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Social influences on substance-use behaviors of gay, lesbian, and bisexual college students: findings from a national study

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Abstract

A variety of social factors are expected to contribute to health behaviors among college students. The goal of this paper is to describe the relationships of two different aspects of the campus social environment, namely the campus resources for gay, lesbian, and bisexual (GLB) students and the campus-wide behavioral norms of substance use, to the individual substance-use behaviors of college students with same-sex experiences. Individual-level data come from 630 college students reporting same-sex experience, who were part of a national random sample returning questionnaires. Current cigarette smoking and binge drinking were examined. College-level data regarding the campus resources designed for GLB students were collected and used with campus-wide substance-use norms to predict individual substance use in logistic regression analyses. One-third to one-half of students reported current smoking and binge drinking, by sex and sex-partner category. The presence of GLB resources was inversely associated with women's smoking and directly associated with men's binge drinking behaviors. The proportion of students reporting same-sex behavior on campus was directly associated with these same outcomes, and behavioral norms were not associated with either outcome. Findings provide a glimpse into the influence of the social environment on the use of two of the most widely used substances at American colleges, and suggest that contextual approaches to explaining and controlling substance use may be important.

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Introduction

Recent research on substance-use behaviors among college students has suggested that cigarette smoking and alcohol use are widespread on American college campuses (Sax, 1997; Centers for Disease Control and Prevention, 1997; Wechsler, Dowdall, Maenner, Gledhill-Hoyt, & Lee, 1998a; Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998b; Wechsler, Lee, Kuo, & Lee, 2000; Rigotti, Lee, & Wechsler, 2000). While the overall

smoking rate among adults has decreased steadily over the past several decades, the prevalence of current (i.e. past 30 day) smoking among college students has risen recently (Sax, 1997; Centers for Disease Control and Prevention, 1997; Wechsler et al., 1998b; Rigotti et al., 2000; Centers for Disease Control and Prevention, 2000). This is true despite the fact that smoking is much less common among college educated adults than among those with less education (Pamuk, Makuc, Heck, Reuben, & Lochner, 1998). Excessive alcohol use is also problematic among college students. One study found 44% of students reported binge drinking, and 23% engaged in this behavior frequently (Wechsler et al., 2000). Alcohol use was associated with a variety of academic, personal and social problems, including missing classes, having unprotected sex, driving while

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intoxicated, and generally “doing something you regret” (Wechsler et al., 1998a).

Very few studies have focused on gay, lesbian, and bisexual (GLB) college students. The many studies of sexual behavior using college samples are typically too small to include a large enough number of GLB students to make valid comparisons to straight students. The large national studies of college students, by contrast, have not included the questions on sexual orientation or same-sex behaviors necessary to identify groups for comparison. Research on GLB adolescents and adults, however, indicates that substance use is more prevalent among GLBs than among heterosexuals (Bradford, Ryan, & Rothblum, 1994; McKirnan & Peterson, 1989; National Institute on Drug Abuse, 1991; Cabaj, 1992; AMA, 1996; Garofalo, Wolf, Kessel, Palfrey, & DuRant, 1998), though this disparity may be less than was previously estimated (Hughes & Eliason, 2002). Indeed, one recent study indicated that substance-use rates were similar for students with only same-sex partners and those with opposite-sex partners, but women with both male and female partners were more likely to smoke cigarettes, binge drink, and use marijuana than other female college students (Eisenberg & Wechsler, in press).

Cigarette smoking and alcohol use behaviors among US college students stem from a variety of factors occurring at multiple levels. Personal factors such as age, race and involvement with fraternities, sororities and college athletics have been shown to be associated with smoking and binge drinking among college students (Wechsler, Dowdall, Davenport, & Castillo, 1995a; Rigotti et al., 2000; Nelson & Wechsler, 2001). In a comprehensive review, Hughes and Eliason (2002) detail the many risk and protective factors which may be particularly useful in understanding substance use in GLB populations, including personal factors (such as social roles), social-psychological factors (such as stress), and interpersonal factors (such as peer and partner substance use). Little information exists, however, on the role of institutional or environmental factors which may also be influential to substance-use behaviors among GLBs.

