209–218. [PubMed: 9104656]
- Bontempo DE, D’Augelli AR. Effects of at-school victimization and sexual orientation on lesbian, gay, or bisexual youths’ health risk behavior. *J Adolesc Hlth*. 2002; 30:364–374.
- Boyd CJ, McCabe SE, d’Arcy H. Ecstasy use among college undergraduates: Gender, race and sexual identity. *J Subst Abuse Treat*. 2003; 24:209–215. [PubMed: 12810141]
- Cass V. Homosexual identity formation: A theoretical perspective. *J Homosexual*. 1979; 4:219–235.
- Cass, V. Sexual orientation identity formation: A western phenomenon. In: Cabaj, RP.; Stein, TS., editors. *Textbook of Homosexuality and Mental Health*. Washington, DC: American Psychiatric Press; 1996. p. 227-251.
- Chng CL, Geliga-Vargas J. Ethnic identity, gay identity, sexual sensation seeking and HIV risk taking among multiethnic men who have sex with men. *AIDS Educ Prev*. 2000; 12:326–339. [PubMed: 10982122]

- Crocker J, Major B. Social stigma and self-esteem: The self protective effects of stigma. *Psychol Rev.* 1989; 96:608–630.
- Czaja, R.; Blair, J. *Designing Surveys: A Guide to Decisions and Procedures.* Thousand Oaks, CA: Pine Forest Press; 1996.
- DeBord KA, Wood PK, Sher KJ, Good GE. The relevance of sexual orientation to substance abuse and psychological distress among college students. *J Coll Student Devel.* 1998; 39:157–168.
- Diamant AL, Wold C, Spritzer K, Gelberg L. Health behaviors, health status, and access to and use of health care: A population-based study of lesbian, bisexual, and heterosexual women. *Arch Fam Med.* 2000; 9:1043–1051. [PubMed: 11115206]
- Diamond LM. Sexual identity, attractions, and behavior among young sexual-minority women over a 2-year period. *Devel Psychol.* 2000; 36:241–250. [PubMed: 10749081]
- Dowdall GW, Wechsler H. Studying college alcohol use: Widening the lens, sharpening the focus. *J Stud Alcohol.* 2002; (Supplement No. 14):14–22.
- Drabble L, Midanik LT, Trocki K. Reports of alcohol consumption and alcohol-related problems among homosexual, bisexual, and heterosexual respondents: Results from the 2000 National Alcohol Survey. *J Stud Alcohol.* 2005; 66:111–120. [PubMed: 15830911]
- Eisenberg M, Wechsler H. Substance use behaviors among college students with same-sex and opposite-sex experience: Results from a national study. *Addict Behav.* 2003; 28:899–913. [PubMed: 12788264]
- Garofalo R, Wolf RC, Kessel S, Palfrey SJ, DuRant RH. The association between health risk behaviors and sexual orientation among a school-based sample of adolescents. *Pediatrics.* 1998; 101:895–902. [PubMed: 9565422]
- Gomez CA, Garcia DR, Kegebein VJ, Shade SB, Hernandez SR. Sexual identity versus sexual behavior: Implications for HIV prevention strategies for women who have sex with women. *Women's Hlth Res Gender Behav Policy.* 1996; 2:91–109.
- Gruskin EP, Hart S, Gordon N, Ackerson L. Patterns of cigarette smoking and alcohol use among lesbians and bisexual women enrolled in a large health maintenance organization. *Amer J Publ Hlth.* 2001; 91:976–979.
- Harrison, L.; Hughes, A. NIDA Research Monograph No. 167, NIH Publication 97–4147. Washington: Government Printing Office; 1997. *The Validity of Self-Reported Drug Use: Improving the Accuracy of Survey Estimates.*
- Hingson RW, Heeren T, Zakocs RC, Kopstein A, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18–24. *J Stud Alcohol.* 2002; 63:136–144. [PubMed: 12033690]
- Hingson R, Heeren T, Winter M, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18–24: Changes from 1998 to 2001. *Annual Rev Publ Hlth.* 2005; 26:259–279.
- Hughes TL. Lesbians' drinking patterns: Beyond the data. *Subst Use Misuse.* 2003; 38:1739–1758. [PubMed: 14582576]
- Hughes TL. Alcohol use and alcohol-related problems in lesbians and gay men. *Annual Rev Nurs Res.* 2005; 23:283–325. [PubMed: 16353369]
- Hughes TL, Eliason M. Substance use and abuse in lesbian, gay, bisexual and transgender populations. *J Prim Prev.* 2002; 22:263–298.
- Hughes TL, Johnson T, Wilsnack SC. Sexual assault and alcohol abuse: A comparison of lesbians and heterosexual women. *J Subst Abuse.* 2001; 13:515–532. [PubMed: 11775080]
- Hughes, TL.; Wilsnack, SC.; Johnson, T. Examining lesbians' mental health and alcohol use: What is an appropriate comparison group?. In: Omoto, A.; Kurtzman, H., editors. *Sexual Orientation and Mental Health: Examining Identity and Development in Lesbian, Gay, and Bisexual People.* Washington, DC: American Psychological Assn; 2005. p. 167-184.
- Johnston, LD.; O'Malley, PM. Issues of validity and population coverage in student surveys of drug use. In: Rouse, BA.; Kozel, NJ.; Richards, LG., editors. *Self-Report Methods of Estimating Drug Use: Meeting Current Challenges to Validity.* NIDA Research Monograph No. 57. DHHS Publication No. (ADM-85-1402). Washington: Government Printing Office; 1985. p. 31-54.

