Measurement of Sexual Identity in Surveys: Implications for Substance Abuse Research

Sean Esteban McCabe,
Institute for Research on Women and Gender, University of Michigan, 204 S. State St., Ann Arbor, MI 48109-1290, USA; Substance Abuse Research Center, University of Michigan, Ann Arbor, MI, USA

Tonda L. Hughes,
Mental Health and Administrative Nursing, Department of Public Health, University of Illinois at Chicago, Chicago, IL, USA

Wendy Bostwick,
Public Health and Health Education Programs, Northern Illinois University, DeKalb, IL, USA

Michele Morales, and
Substance Abuse Research Center, University of Michigan, Ann Arbor, MI, USA

Carol J. Boyd
Institute for Research on Women and Gender, University of Michigan, 204 S. State St., Ann Arbor, MI 48109-1290, USA; Substance Abuse Research Center, University of Michigan, Ann Arbor, MI, USA; School of Nursing, University of Michigan, Ann Arbor, MI, USA; Women's Studies, University of Michigan, Ann Arbor, MI, USA

Sean Esteban McCabe: plius@umich.edu

Abstract

Researchers are increasingly recognizing the need to include measures of sexual orientation in health studies. However, relatively little attention has been paid to how sexual identity, the cognitive aspect of sexual orientation, is defined and measured. Our study examined the impact of using two separate sexual identity question formats: a three-category question (response options included heterosexual, bisexual, or lesbian/gay), and a similar question with five response options (only lesbian/gay, mostly lesbian/gay, bisexual, mostly heterosexual, only heterosexual). A large probability-based sample of undergraduate university students was surveyed and a randomly selected sub-sample of participants was asked both sexual identity questions. Approximately one-third of students who identified as bisexual based on the three-category sexual identity measure chose "mostly heterosexual" or "mostly lesbian/gay" on the five-category measure. In addition to comparing sample proportions of lesbian/gay, bisexual, or heterosexual participants based on the two question formats, rates of alcohol and other drug use were also examined among the participants. Substance use outcomes among the sexual minority subgroups differed based on the sexual identity question format used: bisexual participants showed greater risk of substance use in analyses using the three-category measure whereas "mostly heterosexual" participants were at greater risk when data were analyzed using the five-category measure. Study results have important implications for the study of sexual identity, as well as whether and how to recode responses to questions related to sexual identity.

Correspondence to: Sean Esteban McCabe, plius@umich.edu.

Introduction

Researchers increasingly consider sexual orientation an important focus of health research and a valuable demographic variable for inclusion in studies of health (e.g., Case et al., 2004; Omoto & Kurtzman, 2005; Meyer, 2003; Sell & Becker, 2001). Like race/ethnicity or socioeconomic status, sexual orientation is a complex construct that contains dimensions that are difficult to measure. Sexual orientation is most commonly described as including cognitive (identity), behavioral, and affective (attraction or desire) dimensions (Laumann, Gagnon, Michael, & Michaels, 1994). Although measurement of sexual behavior is relatively straightforward, sexual identity is conceptually and operationally more difficult to define. Adolescent participants report the highest burden when answering questions about sexual identity compared with questions related to sexual behavior (Austin, Conron, Patel, & Freedner, 2007). Given that sexual identity is among the most commonly assessed dimensions of sexual orientation, it is important to examine and contrast various measures used to assess sexual identity.