Characteristics of the social sphere have been related to individual health behaviors and outcomes in a variety of domains (Amick, Levine, Tarlov, & Walsh, 1995; Yen & Syme, 1999; Berkman & Kawachi, 2000). In particular, a number of contextual variables describing the neighborhood context, local policies, pricing strategy, social climate of schools or geographic regions, or the behavioral norms of a reference group have been related to substance use among adolescents and adults (Harford & Grant, 1987; US Department of Health and Human Services, 1994; Karvonen & Rimpela, 1996; Beck & Treiman, 1996; Jones-Webb, Snowden, Herd, Short, & Hannan, 1997; Rountree & Clayton, 1999;

Wechsler, Lee, Gledhill-Hoyt, & Nelson, 2001a; Wechsler, Lee, & Rigotti, 2001b; Czart, Pacula, Chaloupka, & Wechsler, 2001). To our knowledge, this type of environmental variable has not been examined for substance use among GLB college students.

The current study, therefore, is an exploration of the association of two elements of the college social environment with cigarette smoking and binge drinking among GLB college students. In particular, this study examines campus resources for GLB students and the behavioral norms (i.e. campus-wide prevalence) of smoking and drinking. We hypothesize that (a) GLB¹ students at colleges with more comprehensive resources for GLBs will be less likely to use substances than their counterparts at colleges with fewer resources, and (b) GLB students at colleges where substance use is more prevalent among all students will be more likely to smoke and binge drink than those at colleges where use of these substances is less common.

Methods

College Alcohol Study (CAS) data set

Population, setting, data collection

This paper reports results from two data sources—individuals and colleges. Data come from the 1999 CAS, which used a nested random sampling strategy to survey students at American colleges and universities. One hundred and ninety-five institutions were randomly selected from a list of accredited 4-year colleges provided by the American Council on Education. The sample was selected using probability proportionate to the size of undergraduate enrollment at each institution. One hundred and forty colleges participated in the first survey in 1993, 130 participated in the 1997 follow-up, and 128 participated in the 1999 follow-up. The main reason for colleges' non-participation was administrators' inability to provide student contact information within the time parameters of the study.

Administrators at each participating college provided a random sample of 225 full-time undergraduate students. Self-administered 20-page questionnaires were mailed directly to students at the 128 participating colleges in February, March, and April 1999. Reminder postcards and surveys were also sent. Participation was voluntary, anonymous, and encouraged by a cash incentive. The average college response rate was 60%, but varied among the participating colleges (range = 49–83%). To be included in the final CAS sample of colleges

¹Note that although the term “gay, lesbian, and bisexual” or “GLB” will be used to refer to the group of students in this study reporting same-sex experience, these students have not self-identified as gay, lesbian, or bisexual.

(across all three waves), colleges had to meet minimal response rate criteria (at least 50% response rate in at least two of the three waves and at least 40% response rate in the third). One hundred and nineteen schools met these criteria, and data from 14,138 students were included in the final 1999 sample. Overall rates of binge drinking were not changed by the exclusion of low-response schools. Additional details about the CAS sampling strategy and data collection are given elsewhere (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994; Wechsler et al., 2000; Rigotti et al., 2000).

Measures

A single survey item was used to categorize students by their sexual-partner experience: “If you have ever been sexually active, has it been with... (a) I have not been sexually active, (b) Opposite sex partner(s), (c) Same sex partner(s), or (d) Both opposite and same sex partners”. All those who gave responses “c” or “d” were included in the present analyses.

Health behaviors assessed in this study include current tobacco use and binge drinking behavior. Tobacco use was measured with the item “How often, if ever, have you used any of the drugs listed below?” and responses included: (a) never used, (b) used but not in the past 12 months, (c) used but not in the past 30 days, and (d) used in the past 30 days. Current smokers were those who indicated they had smoked a cigarette in the past 30 days. Binge alcohol drinking was measured according to the gender-specific 5/4 binge drinking definition (Wechsler, Dowdall, Davenport, & Rimm, 1995b) with the item “in the last two weeks, how many times have you had 4 (or 5) drinks in a row?” (for females or males, respectively), and responses were ordinal, ranging from 0 to 10 or more times. Those who reported at least one episode of binge drinking in the past 2 weeks were considered binge drinkers for this study. Additional variables previously shown to be associated with substance use were also included, specifically three college life variables (membership in a fraternity or sorority, participation in college athletics, and on- or off-campus residence) and major demographic variables (sex, age, race, Hispanic ethnicity, and marital status).