- Johnston, LD.; O'Malley, P.; Mand Bachman, JG. Monitoring the Future: National Survey Results on Drug Use. 1975–2000, Vol. 2. NIH Publication No. 01-4925. Washington: Government Printing Office; 2001.
- Johnston, LD.; O'Malley, PM.; Bachman, JG. Monitoring the Future: National Survey Results on Drug Use. 1975–2002, Vol.2. NIH Publication No. 03-5376. Bethesda, MD: Department of Health and Human Services; 2003.
- Jorm AF, Korten AE, Rodgers B, Jacomb PA, Christensen H. Sexual orientation and mental health: Results from a community survey of young and middle-aged adults. *Brit J Psychiat*. 2002; 180:423–427.
- Koh AS. Use of preventive health behaviors by lesbian, bisexual, and heterosexual women: Questionnaire survey. *West J Med*. 2000; 172:379–384. [PubMed: 10854384]
- Kypri K, Gallagher SJ, Cashell-Smith ML. An internet-based survey method for college student drinking research. *Drug Alcohol Depend*. 2004; 76:45–53. [PubMed: 15380288]
- Laumann, EO.; Gagnon, JH.; Michael, RT.; Michaels, S., editors. *The Social Organization of Sexuality: Sexual Practices in the United States*. Chicago, IL: Univ. of Chicago Press; 1994.
- McCabe SE. Gender differences in collegiate risk factors for heavy episodic drinking. *J Stud Alcohol*. 2002; 63:49–56. [PubMed: 11925058]
- McCabe SE. Comparison of web and mail surveys in collecting illicit drug use data: A randomized experiment. *J Drug Educ*. 2004; 34:61–72. [PubMed: 15468748]
- McCabe SE, Boyd CJ, Couper MP, Crawford S, d'Arcy H. Mode effects for collecting alcohol and other drug data: Web and U.S. mail. *J Stud Alcohol*. 2002; 63:755–761. [PubMed: 12529076]
- McCabe SE, Boyd C, Hughes TL, d'Arcy H. Sexual identity and substance use among undergraduate students. *Subst Abuse*. 2003; 24:77–91.
- McCabe SE, Hughes TL, Boyd CJ. Substance use and misuse: Arc bisexual women at greater risk? *J Psychoact Drugs*. 2004; 36:217–225.
- Marcia JE. Development and validation of ego-identity status. *J Pers Social Psychol*. 1966; 3:551–558.
- Markovic, N.; Aaron, DJ.; Danielson, ME. Using sexual identity vs. behavior among lesbian and bisexual women to assess health status. Paper presented at the National Lesbian Health Conference; San Francisco, CA. 2001.
- Mays VM, Cochran SD. Mental health correlates of perceived discrimination among lesbian, gay, and bisexual adults in the United States. *Amer J Publ Hlth*. 2001; 91:1869–1876.
- 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]
- Meyer IH, Rossano L, Ellis JM, Bradford J. A brief telephone interview to identify lesbian and bisexual women in random digit dialing sampling. *J Sex Res*. 2002; 39:139–144. [PubMed: 12476246]
- Miller ET, Neai DJ, Roberts LJ, Baer JS, Cressler SO, Metrik J, Marlatt GA. Test-retest reliability of alcohol measures: Is there a difference between internet-based assessment and traditional methods? *Psychol Addict Behav*. 2002; 16:56–63. [PubMed: 11934087]
- O'Malley PM, Bachman JG, Johnston LD. Reliability and consistency in self-reports of drug use. *Int J Addict*. 1983; 18:805–824. [PubMed: 6605313]
- Peplau LA, Garnets LD. A new paradigm for understanding women's sexuality and sexual orientation. *J Social Issues*. 2000; 56:329–350.
- Perkins HW. Surveying the damage: A review of research on consequences of alcohol misuse in college populations. *J Stud Alcohol*. 2002; (Supplement No. 14):91–100. [PubMed: 11925064]
- Pope HG Jr, Ionescu-Pioggia K, Pope KW. Drug use and life style among college undergraduates: A 30-year longitudinal study. *Amer J Psychiat*. 2001; 158:1519–1521. [PubMed: 11532744]
- Presley, CA.; Meilman, PW.; Cashin, JR. *Consequences, and Perceptions of the Campus Environment*. Volume IV: 1992–94. Carbondale, IL: Core Institute, Southern Illinois University; 1996. Alcohol and Drugs on American College Campuses: Use.
- Rothblum ED. Sexual orientation and sex in women's lives: Conceptual and methodological issues. *J Social Issues*. 2000; 56:193–204.