Health-related research has used a wide array of measures to assess sexual identity (e.g., Friedman et al., 2004; Sell, 1997; Solarz, 1999). Commonly used sexual identity measures include five- or seven-category scales that conceptualize sexual identity as a continuum ranging from "exclusively homosexual" to "exclusively heterosexual" (e.g., Debord, Wood, Sher, & Good, 1998; Hughes, Wilsnack, & Johnson, 2005; Laumann et al., 1994; Matthews, Hughes, Johnson, Razzano, & Cassidy, 2002) and discrete three-category measures consisting of responses such as heterosexual, bisexual or lesbian/gay (e.g., Bontempo & D'Augelli, 2002; Drabble, Midanik, & Trocki, 2005; Garofalo, Wolf, Kessel, Palfrey, & DuRant, 1998; Jorm, Korten, Rodgers, Jacomb, & Christensen, 2002; McCabe, Boyd & Hughes, & d'Arcy, 2003). Some sexual identity measures also include other responses such as "don't know"(Jorm et al., 2002), "not sure"(Bontempo & D'Augelli, 2002; Garofalo et al., 1998), "refused"(McCabe et al., 2003),"none of the above"(Bontempo & D'Augelli, 2002; Garofalo et al., 1998), "curious," "questioning," "unlabeled" (Thompson & Morgan, 2008) or "other (specify)"(McCabe, Hughes, Bostwick, & Boyd, 2005). Such studies focusing on sexual identity often utilize inconsistent response options and recoding practices which can lead to the misclassification of sexual minorities and present challenges to comparing results across studies. Despite these variations in measurement, little research has examined using one sexual identity measure versus another in terms of response decisions and distribution of sexual orientation.

A growing body of research suggests that sexual minority populations are at heightened risk for substance use, abuse, and dependence relative to their heterosexual counterparts (Cochran, Ackerman, Mays, & Ross, 2004; Drabble et al., 2005; Hughes et al., 2005; McCabe, Hughes, Bostwick, West, & Boyd, 2009; Wilsnack et al., 2008). In addition, recent research suggests that risk varies among sexual minority groups. For example, some studies have found that bisexuals have poorer mental health than lesbians and gay men (e.g., Bostwick, Boyd, Hughes, & McCabe, 2010; Eisenberg & Wechsler, 2003; Jorm et al., 2002; McCabe et al., 2009).

The majority of college-based studies that have examined the relationship between sexual identity and substance use have asked participants to label themselves as bisexual, lesbian/ gay or heterosexual (e.g., Boyd, McCabe, & d'Arcy, 2003; McCabe et al., 2003; McCabe,

Hughes, & Boyd, 2004). However, there is evidence that adolescents and young adults prefer intermediate options, such as "mostly heterosexual" or "mostly homosexual" to describe their sexual identity rather than labels which imply a static state such as "bisexual" or "lesbian/gay" (Austin et al., 2007). Findings from college-based and non-college based samples indicate that health-related outcomes and rates of health behaviors can vary based on the dimension of sexual orientation assessed (e.g., Bontempo & D'Augelli, 2002; Bostwick et al., 2010; McCabe et al., 2009; Russell, Driscoll, & Truong, 2002; Scheer et al., 2003). Furthermore, at least two college-based studies have shown gay and bisexual men were at lower risk for binge drinking than their heterosexual peers but the results of these studies varied based on whether sexual orientation was measured using a five-category Likert-scale or a discrete three-category measure (Eisenberg & Wechsler, 2003; McCabe et al., 2003, 2005). Based on results of a qualitative study using cognitive processing interviews, Austin et al. (2007) concluded that more research is needed to assess the performance of various sexual identity measures, particularly among adolescents.

Building on our previous work on substance use and sexual orientation, we designed a randomized study to compare two measures commonly used to assess sexual identity among adolescents and young adults. The primary objectives of the study were to (1) compare sample proportions of lesbian/gay, bisexual, or heterosexual participants based on the two question formats (three-category vs. five-category) and (2) compare the prevalence of alcohol and other drug use among those participants based on the two sexual identity question formats.

Method

Participants

Table 1 summarizes demographic characteristics of study participants who were asked both sexual identity questions and did not refuse or reply with some other response to either of the questions ($n = 2,077$). The demographic characteristics of this group were compared to those of the university's overall student population. The proportion of women was higher in the sample than the university's overall student population (58% vs. 51%), but otherwise the demographic characteristics of the sample closely resembled the population of full-time undergraduate students attending the university. For example, in both the sample and the overall population, approximately two out of three students were White, 13% were Asian, and three out of four students lived within one mile of the main campus. Table 1 summarizes the gender, race/ethnicity, and class year of the sample based on the two sexual identity measures (three-category vs. five-category) among participants who were asked both sexual identity questions.