College-level data set

Data collection

The college-level data set was composed both of measures derived from the CAS data and from measures of the GLB-related resources collected from each college. College-level data were collected from the 119 colleges between April and August 2000, regarding institutional policies and programmatic resources for gay, lesbian and bisexual students (described below). All relevant information posted on college websites was gathered first, and additional information not available

on-line was requested through e-mail correspondence or telephone conversations with college representatives (typically an administrative official or the student president or faculty/staff advisor to the gay and lesbian student organization). Multiple attempts were made to contact college representatives. Complete data were obtained from 109 colleges (92%), and partial information was available for the remaining 10 colleges.

Measures

The index of resources for GLB students was assessed through several different measures of institutional policy and resources. The presence of a *GLB student organization* was assessed first (recorded as no group, 1 group, or 2 or more groups); followed by details about the organization(s), including the *frequency of meetings* (less than once/week, once/week, or more than once/week), *year the first group was founded* (1970s, 1980s, 1990–1994, 1995 or later), and the appointment of a *paid staff person* focused on GLB programming (yes/no). The existence of a university-wide *equal opportunity policy* which explicitly mentioned sexual orientation as a protected class was recorded (yes/no). The presence of a formal *GLB studies program* (yes/no) and the number of academic *courses* with GLB issues specified in the course title (none, 1–2 courses, 3 or more courses) were also measured. The presence of *campus housing units* specified as GLB-friendly (yes/no), a *SafeZone or Allies* (or similar) program whereby supportive faculty and staff can identify themselves as part of a support system to students concerned about GLB issues (yes/no), and *other GLB-specific resources* such as counseling or a resource library (none, some additional resource, many additional resources) were also measured. Responses were standardized to a scale of 0–2 (e.g., no = 0, yes = 2), and summed to a single index of GLB resources with a potential range of 0–20. Although mathematically each item was given equal weight, the measure of GLB student organizations inherently carried more weight, as the follow-up details (e.g. frequency of meetings) were only collected for colleges with at least one GLB group. A college with multiple GLB organizations that were established early and meet frequently would therefore obtain a much higher index score than a college without a GLB group. This inherent weighting reflects the fact that a GLB student group is typically the most visible campus resource for students and is often the focal point of GLB campus life.

The behavioral norms for smoking and binge drinking were derived from the CAS data. For each college, the proportion of all students reporting each behavior was used as its behavioral norm. This was done for the 119 schools in the sample which met minimum response rate criteria (described above), as response rates were not correlated with prevalence of substance use on campus. In addition, the proportion of students at each

institution reporting same-sex behavior was calculated from CAS data and was used as another contextual measure of the social environment around GLB students.

Several other college characteristics were controlled in these analyses, including size of the student body, competitiveness (based on ACT and SAT scores and percentage of applicants accepted; [Barron's Profiles of American Colleges, 1996](#)), region of the country, religious affiliation, and whether the college was public or private, coeducational or women-only, rural or urban, or a commuter school (defined as schools with $\geq 90\%$ of students living off campus).

The 119 participating colleges are located in 39 states. Two-thirds are public institutions and one-third are private. Forty-four percent of colleges sampled enroll more than 10,000 students, 23% enroll 5001–10,000 students, and 34% enroll 5000 or fewer students. Approximately two-thirds are in an urban or suburban location and one-third are in a rural or small town setting. Fifteen percent have a religious affiliation, and 5% enroll only women.

Data analysis

Of the 14,138 respondents in the 1999 sample, 10,301 students (73%) reported being sexually active. Of these, 435 women and 195 men had been sexually active with same- or both-sex partners and were not missing data on sex, substance use, or other key variables; this constituted the final sample for the current analysis. In addition, one college with a particularly stringent behavioral code for students was a low outlier on both substance-use behavioral norms, and no students from that college reported same-sex behavior; this college was dropped from analysis to avoid skewing results.