- Russell ST, Driscoll AK, Truong N. Adolescent same-sex romantic attractions and relationships: Implications for substance use and abuse. *Amer J Publ Hlth.* 2002; 92:198–202.
- Russell ST, Joyner K. Adolescent sexual orientation and suicide risk: Evidence from a national study. *Amer J Publ Hlth.* 2001; 91:1276–1281.
- Rust PC. “Coming out” in the age of social constructionism: Sexual identity formation among lesbian and bisexual women. *Gender Soc.* 1993; 7:50–77.
- Saewyc EM, Bauer GR, Skay CL, Bearinger LH, Resnick MD, Reis E, Murphy A. Measuring sexual orientation in adolescent health surveys: Evaluation of eight school-based surveys. *J Adolesc Hlth.* 2004; 35:345.e1–e15.
- Sanders SA, Reinisch JM. Would you say you “had sex” if ... ? *JAMA.* 1999; 281:275–277. [PubMed: 9918484]
- Scheer S, Parks CA, McFarland W, Page-Shafer K, Delgado V, Ruiz JD, Molitor F, Klausner JD. Self-reported sexual identity, sexual behaviors and health risks: Examples from a population-based survey of young women. *J Lesbian Stud.* 2003; 7:69–83.
- Solarz, AL. *Lesbian Health: Current Assessment and Directions for the Future.* Washington, DC: National Academy Press; 1999.
- Substance Abuse and Mental Health Services Administration. *Bisexual, and transgender Individuals.* DHHS Publication No. (SMA) 01-3498. Bethesda, MD: Center for Substance Abuse Treatment, Department of Health and Human Services; 2001. A Provider’s Introduction to Substance Abuse Treatment for Lesbian, Gay.
- Teter CJ, McCabe SE, Boyd CJ, Guthrie SK. Illicit methylphenidate use in an undergraduate student sample: Prevalence and risk factors. *Pharmacotherapy.* 2003; 23:609–617. [PubMed: 12741435]
- Wechsler H, Lee JE, Kuo M, Seibring M, Nelson TF, Lee H. Trends in college binge drinking during a period of increased prevention efforts. Findings from 4 Harvard School of Public Health College Alcohol Study surveys: 1993–2001. *J Amer Coll Hlth.* 2002; 50:203–217.
- Wechsler H, Dowdall GW, Davenport A, Rimm EB. A gender-specific measure of binge drinking among college students. *Amer J Publ Hlth.* 1995; 85:982–985.
- Wechsler H, Davenport A, Dowdall G, Moeykens B, Castillo S. Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *JAMA.* 1994; 272:1672–1677. [PubMed: 7966895]

Table 1

Alcohol and other drug use by sexual identity, sexual attraction and sexual behavior among women, percentage distributions

