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Substance Use among Lesbian, Gay, and Bisexual Clients Entering Substance Abuse Treatment: Comparisons to Heterosexual Clients

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Abstract

Objective: This study evaluated whether sexual orientation-specific differences in substance use behaviors exist among adults entering substance abuse treatment.

Method: Admissions records (July 2007-December 2009) were examined for treatment programs in San Francisco, California receiving government funding. Lesbian, gay, and bisexual (LGB) persons ($n=1441$) were compared

to heterosexual persons (*n*=11770) separately by sex, examining primary problem substance of abuse, route of administration, age of first use, and frequency of use prior to treatment.

Results: Regarding bisexual males, the only significant finding of note was greater prevalence of methamphetamine as the primary substance of abuse. When compared to heterosexual men, gay and bisexual men evidenced greater rates of primary problem methamphetamine use (44.5% and 21.8% respectively versus 7.7%, adjusted odds ratios [ORs] 6.43 and 2.94), and there was lower primary heroin use among gay men (9.3% vs. 25.8%,OR 0.35). Among LGB individuals, race and ethnicity did not predict primary problem substance, except that among LGB men and women, a non-White race predicted cocaine use (OR 4.83 and 6.40, respectively), and among lesbian and bisexual women, Hispanic ethnicity predicted lower odds of primary cocaine use (OR 0.24). When compared to heterosexual men, gay men were more likely to smoke their primary problem substance (OR 1.61), first used this substance at an older age (*M* = 23.16 versus *M*=18.55, *p*<.001), and used this substance fewer days prior to treatment (*M*=8.75 versus *M*=11.41, *p*<.001). There were no differences between heterosexual and lesbian or bisexual women.

Conclusions: There wereunique patterns of substance use for gay and bisexual men entering substance abuse treatment, but women did not evidence differences. Gay men evidenced unique factors that may reflect less severity of use when entering treatment including fewer days of use and a later age of initiation of their primary problem substances. The results underscore the importance of being sensitive to differences between gay, bisexual and heterosexual males when considering substance use disorders.

Public Health Significance Statement: This study suggests that it is important to consider the sexual orientation of individuals entering substance abuse treatment as it may be an indicator of different patterns of substance use, particularly among gay men.

Keywords: Sexual minority, lesbian, gay, bisexual, substance abuse treatment

Sexual Minorities and Substance Use

Research identifying substance use behaviors and substance use disorder epidemiology among lesbian, gay, bisexual (LGB), and sexual minority[1] individuals is relatively new, as it was only in the past two decades that large-scale epidemiological studies started to ask questions about sexual orientation. Estimates of substance use among the sexual minority population vary depending on how sexual orientation and substance use have been measured, in addition to variability based on other aspects of research methodology (Green & Feinstein, 2012). Generally, however, the evidence suggests that sexual minority individuals experience higher rates of alcohol and

substance use disorders relative to heterosexual individuals (Cochran, Ackerman, Mays, & Ross, 2004; Cochran & Mays, 2000; Gilman et al., 2001; King et al., 2008; McCabe, Hughes, Bostwick, West, & Boyd, 2009). While sexual minority individuals evidence greater risk for developing substance use disorders, previous research has also found that sexual minorities are more likely to use substance abuse treatment services (Cochran & Mays, 2000; McCabe, West, Hughes, & Boyd, 2013).

Evidence suggests that there is heterogeneity within sexual minorities based on additional grouping factors such as sexual behavior and sexual identity. For instance, men who identified as gay, but not bisexual were at greater odds of lifetime substance use disorder than those who identified as heterosexual (McCabe et al., 2013). When sexual behavior alone was considered, however, men who had engaged in sexual behavior with both sexes were at higher risk for lifetime substance use disorders, while those who engaged in only same-sex sexual behavior were not at higher risk (McCabe et al., 2013). Furthermore, sexual minority men who engage in both-sex sexual behavior often report higher rates of marijuana and illicit drug use, relative to men who engage in exclusively same-sex or opposite-sex behavior (Bowers, Branson, Fletcher, & Reback, 2011; Eisenberg & Wechsler, 2003; Ford & Jasinski, 2006). Similar patterns of use also exist for women, with those who engage in both-sex sexual behavior reporting higher rates of marijuana and other drug use (Eisenberg & Wechsler, 2003; Ford & Jasinski, 2006).