Convergent analysis tested the construct validity of the GLB resources index by assessing its performance against other factors. As predicted, *t*-tests demonstrated that colleges in the South of the US tended to have significantly lower GLB resource scores than those not in the South ($p < 0.05$), and the 18 colleges with a religious affiliation had, on average, marginally lower scores than those without a religious tie ($p = 0.08$). In addition, college GLB resources scores had a marginally significant Spearman correlation with state policies regarding GLB issues, such that schools with more support tended to be located in states with more liberal policies towards gays and lesbians ($p = 0.05$).

t-Tests and one-way ANOVAs were used to test the hypotheses that GLB resources and behavioral norms were consistent across different types of institutions. Multivariate logistic regression was conducted using a generalized estimating equation (GEE) to control for the clustering inherent in the sampling design ([Zeger & Liang, 1988](#)); this provided accurate standard errors for both individual-level and contextual-level parameter

estimates and thus appropriate tests of significance. For each outcome, models were built by first entering all covariates into a single model, then eliminating those clearly not relevant to the associations being tested (i.e., those with *p*-values greater than 0.20). Models were stratified by sex.

Results

Student characteristics

Characteristics of the student sample are shown in [Table 1](#). Over twice as many women reported both-sex partners as only same-sex partners. For men, this was reversed; approximately one-third more men reported only same-sex partners as both-sex.

The majority of students in the sample were of traditional college age (18–22 years) and were white, non-Hispanic. Most students were not married, but some proportion of respondents with only same-sex experience reported their status as married (5% of men, 16% of women). Because same-sex marriages are not legally recognized in the US, we assume these respondents were indicating their involvement in a “marriage-like” partnership. Most students were also not deeply involved in organized campus life: a majority lived off-campus, and 7–18% were involved in either the Greek system or college athletics. Demographic information for students with only opposite-sex experience is also shown in [Table 1](#), for comparison.

One-third to one-half of students with same-sex or both-sex experience reported current smoking, by sex and sex-partner category. Women with both-sex partners had the highest prevalence (51%) and women with only same-sex partners had the lowest prevalence (33%). The same pattern was evident for binge drinking: 53% of women with both-sex partners and 39% of women with same-sex partners reported this behavior. The two GLB groups of men had intermediate prevalences for both behaviors.

College characteristics

The extent of GLB resources varied considerably across colleges. Most colleges, however, had at least one GLB student organization, and the majority of these were well-established and met regularly. Most schools had equal opportunity policies which specifically included sexual orientation as a protected class, and many offered other academic and/or support services geared towards GLB students. Specific resources are described in greater detail elsewhere ([Eisenberg, 2002](#)). Mean GLB resource score was 7.01 (std = 4.34, range 0–17). A high score indicates an environment with greater resources for GLB students.

Table 1
Characteristics of the sample of students with same-sex experience (percent)

	Same-sex only		Both opposite and same-sex		Opposite-sex only	
	Males	Females	Males	Females	Males	Females
<i>N</i>	112	134	83	301	3896	5775
<i>Demographics</i>						
Age 22 or younger (%)	66	63	66	67	78	74
Race (white)	70	72	78	80	80	80
Hispanic (yes)	6	10	11	9	7	8
Married (yes)	5	16	4	9	11	8
<i>College life</i>						
On-campus housing	41	31	38	35	41	39
Greek member (yes)	13	10	17	7	13	16
College athlete (yes)	14	15	18	11	10	22
<i>Substance-use behaviors</i>						
Cigarette smoking (past 30 days)	36	33	39	51	33	34
Binge drinking (past 2 weeks)	50	39	47	53	59	46

In addition, an estimate of the size of the GLB community was obtained by calculating the proportion of students per college who reported ever having a same-sex partner. Across all colleges, approximately 6% of students sampled reported ever having a same-sex partner, and this proportion ranged from 0% to 19% by college.

The behavioral norms of smoking and binge drinking also varied across college campuses. The average prevalence of current smoking across colleges was 29% (std=8.1), ranging from 11% to 48% of students reporting smoking cigarettes in the 30 days preceding the survey. Binge drinking was slightly more common, with an average prevalence of 44% across colleges (std=14.1). This proportion ranged from 9% to 76% by colleges. These behavioral norms were significantly correlated with each other at the college level ($r = 0.71$, $p < 0.001$), but neither norm was associated with college GLB resources in bivariate correlational analysis ($r_{\text{smoking/resources}} = 0.004$; $r_{\text{binge/resources}} = -0.03$).