Procedure

In 2003, a simple random sample of 19,378 full-time undergraduate students was drawn from the Registrar's Office at a large midwestern research university following institutional review board approval. The entire sample was sent an e-mail message describing the Student Life Survey (SLS) and inviting them to participate by clicking on a link and using a unique password to access the Web-based survey. All participants were informed that a research firm unaffiliated with the university was contracted to format the Web-based survey as well as store and maintain data, and that university officials, faculty, and staff were unable to access any contact information connected with the participants. Data were collected during a one-month period in March and April 2003. The Web-based survey was maintained on a hosted secure Web site running under the secure sockets layer protocol to insure that data were safely transmitted between the participant's browser and the server. Information sent to students in the sample explained the study, emphasized that participation was voluntary, and

confirmed that responses would be kept confidential. Non-participants were sent up to three reminder e-mail messages. Students who participated in the study were eligible for a sweepstakes that included several cash prizes. The response rate was 47%, which is consistent with national alcohol and other drug studies of 4-year colleges and universities (e.g., Wechsler et al., 2002). The entire sample was asked a five-category question about their sexual identity and one-fourth of the sample was randomly selected to receive an additional three-category sexual identity question earlier in the survey. This study focuses on the sub-sample of participants who were asked both sexual identity questions.

Measures

The 2003 SLS was developed and pilot tested in 1993, and contained several substance use measures, including several items from the *Monitoring the Future Study* (Johnston, O'Malley, & Bachman, 2001), the *CORE Survey* (Presley, Meilman, & Cashin, 1996), and the *College Alcohol Study* (Wechsler et al., 2002). The 2003 SLS used sexual orientation measures adapted from the *Chicago Health and Life Experiences of Women Study* (e.g., Hughes, 2003; Hughes, Johnson, & Wilsnack, 2001).

Sexual identity was measured using the following five-category question: "How would you define your sexual identity? Would you say that you are… (1) only lesbian/gay, (2) mostly lesbian/gay, (3) bisexual, (4) mostly heterosexual, (5) only heterosexual, (6) other (specify) or (7) refused." In addition, one-fourth of the sample was randomly assigned to receive a three-category sexual identity question earlier in the survey: "With respect to your sexual identity, would you say you are… (1) heterosexual, (2) lesbian/gay, (3) bisexual or (4) refused." The three-category sexual identity question appeared as Question 14 and the five-category sexual identity question appeared as Question 92 in the survey. Because participants who answered the three-category sexual identity question did so before answering the five-category question, we considered the possibility that responses to the second question might have been influenced by question order. However, comparisons using a chi-square test of homogeneity indicated no statistically significant differences in the distributions of responses to the five-category question between those who only were asked the five category question and those who were asked both the three and the five category questions ($\chi^2 = 3.6$, df=4). Participants indicating "other" or "refused" were dropped from analyses.

The SLS also included standard measures of substance use, such as cigarette smoking (Johnston et al., 2001), binge drinking (Wechsler, Dowdall, Davenport, & Rimm, 1995), and marijuana and other drug use (Johnston et al., 2001). *Cigarette use* was measured using the following question: "How many cigarettes did you smoke during the past 30 days ?" The response categories were: (1) none, (2) less than 1 cigarette per day, (3) 1–5 cigarettes per day, (4) about ½ pack per day, (5) about 1 pack per day, (6) about 1½ packs per day, and (7) 2 or more packs per day.

Heavy episodic drinking was measured using the following single item question: "Over the past 2 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 liquor, or a mixed drink. The response scale was (1) none, (2) once, (3) twice, (4) 3–5 occasions,(5) 6–9 occasions, and (6) 10 or more occasions (Wechsler et al., 1995).