Sexual orientation measures	2 week heavy drinking %	Past month cigarette smoking %	Past month marijuana use %	Past year opioid analgesic use %	Past year stimulant use %	Past year other illicit drug use ^a %
Sexual identity	†	‡	‡	‡	‡	‡
Only homosexual/lesbian (n = 16)	43.8	50.0	18.8	6.3	0.0	6.3
Mostly homosexual/lesbian (n = 22)	59.1	36.4	36.4	27.3	9.1	18.2
Bisexual (n = 81)	45.1	29.6	32.9	15.9	8.5	30.5
Mostly heterosexual (n = 458)	57.1	33.8	32.9	15.8	9.8	20.3
Only heterosexual (n = 4,190)	48.7	17.6	16.5	7.7	4.0	5.9
Sexual attraction	‡	‡	‡	‡	‡	‡
Only women (n = 28)	46.4	28.6	28.6	10.7	3.6	7.1
Mostly women (n = 39)	59.0	33.3	33.3	17.9	5.1	12.8
Equally men and women (n = 61)	40.3	29.5	33.9	12.9	9.7	32.3
Mostly men (n = 711)	57.2	33.6	31.5	14.8	9.3	19.6
Only men (n = 3,933)	48.2	16.6	15.6	7.4	3.7	5.2
Sexual behavior	‡	‡	‡	‡	‡	‡
Same gender (n = 38)	61.5	18.4	28.2	17.9	2.6	17.9
Both genders (n = 138)	68.3	47.8	44.2	24.6	18.8	31.9
Not sexually active (n = 1,822)	32.3	8.0	7.9	3.6	1.5	2.0
Other gender (n = 2,746)	59.9	25.9	24.2	11.1	6.0	10.3

Notes: Sample sizes based on past month cigarette smoking. Sample sizes vary because of missing responses to individual substance use questions.

^aPast year other illicit drug use consisted of any use of cocaine, LSD, other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, GHB or Rohypnol.

† $p < .01$,

‡ $p < .001$ based on chi-square tests examining the bivariate associations between each sexual orientation dimension and each substance use behavior.

Table 2

Alcohol and other drug use by sexual identity, sexual attraction and sexual behavior among women, adjusted odds ratio (adj. OR)

Sexual orientation measures	2 week heavy drinking Adj. OR ^b	Past month cigarette smoking Adj. OR ^b	Past month marijuana use Adj. OR ^b	Past year opioid analgesic use Adj. OR ^b	Past year stimulant use Adj. OR ^b	Past year other illicit drug use ^a Adj. OR ^b
Sexual identity						
Only homosexual lesbian	0.84	4.90 [†]	1.31	0.86	0.02	1.12
Mostly homosexual lesbian	1.61	2.61*	3.23 [†]	4.61 [†]	2.61	3.54*
Bisexual	0.90	1.92 [†]	2.58 [†]	2.18*	2.28*	7.12 [‡]
Mostly heterosexual	1.35 [‡]	2.33 [‡]	2.48 [‡]	2.26 [‡]	2.60 [‡]	3.91 [‡]
Only heterosexual	—	—	—	—	—	—
Sexual attraction						
Only women	0.81	1.86	2.14	1.60	0.93	1.36
Mostly women	1.95	2.64 [†]	3.10 [‡]	2.76*	1.58	2.81*
Equally men and women	0.75	2.03*	2.90 [‡]	1.81	2.90*	8.56 [‡]
Mostly men	1.38 [‡]	2.45 [‡]	2.48 [‡]	2.17 [‡]	2.58 [‡]	4.28 [‡]
Only men	—	—	—	—	—	—
Sexual behavior						
Same gender	1.12	0.63	1.26	1.73	0.43	1.92
Both genders	1.72 [†]	2.81 [‡]	2.72 [‡]	2.63 [‡]	4.07 [‡]	4.50 [‡]
Not sexually active	0.33 [‡]	0.26 [‡]	0.26 [‡]	0.29 [‡]	0.24 [‡]	0.18 [‡]
Other gender	—	—	—	—	—	—

Notes: indicates reference group.

^aPast year other illicit drug use consisted of any use of cocaine, LSD, other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, GHB or Rohypnol;^bORs are adjusted for race and class year: the results for these variables are not shown.* $p < .05$,[†] $p < .01$,[‡] $p < .001$.