The social variables assessed in this study differed according to several college characteristics, as shown in Table 2. Large colleges, public, and coeducational institutions had, on average, more resources to support GLB students. Substance use was less prevalent at commuter schools and differed by region of the country. In addition, more competitive schools, those located in rural or small town settings, and coeducational colleges tended to have a higher prevalence of binge drinking among all students.

Cross-level associations

Final models for cross-level multivariate analyses predicting individual smoking and binge drinking

behavior are shown in Table 3. When the four variables of interest (i.e. GLB resources, behavioral norm, percent of students with same-sex behavior, and individual sex-partner group) were included simultaneously, and individual- and college-level covariates were entered into the model, the GLB resource score was a significant predictor of substance-use behavior. After removing extraneous non-significant variables from the model, these associations became even more pronounced. For women's smoking, there was an inverse association, such that women at schools with more GLB resources were less likely to report recent smoking, as hypothesized. One-unit on the GLB resources index was associated with odds of smoking of 0.92. Because the actual, experienced difference in GLB resources is typically greater than that measured by a single unit, the odds ratio was also calculated to compare the odds of smoking given a more substantial difference in resources: for females at a school with extensive GLB resources (i.e. 75th percentile), the odds ratio for smoking was 0.48 compared to women at a school with few GLB resources (i.e. 25th percentile). The relationship of GLB resources to men's binge drinking behavior was the reverse, however, with odds of 1.11 associated with each unit on the resources index. Thus, the odds of a man's binge drinking at a school with extensive GLB resources were 1.98 compared to a man at a school with few GLB resources. The presence of resources was not associated with men's smoking or women's binge drinking.

The percent of students with same-sex experience was used as an additional measure of the college social environment and also exhibited an association with women's smoking and men's binge drinking in the final models. In both cases, a greater proportion of students

Table 2
Mean GLB resources index score and behavioral norms, by college characteristic

College characteristic	<i>N</i>	GLB resources index	% Smoke cigarettes	% Binge drink
Total	118	7.01	0.29	0.44
Commuter school ^a	18	8.63	0.23	0.31
Not commuter school	100	6.79	0.29	0.45
<i>t</i>		−1.68*	3.19***	6.77****
Not competitive ^b	27	6.63	0.28	0.38
Competitive	42	7.13	0.28	0.41
Very competitive	30	7.12	0.31	0.50
Highly competitive	18	7.56	0.25	0.45
<i>F</i>		0.17	1.71	4.41***
Small: <5000 undergraduates	43	4.69	0.28	0.41
Medium: 5001–10,000 undergraduates	27	7.82	0.29	0.43
Large: >10,001 undergraduates	48	8.78	0.28	0.45
<i>F</i>		12.93****	0.23	0.60
Public	77	7.68**	0.29	0.43
Private	41	5.93	0.27	0.43
<i>t</i>		−2.13**	−1.01	−0.24
Northeast	32	6.91	0.30	0.48
South	34	5.77	0.27	0.41
North Central	33	7.77	0.32	0.47
West	19	8.44	0.22	0.34
<i>F</i>		2.03	7.62****	5.11***
No religious affiliation	100	7.38	0.29	0.44
Protestant	10	5.92	0.24	0.35
Roman Catholic	8	4.67	0.32	0.47
<i>F</i>		1.88	1.64	2.09
Rural/small town	33	7.04	0.30	0.48
Suburban/urban	85	7.08	0.28	0.42
<i>t</i>		0.04	−1.53	−2.05**
Women only	6	3.59	0.27	0.31**
Co-educational	112	7.25	0.29	0.44
<i>t</i>		−2.06**	−0.55	−2.06**

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$

^aCommuter schools were defined as schools with $\geq 90\%$ of students living off campus.

^bCompetitiveness is based on ACT and SAT scores and percentage of applicants accepted, as reported in Barron's profiles of American Colleges.

reporting same-sex experience at a school was associated with a higher likelihood of individual women's smoking (OR = 1.06 for a one-unit difference) and men's binge drinking behavior (OR = 1.16 for a one-unit difference), controlling for other variables in the model. As above, the proportion of the student body with same-sex experience was not associated with men's smoking or women's binge drinking.