Marijuana use was measured using the following question: "On how many occasions in the past 12 months have you used marijuana or hashish?" The response scale was: (1) no occasions, (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). We created an *other illicit drug use* variable by summing the total number of illicit drugs used in the past year

(other than marijuana), including cocaine in any form, lysergic acid diethylamide (LSD), other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, gamma-hydroxybutyrate (GHB), and flunitrazepam (Rohypnol).

Data Analysis

Data analysis focused on participants who received both sexual identity questions. First, we examined the associations between sexual identity as measured by each question type and gender, race, and class year using chi-square tests of homogeneity. Next, we compared the prevalence of tobacco, alcohol, marijuana, and other illicit drug use among participants classified as lesbian, gay or bisexual based on the two questions using chi-square tests of homogeneity. Logistic regression models were used to examine the relationship between each sexual identity question and multiple measures of substance use, adjusting for sex, race, and class year. Ordinal outcome measures were collapsed to create dichotomous variables, such that "none" or "no occasions" were coded "0" and all other responses were coded "1". For all logistic regression analyses, the largest category for each measure of sexual identity served as the reference group (i.e., "only heterosexual" for the five-category measure and "heterosexual" for the three-category measure).

Results

Distribution of Sexual Identity

Tables 2 and 3 summarize distributions of sexual identity based on the three- and the five-category sexual identity questions by participants' sex. Among students who were asked both questions, discrepancies in classification occurred equally among the female and male students (0.9% for both). Both male and female participants who self-identified as "lesbian or gay" on the three-category measure chose either "only lesbian/gay" (54.3%, $n = 19$) or "mostly lesbian/gay" (45.7%, $n = 16$) on the five-category measure. A total of 116 female participants and 41 male participants who identified as heterosexual using the three-category format chose "mostly heterosexual" using the five-category format. In addition, half (50.0%) of the male students who chose the bisexual response option on the three-category measure selected a different response on the five-category measure such that the three-category question resulted in a greater number of male participants who self-identified as bisexual ($n = 10$) than the five-category question ($n = 5$). Finally, almost one-third (31.0%) of the female students who chose the bisexual response option on the three-category measure selected "mostly heterosexual" on the five-category measure and the remaining selected "bisexual".

Sexual Identity Measures and Substance Use

In addition to examining the distribution of sexual identities, we investigated the impact of question format on the participants' reports of substance use separately by sex. As shown in Tables 4 and 5, although substance use was generally higher among lesbian/gay and bisexual students than heterosexual students regardless of question type, there were some notable differences in outcomes between the two questions. For example, using responses to the three-category question, rates of monthly cigarette smoking and past-year marijuana use were significantly higher among bisexual females compared with their heterosexual counterparts. However, when responses to the five-category question were compared, we found no such differences. Further, we found odds of binge drinking that were significantly lower for gay men than for heterosexual men in analyses using the three-category format but no significant differences in analyses that used the five-category measure.

We conducted additional analyses and found that by collapsing mostly heterosexual and mostly lesbian/gay responses into the bisexual category, the odds of substance use were

increased for both bisexual women and men. In contrast, when participants who endorsed the *mostly* categories were collapsed into the heterosexual or lesbian/gay categories (and not counted as bisexual), no significant sexual identity differences were found in substance use (data not shown).

Discussion

Findings from this study highlight some of the challenges faced by survey researchers in assessing sexual identity. Indeed, several studies contend that sexual identity is fluid and may be difficult to adequately measure using traditional survey questions that treat sexual identity as static (e.g., Diamond, 2008; Friedman et al., 2004; Peplau & Garnets, 2000; Rothblum, 2000; Rust, 2002). Although the overall proportion of undergraduate students categorized as a sexual minority did not statistically differ between the two measures in this study, we found some important differences in how sexual minority groups were classified. For example, more than one-third of participants who self-identified as "bisexual" on the three-category sexual identity measure chose "mostly heterosexual" or "mostly lesbian/gay" when answering the expanded five-category measure. These students would have been misclassified as either gay/lesbian or heterosexual had we used the five-category measure and collapsed the categories outward, as is common practice.