Table 3

Alcohol and other drug use by sexual identity, sexual attraction and sexual behavior among men, percentage distributions

Sexual orientation measures	2 week heavy drinking %	Past month cigarette smoking %	Past month marijuana use %	Past year opioid analgesic use %	Past year stimulant use %	Past year other illicit drug use ^d %
Sexual identity	*	‡	†	–	‡	‡
Only homosexual/gay (n = 63)	47.6	30.2	25.4	12.7	3.2	20.6
Mostly homosexual gay (n = 50)	38.8	30.0	32.7	20.0	20.0	24.0
Bisexual(n = 41)	37.5	34.1	24.4	14.6	9.8	19.5
Mostly heterosexual (n = 171)	53.5	39.8	34.5	12.4	11.7	24.6
Only heterosexual (n = 3,240)	54.8	20.4	22.9	9.7	5.9	11.7
Sexual attraction	*	‡	*	–	*	‡
Only men (n = 64)	54.7	39.1	35.5	15.6	7.8	25.4
Mostly men (n = 55)	37.0	30.9	27.3	16.4	14.5	20.0
Equally men and women (n = 32)	41.9	31.3	34.4	18.8	12.5	28.1
Mostly women (n = 170)	49.1	32.9	27.6	8.9	8.3	17.6
Only women (n = 3,277)	54.7	20.7	23.0	9.8	6.1	12.0
Sexual behavior	‡	‡	‡	‡	‡	‡
Same gender (n = 80)	55.7	40.0	35.5	15.4	12.8	23.1
Both genders (n = 60)	45.8	38.3	35.6	26.7	18.3	36.7
Not sexually active (n = 1,334)	33.0	10.0	11.1	3.7	1.5	3.4
Other gender (n = 2,078)	67.9	28.4	31.3	13.7	9.1	17.9

Notes: Sample sizes based on past month cigarette smoking. Sample sizes vary due to missing responses to individual substance use questions.

^aPast year other illicit drug use consisted of any use of cocaine, LSD other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, GHB or Rohypnol.

* $p < .05$,

† $p < .01$,

‡ $p < .001$ based on chi-square tests examining the bivariate associations between each sexual orientation dimension and each substance use behavior.

Table 4

Alcohol and other drug use by sexual identity, sexual attraction and sexual behavior among men. adjusted odds ratio (adj. OR)

Sexual orientation measures	2 week heavy drinking Adj. OR ^b	Past month cigarette smoking Adj. OR ^b	Past month marijuana use Adj. OR ^b	Past year opioid analgesic use Adj. OR ^b	Past year stimulant use Adj. OR ^b	Past year other illicit drug use ^a Adj. OR ^b
Sexual identity						
Only homosexual gay	0.65	1.59	1.09	1.24	0.48	1.83
Mostly homosexual/gay	0.58	1.89 [*]	1.94 [*]	2.41 [*]	4.85 [†]	2.63 [†]
Bisexual	0.50 [*]	2.10 [*]	1.09	1.64	1.84	1.82
Mostly heterosexual	0.93	2.61 [‡]	1.82 [‡]	1.29	2.14 [†]	2.46 [‡]
Only heterosexual	–	–	–	–	–	–
Sexual attraction						
Only men	0.89	2.38 [‡]	1.82 [*]	1.57	1.25	2.39 [†]
Mostly men	0.52 [*]	1.90 [*]	1.38	1.84	3.07 [†]	1.96
Equally men and women	0.59	1.78	1.83	2.14	2.37	2.89 [†]
Mostly women	0.77	1.89 [‡]	1.28	0.88	1.39	1.56 [*]
Only women	–	–	–	–	–	–
Sexual behavior						
Same gender	0.60 [*]	1.79 [*]	1.33	1.14	1.61	1.45
Both genders	0.44 [†]	1.68	1.30	2.49 [†]	2.55 [†]	2.84 [‡]
Not sexually active	0.24 [‡]	0.27 [‡]	0.26 [‡]	0.25 [‡]	0.15 [‡]	0.16 [‡]
Other gender	–	–	–	–	–	–

Notes: indicates reference group.

^aPast year other illicit drug use consisted of any use of cocaine, LSD, other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, GHB or Rohypnol;^bORs are adjusted for race and class year; the results for these variables are not shown.^{*} $p < .05$,[†] $p < .01$,[‡] $p < .001$.