Behavioral norms were not significantly related to individual smoking and binge drinking behavior in any model, though the association was near significant

($p < 0.10$) for women's smoking. In this case, women with same-sex experience were somewhat less likely to smoke at schools where this behavior was more prevalent through the whole student body. The relatively large estimated odds ratios in the models shown did not achieve statistical significance in any case due in part to large standard errors associated with the behavioral norms variable; this is likely due to the small number of students with same-sex behavior at each level of the behavioral norms scales (which ranged from 0.11 to 0.48 for smoking and 0.09 to 0.76 for binge drinking).

Table 3
Odds ratios for individual substance-use behaviors

Variable	Cigarette smoking		Binge drinking	
	Female	Male	Female	Male
<i>Main variables</i>				
GLB resources ^a	0.92 (0.87–0.97)	1.07 (0.98–1.17)	0.97 (0.92–1.03)	1.10 (1.02–1.20)
Behavioral Norm ^a	0.10 (0.01–1.27)	5.84 (0.14–248.77)	2.23 (0.53–9.37)	2.07 (0.17–24.95)
Percent with same-sex experience ^a	1.06 (1.00–1.16)	1.08 (0.96–1.21)	0.99 (0.94–1.03)	1.16 (1.01–1.32)
Same-sex partners (vs. both)	0.56 (0.34–.92)	0.80 (0.43–1.48)	0.60 (0.36–1.00)	1.06 (0.52–2.15)
<i>Individual factors</i>				
Age ≤22 years (vs. 23+)	—	—	0.39 (0.25–0.60)	—
White (vs. non-white)	—	—	2.00 (1.17–3.41)	—
Hispanic (vs. not)	0.56 (0.31–1.02)	—	—	—
Married (vs. not)	0.54 (0.31–0.95)	0.13 (0.03–1.27)	0.52 (0.28–0.97)	—
On-campus housing (vs. off-campus)	1.55 (0.95–2.53)	3.06 (1.37–6.82)	—	—
Frat/soro. member (vs. not)	—	4.14 (1.43–11.99)	—	10.91 (3.26–36.47)
Athlete (vs. not)	0.49 (0.23–1.05)	0.33 (0.10–1.11)	—	—
<i>College factors</i>				
% male ^a	4.38 (0.83–23.01)	—	—	0.04 (0.00–1.47)
Black college (vs. not)	0.45 (0.18–1.16)	—	0.39 (0.22–0.70)	0.03 (0.00–0.26)
% in Greek system ^a	4.48 (0.58–34.66)	—	—	—
Public college (vs. private)	0.42 (0.20–0.90)	—	—	0.10 (0.03–0.32)
Rural location (vs. urban or suburban)	—	—	—	2.48 (1.00–6.13)
Region	$\chi^2 = 6.84^*$	$\chi^2 = 7.24^*$	—	—
Competitiveness	$\chi^2 = 14.23^{***}$	—	—	$\chi^2 = 9.46^{**}$
Religious affiliation	$\chi^2 = 2.77$	—	—	$\chi^2 = 15.96^{****}$
Enrollment	$\chi^2 = 9.26^{***}$	—	—	$\chi^2 = 4.69^*$

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, **** $p < 0.001$.

ORs significant at the 0.05 level are shown in boldface.

Commuter was dropped from all final models due to $p < .20$.

Percent male and black college were dropped from smoking model for men only due to empty cells.

Chi-square scores refer to the contribution of multiple categories in each variable group (see Table 2 for categories).

^aORs shown are associated with a one-unit difference in the index of the independent variable.

However, when each norm variable was entered into the model only as a categorical variable (high, medium, or low prevalence of each behavior) to increase the number of respondents at each level, the norms variables still failed to achieve statistical significance at the 0.05 level (results not shown), indicating that the behavioral norms of the entire student body do not appear to have an association with the smoking or binge drinking behavior of individual student with same-sex experience.