Our findings also indicate that decisions regarding the measurement and coding of sexual identity in survey research may have important implications in terms of substance use outcomes. Recent work recommends using "mostly heterosexual" and "mostly lesbian/gay" categories for measuring sexual identity among adolescents and young adults (Austin et al., 2007; Saewyc et al., 2004; Thompson & Morgan, 2008); however, very little research has examined the association between the "mostly" categories and health outcomes such as substance use. Notably, we found that participants who endorsed the "mostly heterosexual" category reported the highest rates of substance use, which is consistent with a growing literature indicating heightened health risks among individuals who identify in this manner (Austin et al., 2009; Corliss, Rosario, Wypij, Fisher, & Austin, 2008; Hughes, Szalacha & McNair, 2010; Hughes, Szalacha, Johnson et al., 2010; Ziyadeh et al., 2007).

Austin et al. (2007) conducted cognitive processing interviews regarding sexual identity measures and found that adolescents preferred the "mostly" categories because these options most closely reflected their feelings of being somewhere between the categories of heterosexual, bisexual, and lesbian/gay. Our results indicate that nearly all individuals who identified as "mostly heterosexual" according to the five-category sexual identity measure selected "heterosexual" on the three-category measure. The five-category measure identifies a subgroup of men and women who had greater odds of using more substances than any of the five sexual minority subgroups. It seems plausible that individuals who selected "mostly heterosexual" could represent a subgroup who lack a recognized group sexual identity and that this may contribute to their heightened risk for substance use. It is also possible that such individuals are in an identity exploration stage and have not yet clearly committed to a particular sexual identity (Cass, 1979, 1996). Such exploration may extend to a number of areas, including experimentation with alcohol and other drugs, and this may contribute to high-risk substance use behaviors among these individuals (Bishop, Macy-Lewis, Schnekloth, Puswella, & Struessel, 1997). Thus, it seems advisable to exercise caution when recoding and combining data involving the "mostly" sexual identity categories.

All of the participants in the current study who identified as non-heterosexual showed heightened risk on each of the substance use outcomes assessed in the study with the exception of binge drinking. However, in analyses using the three-category sexual identity format, men who identified as gay had significantly lower odds of binge drinking than

heterosexual men (but this was not the case in analyses using the five-category sexual identity measure). Although the small cell sizes of some of the subgroups in analyses using the five-category measure may have contributed to the statistically non-significant findings, our results were consistent with previous research indicating that gay men were at lower risk for binge drinking than their heterosexual peers (Eisenberg & Wechsler, 2003; McCabe et al., 2003,2005). Given the potentially harmful impact of binge drinking among adolescents/ young adults (Presley et al., 1996; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994), and the need for preventive interventions that more effectively target subgroups at highest risk for this pattern of drinking, substance abuse researchers need to understand the implications of using broader versus more nuanced measures to assess sexual orientation.

In much of the previous health research with sexual minority groups, data from bisexual participants have either been combined with data from lesbians or gay men (e.g., Bontempo & D'Augelli, 2002; Garofalo et al., 1998; Mays & Cochran, 2001; Mays, Yancey, Cochran, Weber, & Fielding, 2002) or excluded from analyses (e.g., Aaron et al., 2001; Hughes et al., 2005). However, recent studies that have included comparisons of bisexual participants have found that bisexual women and men (whether defined based on identity, attraction or sexual behavior) generally report higher rates of substance use and poorer mental health outcomes than their heterosexual counterparts and, in some cases, than their lesbian/gay counterparts as well (e.g., Bostwick et al., 2010; Corliss et al., 2008; Eisenberg & Wechsler, 2003; McCabe et al., 2004, 2009; Wilsnack et al., 2008). Given our finding that bisexual groups, specifically bisexual women, reported significantly higher frequencies of substance use when using the three-item measure, we recommend that researchers exercise caution when combining all non-heterosexuals into an umbrella "sexual minority" category. This practice may inflate estimates of risk and substance use behaviors among some groups and erroneously weaken estimates among others. Where possible, sexual orientation groups should be considered separately in analyses. If there are theoretical or conceptual reasons for creating an omnibus "sexual minority" category, this should be made explicit. In those instances where researchers choose to combine groups to enhance statistical power, they should at least report whether or not separate analyses produced different results. Finally, because it is still common practice to combine all "non-heterosexual" groups, comparisons between studies must be made cautiously and only after careful consideration of the format and wording of questions in the studies being compared.

The present study included a number of strengths, such as the probability-based simple random sample and randomized design. However, subgroups of sexual minorities were small and therefore, substantially limited statistical power to detect differences that may have been apparent in larger samples. Also, the student population was predominantly White, traditional-age (18–22 years of age), and middle to upper class. Thus, results cannot be generalized to all university or college populations. More research is needed with more diverse populations, with a broader age range that includes both college students as well as those not attending college. Although data collected in 2003 may represent a limitation, the challenges of measuring sexual identity remain highly relevant. Furthermore, the prevalence of sexual minorities has remained stable over time. Data collected for the SLS between 2001 and 2009 show very little variation in prevalence based on self-identity: 2001 (3.3%), 2003 (3.2%), 2005 (3.3%), 2007 (3.3%) and 2009 (3.3%). We chose to focus on sexual identity in order to compare our results with other studies of college-age sexual minorities that have used three- and five-category measures.

Concerns about response bias due to the sensitive nature of the questions were lessened by findings that our study sample resembled the overall student population and that reported rates of substance use and sexual minority identity were similar to those found in previous adolescent and college-based studies (e.g., Garofalo et al., 1998; Johnston, O'Malley,

Bachman, & Schulenberg, 2004; McCabe et al., 2003; Mohler-Kuo, Lee, & Wechsler, 2003). Nevertheless, the possibility of under-reporting of both substance use and sexual minority identity cannot be ignored. The small cell sizes of some of the subgroups may have contributed to some of the statistically non-significant findings in the present study.

Although it is reasonable to posit that having an additional sexual identity question earlier in the survey may have biased responses to the later question, we found no statistically significant differences in the response distributions on the five-category sexual identity measure depending on which survey was utilized. This suggests that responses were not substantially influenced by including the earlier question. Discrepancies were rare and appeared to be the result of participant error. For example, four students who indicated they were heterosexual on the three-category sexual identity question chose "only lesbian/gay" on the five-category measure, suggesting that they either misread or misunderstood one or both of the questions.

Because few studies have been conducted using a Web-based survey approach, we are uncertain about potential mode effects. Past research on sexual orientation and health outcomes has involved a wide range of data collection modalities, including face-to-face interviews (e.g., Floyd & Stein, 2002; Hughes et al., 2006; Scheer et al., 2003), telephone interviews (e.g., Diamant, Wold, Spritzer, & Gelberg, 2000; Mays & Cochran, 2001; Mays et al., 2002), self-administered survey questionnaires sent via U.S. mail (e.g., Eisenberg & Wechsler, 2003), self-administered survey questionnaires conducted in school classrooms (e.g., Bontempo & D'Augelli, 2002; Garofalo et al., 1998), and mixed methods of data collection (e.g., Jorm et al., 2002; Russell et al., 2002). Previous research has found that a Web-based survey mode of administration produced the same proportion of sexual minorities as a U.S. mail-based survey mode of administration among undergraduate college students (about 3%), as well as similar substance use outcomes (e.g., McCabe, 2004; McCabe, Boyd, Couper, Crawford, & d'Arcy, 2002). In addition, the Web-based survey mode of administration resulted in a final sample that more closely matched the demographic characteristics of the target sample than the traditional U.S. mail-based survey mode. Nevertheless, given previous research indicating that different modes of data collection can lead to substantially different prevalence estimates, especially in response to questions related to sensitive topics such as illicit drug use and sexual behavior (e.g., Fendrich & Johnson, 2001; Gfroerer, Wright, & Kopstein, 1997; Sudman, 2001; Turner et al., 1998; Wright, Aquilino, & Supple, 1998), more research is needed to examine how different survey modes influence the reporting of sexual identity and sensitive health outcomes, and whether differences in question wording and alternative modes of data collection interact to affect survey responses.