As seen previously (Eisenberg & Wechsler, in press), women with only same-sex partners appear to be at lower risk for substance use than those with both-sex partners, controlling for a variety of individual-level and college-level factors (OR = 0.56 for smoking, OR = 0.60 for binge drinking). Interactions of sex-partner group with both GLB resources and behavioral norms were not significant in the final models, indicating that GLB resources and behavioral norms do not appear to function differently for those in each group.

Additional individual and college characteristics were significantly associated with smoking and binge drinking behavior, as shown in Table 3.

Discussion

The results of this analysis suggest that aspects of the college institutional and social environment may be associated with the substance-use behaviors of GLB students, after controlling for several individual and college-level covariates. This was particularly evident for campus GLB resources, which were inversely related to women's smoking (as hypothesized) and directly related to men's binge drinking (contrary to expectations), and the proportion of students reporting same-sex experience, which was similarly related to these same behaviors.

Although these findings appear contradictory, both can be understood in light of the different reasons young people choose to partake of different substances, and the different mechanisms by which social factors might influence behaviors. For example, the presence of a strong GLB student organization might serve to facilitate social connections among GLB students. This could have the dual result of reducing tension about peer and community acceptance—thus reducing a possible trigger to smoke—and could also provide an entrée into mainstream socializing, which typically includes drinking in a college setting (O'Hare, 1990). Although this analysis does not imply such a causal relationship, the different motivations and mechanisms of each substance use are compatible with the observed associations.

The proportion of students reporting same-sex behavior at each school was directly associated with women's smoking and men's binge drinking. To some extent, this proportion represents the size of the GLB community and social scene on campus. Prior research has demonstrated that the size of one's social network and the amount of time spent socializing with friends is positively associated with substance use among college students (Wechsler et al., 1995a; Bell, Wechsler, & Johnston, 1997; Rigotti et al., 2000). We expect this mechanism could be similar for students with same-sex experience, i.e. those who are part of a large social scene of GLB students would be more likely to smoke and binge drink as a function of their social ties and opportunities to socialize or "party". Again, it was not possible to test directly whether the presence of a larger group of students with same-sex experience did indeed translate to more social opportunities for individual students in this subgroup, but this speculation is consistent with previous work in this area.

Although the specific mechanisms by which social factors may act on individual substance use cannot be detailed here, the inclusion of a measure of the amount of time students spend socializing with friends makes it possible to examine this theorized pathway a little further. Subsequent analyses added the number of hours spent socializing to the final models described above. Among GLBs in this sample, time spent socializing had a significant positive association with binge drinking (for both sexes) and women's smoking behavior, similar to what has been found previously among a general sample of college students (Wechsler et al., 1995a; Bell et al., 1997). However, the findings regarding GLB resources and the percent of students with same-sex experience remained virtually unchanged. This suggests that the size of the GLB student body does not function solely through a pathway of increased social ties and opportunities for socializing with peers, but rather speaks to some other social characterization of a college campus, vis-à-vis GLB students.

The school-wide prevalence of substance use did not appear to have an association with the substance-use behaviors of students with same-sex experience. This finding was in contrast to the generally positive association in bivariate GEE models between behavioral norms and individual substance-use behavior among straight students: men at schools with a higher prevalence of smoking were significantly more likely to smoke, and women showed a non-significant positive trend between campus-wide substance use and their individual smoking and binge drinking. Several social scientists have theorized that the behavioral norms of a reference group can be influential on individual behavior (House, Landis, & Umberson, 1988; Rose, 1992; Weinberg, 1994); these findings suggest that the behavioral norms set by a predominantly straight student body may not be particularly salient among GLB students on campus. The lack of a significant relationship could, however, simply be a product of too few students reporting same-sex experience at each behavioral norm level to test this association with adequate power.