Future research is needed with measures of sexual identity not examined in the present study. For example, a seven-category measure might provide even more nuanced variations in sexual identity. However, such studies will require much larger samples given that a seven-category measure would result in even smaller sample sizes for some of the subgroups. Finally, the present study relied largely on one-item measures for purposes of making comparisons and future work should consider more comprehensive measures.

In conclusion, our findings illustrate several challenges associated with assessing sexual identity in survey research. We found evidence that the five-category response scale may under-count bisexual participants and that substance use outcomes can differ based on the type of sexual identity question used and how responses are analyzed. These findings suggest that researchers need to carefully consider question wording, as well as whether and how to recode responses to questions related to sexual orientation. It is also important to describe methods used to code and analyze data, as well as the rationale for such decisions.

Acknowledgments

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Table 1

Demographic characteristics of participants who were asked both sexual identity questions (n = 2,077)

Response option categories	Gender		Race			Class year*			
	Male (n=870) %	Female (n=1207) %	White (n=1409) %	Asian (n=278) %	Other (n=390) %	Freshmen (n=330) %	Sophomore (n=508) %	Junior (n=545) %	Senior (n=683) %
Three-category sexual identity									
Heterosexual (n = 2003)	42	58	68	14	19	16	25	26	33
Bisexual (n = 39)	26	74	62	5	33	23	26	18	33
Lesbian/gay (n=35)	74	26	77	3	20	20	11	34	34
Five-category sexual identity									
Only heterosexual (n = 1841)	43	57	68	14	18	16	25	26	33
Mostly heterosexual (n = 169)	26	74	71	9	20	16	23	25	35
Bisexual (n = 26)	23	77	58	12	31	15	19	23	42
Mostly lesbian/gay (n= 18)	67	33	56	6	39	28	11	28	33
Only lesbian/gay (n=23)	78	22	91	0	9	13	17	35	35

* *Note:* There were 11 participants indicating "Heterosexual" on the three-category sexual identity question who did not respond with a class level; of these 11 participants, 8 indicated "Only heterosexual" and 3 indicated "Mostly heterosexual" on the five-category sexual identity question

Table 2

Percentage distributions of sexual identity based on participants asked two sexual identity measures, female sample

	Three-category sexual identity measure		
	Heterosexual (n)	Lesbian (n)	Bisexual (n)
Five-category sexual identity measure			
Only heterosexual	1051	0	0
Mostly heterosexual	116	0	9
Bisexual	0	0	20
Mostly lesbian	0	6	0
Only lesbian	2	3	0

Table 3

Percentage distributions of sexual identity based on participants asked two sexual identity measures, male sample

	Three-category sexual identity measure		
	Heterosexual (n)	Gay (n)	Bisexual (n)
Five-category sexual identity measure			
Only heterosexual	790	0	0
Mostly heterosexual	41	0	3
Bisexual	1	0	5
Mostly gay	0	10	2
Only gay	2	16	0

Table 4

Prevalence and logistic regression models among participants asked both sexual identity questions: substance use outcomes, female sample

Response option categories	Cigarette use in past 30 days		Binge drinking in past 2 weeks		Marijuana use in past year		Other illicit drug use in past year[a]	
	%	AOR[b] (95% CI)	%	AOR[b] (95% CI)	%	AOR[b] (95% CI)	%	AOR[b] (95% CI)
Three-category sexual identity								
Heterosexual	17.3	–	51.0	–	34.5	–	7.5	–
Bisexual	37.9	2.9 (1.3, 6.2) **	51.7	1.0 (0.5, 2.0)	69.0	4.1 (1.9, 9.2) **	24.1	4.0 (1.7, 9.8) **
Lesbian	44.4	3.7 (1.0, 13.9)	44.4	0.7 (0.2, 2.7)	55.6	2.3 (0.6, 8.6)	22.2	3.3 (0.7, 16.3)
		1249		1237		1209		1216
Five-category sexual identity								
Only heterosexual	15.6	–	49.9	–	32.2	–	6.1	–
Mostly heterosexual	31.7	2.5 (1.7, 3.8) ***	56.3	1.3 (0.9, 1.9)	57.1	2.8 (1.9, 4.1) ***	19.0	3.6 (2.1, 6.1) ***
Bisexual	28.6	2.2 (0.8, 5.7)	42.9	0.8 (0.3, 1.8)	52.4	2.4 (1.0, 5.7)	28.6	6.5 (2.4, 17.7) ***
Mostly lesbian	33.3	2.5 (0.5, 14.0)	50.0	0.9 (0.2, 4.7)	50.0	1.8 (0.4, 9.3)	33.3	6.2 (1.1, 35.4) *
Only lesbian	60.0	8.0 (1.3, 48.7) *	40.0	0.6 (0.1, 3.7)	80.0	8.4 (0.9, 77.1)	0.0	–
		1208		1201		1200		1207

Note: The dash (–) indicates reference group. Sample sizes ranged from 1200 (marijuana use in past year, five-category measure) to 1249 (cigarette use in past 30 days, three-category measure) to missing responses. The model for other illicit drug use for the five-category measure did not converge due to the zero cell

*
$p<.05$

**
$p<.01$

***
$p<.001$

[a] Other illicit drug use consisted of *any* use of cocaine, LSD, other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, GHB or Rohypnol

[b] Odds ratios were adjusted for race and class year. The results for these variables are not shown

Table 5

Prevalence and logistic regression models among participants asked both sexual identity questions: substance use outcomes, male sample

Response option categories	Cigarette use in past 30 days		Binge drinking in past 2 weeks		Marijuana use in past year		Other illicit drug use in past year[a]	
	%	AOR[b] (95% CI)	%	AOR[b] (95% CI)	%	AOR[b] (95% CI)	%	AOR[b] (95% CI)
Three-category sexual identity								
Heterosexual	22.8	–	57.6	–	37.1	–	13.4	–
Bisexual	38.5	2.3 (0.7, 7.2)	53.8	1.1 (0.3, 3.2)	54.5	2.7 (0.8, 9.3)	45.5	6.6 (1.9, 22.9) **
Gay	18.5	0.8 (0.3, 2.0)	37.0	0.4 (0.2, 0.9) *	51.9	1.8 (0.8, 3.8)	22.2	1.8 (0.7, 4.7)
		917		914		882		887
Five-category sexual identity								
Only heterosexual	20.5	–	56.5	–	36.7	–	12.3	–
Mostly heterosexual	42.6	2.9 (1.6, 5.3) **	63.8	1.4 (0.7, 2.6)	53.2	2.0 (1.1, 3.7) *	38.3	4.5 (2.4, 8.5) ***
Bisexual	14.3	0.7 (0.1, 6.1)	28.6	0.4 (0.1, 2.1)	28.6	1.0 (0.2, 5.1)	14.3	1.6 (0.2, 13.6)
Mostly gay	16.7	0.8 (0.2, 3.9)	50.0	0.9 (0.3, 2.8)	66.7	4.4 (1.3, 15.2) *	41.7	6.0 (1.8, 20.0) **
Only gay	16.7	0.7 (0.2, 2.6)	38.9	0.4 (0.1, 1.0)	38.9	0.9 (0.4, 2.5)	11.1	0.8 (0.2, 3.6)
		869		868		865		870

Note: The dash (–) indicates reference group. Sample sizes ranged from 865 (marijuana use in past year, five-category measure) to 917 (cigarette use in past 30 days, three-category measure) due to missing responses. The models for other illicit drug use for the three-category and five-category measures did not converge

*
$p<.05$

**
$p<.01$

***
$p<.001$

[a] Other illicit drug use consisted of *any* use of cocaine, LSD, other psychedelics, amphetamines, crystal methamphetamine, heroin, inhalants, ecstasy, GHB or Rohypnol

[b] Odds ratios are adjusted for race and class year. The results for these variables are not shown