Limitations and strengths

Survey data carry several limitations which must be considered in interpretation of these findings. First, because all data described here are based on students' self-reported behaviors, it is possible that social desirability colored responses. However, a number of studies have demonstrated the validity of self-reports of substance use (Midanik, 1988; Frier, Bell, Ellickson, 1991; Harrell, 1997; Caraballo, Giovino, Penchacek, & Mowery, 1998). In addition, the anonymity of student responses was made clear during data collection, which is recommended to minimize under- and mis-reporting of sensitive information, such as sexual behavior (Aday, 1996). The use of survey data also raises a concern about non-response bias. Two strategies were used to detect this bias in the full CAS sample. First, the correlation of colleges' response rates and substance-use rates was calculated and found to be non-significant. Second, a sub-sample of non-respondents completed brief surveys regarding their substance use; their rates of use were not significantly different from respondents to the original survey. The sexual behavior of non-respondents, however, was not assessed; thus, it is impossible to determine the extent to which this study's GLB respondents are representative in terms of sexual orientation. We expect that information regarding sexual behavior is unlikely to be biased by non-response, as this was measured by only one survey item in a 20-page survey primarily focused on alcohol use. The item non-response for the sex-partner experience item was 1.3%.

This is an exploratory study which illustrates associations; it is impossible to infer a causal relationship

between the existence of campus GLB resources and substance-use behaviors. The possibility exists that high school students could have self-selected into colleges based on their GLB resources, campus-wide substance-use norms, or other factors, and these cannot be controlled for in this cross-sectional study. Demonstrating a causal link between the variables addressed here would require a longitudinal analysis charting the advent of certain resources for GLB students and concurrent and subsequent tracking of the substance-use behaviors (and contexts surrounding those behaviors) of affected students. Due to the anonymous nature of data collection in the CAS, this type of individual follow-up was impossible.

Only limited data were available to test possible mechanisms of the associations found, leading to an incomplete picture of the influence of social factors on the substance-use behaviors of students with same-sex experience. This study does, however, generate several research questions for future investigation, such as whether the behavioral norms of GLB students have an association with individual health behaviors among this cohort, how substance use varies among those with same-sex experience according to involvement with supports or resources for GLB students, and what other elements of the college social environment may be influential in the substance-use behaviors of students.

Because the CAS was not designed to test hypotheses related to sexual orientation, measures were not included which would aid interpretation of these findings. For example, the study did not include a measure of “outness”; this characteristic is likely to be relevant to support gleaned from a college’s GLB support structure. This study also did not include other measures of sexual orientation. Researchers on GLB health have used different criteria to identify study populations and draw samples. [Laumann, Gagnon, Michael and Michaels \(1994\)](#) determined three relevant domains: behavioral (having same-sex sexual experience), desire (having a sexual attraction to members of the same sex), and identity (self-identification as gay, lesbian, or bisexual). Although there is considerable overlap of people in these three domains, they do not necessarily capture the same sub-sample. Additional information about the sexual orientation of respondents may have been useful in determining groups for analysis or comparing results based on different criteria for classification as GLB.

We theorize, however, that the measure of lifetime experience of same-sex sexual activity is an appropriate tool to define the GLB subgroup for the present study. Individuals who have same-sex sexual contact but do not self-identify as lesbian, gay or bisexual may be less comfortable with their sexuality than those who are openly gay. This discomfort may put them at higher risk of substance use as a coping mechanism, and they may

be less likely to have “come out” and developed the supportive social ties that might ease their social experiences. In addition, students in this position may be particularly sensitive to subtle messages about the acceptability of same-sex activity on their campus. Prior studies of adult sexual behavior have found a similar proportion of the population reporting same-sex experiences, which lends credibility to these findings ([Diamond, 1993](#); [Laumann et al., 1994](#); [American College Health Association, 2001](#)). Finally, this study uses the largest randomly selected sample of GLB college students to date, which is a strength of this analysis.

Conclusions

This research provides an important first glimpse into the influence of the social environment on the use of two of the most widely used substances at American colleges and universities. The two measures of the institutional and social environment towards gay and lesbian students may in fact serve as a proxy for another social factor, such as a more general socio-political norm of openness or acceptance of “personal choice” activities such as same-sex behavior and substance use. While this type of tolerance might serve students well as they evaluate the meanings and implications of their same-sex experiences, it might simultaneously be permissive of high-risk health behaviors which could pose a threat to the well-being of all students on campus. Additional research is warranted to further characterize this type of socio-political norm and determine its influence on college students’ health behaviors.

Although not definitive in the details of their associations, these findings illustrate an important message for college administrators, college health professionals, and others concerned with student life: context matters. This point suggests a world of different approaches to combating student health issues on campus. Future research will advance our understanding on the precise nature of these relationships and mechanisms through which they operate.

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