Emerging evidence also suggests that while there is significant variability in substance use by race and ethnicity for adolescents across all sexual orientations (Bachman et al., 2011), racial differences are not as pronounced among sexual minority adolescents (Newcomb, Birkett, Corliss, & Mustanski, 2014). Among adults, Caucasian LGB men and women evidence elevated rates of substance use problems, relative to their same gender heterosexual counterparts; and this effect remained for lesbian and bisexual ethnic minority women, but not for gay and bisexual ethnic minority men (Mereish & Bradford, 2014). Relative to White sexual minority men, meta-analytic evidence indicates that Black sexual minority men evidence lower risk for illicit drug use generally, and illicit drugs associated with human immunodeficiency virus infection (e.g., nitrites, injection drugs,

crack/cocaine, opiates) in particular (Millett, Flores, Peterson, & Bakeman, 2007; Millett, Peterson, Wolitski, & Stall, 2006). In sum, the research suggests that sexual minority individuals are at higher risk for substance use disorders than heterosexual individuals, but there is variability in patterns of substance use by sexual orientation, gender, and race/ethnicity.

Cochran and Cauce (2006) examined a database of treatment records of state funded substance abuse treatment programs in Washington State and compared transgender and LGB persons to heterosexual persons to identify unique substance use behaviors and treatment needs of LGB clients. Relative to their heterosexual counterparts, LGB clients were less likely to report alcohol and more likely to report cocaine and methamphetamine as their primary substance of abuse; they also reported using their primary substance of abuse more frequently in the 30 days prior to treatment, but did not differ in terms of the age they started using their primary substances of abuse (Cochran & Cauce, 2006). Notably, Cochran and Cauce tested their hypotheses by comparing LGB (considered as a single group) and heterosexual participants and then conducted sex-by-sexual orientation exploratory analyses (Cochran & Cauce, 2006). The exploratory analyses, conducted separately by sex, indicated that gay and bisexual men were more likely to report methamphetamine or "other" drug use than their heterosexual counterparts, while lesbian and bisexual women were more likely to endorse primary heroin use (Cochran & Cauce, 2006). This study was limited by a lack of racial and ethnic diversity (the sample was 70.9% Caucasian) and by a likely underidentification of sexual minorities (Cochran & Cauce, 2006).

Purpose of This Study

This study replicates and extends the work of Cochran and Cauce (2006) and examines the specific patterns of substance use at substance abuse treatment admission in a racially and ethnically diverse urban sample. The study includes an LGB sample that is large enough to allow for *a priori* comparisons of males and females separately. The sample size also allows for comparisons between sexual orientation groups, as opposed to combining gay/bisexual men and lesbian/bisexual women into groups, as was done by Cochran and

Cauce. Finally, for outcomes that pertain to a specific problem substance (e.g., number of days that a substance was used in the 30 days prior to treatment; age of initiation of a substance) the sample size is sufficient for making comparisons across different categories of sexual orientation for each primary problem substance, that is the primary substance for which the individual is seeking substance abuse treatment.

Based on previous research (Cochran & Cauce, 2006) it was anticipated that there would be differences in the substance use behaviors of LGB and heterosexual individuals. Specifically, primary problem substances would differ between LGB and heterosexual clients. We anticipated that gay and bisexual men, relative to heterosexual men, would be more likely to report methamphetamine as their primary substance of abuse, while lesbian and bisexual women would be more likely to endorse heroin as their primary substance of abuse relative to heterosexual women. It was also anticipated that that LGB individuals would report using their primary problem substance at a higher frequency prior to treatment admission, when compared to their heterosexual counterparts. All of the aforementioned predictions, if supported by the data, would replicate findings reported by Cochran and Cauce (2006).

To extend the research base we also expected that, when comparing only individuals with the *same* primary problem substance across levels of sexual orientation, LGB individuals would report a higher-frequency of use of their primary problem substance prior to treatment admission. Furthermore, although Cochran and Cauce did not detect significant differences between the age at which LGB and heterosexual clients first used their primary problem substance, we anticipated that when comparisons of individuals with the same primary problem substance were made across categories of sexual orientation, LGB individuals would evidence earlier ages of initiation of their primary problem substance, as earlier age of initiation among sexual minority youth has been observed for alcohol use (Corliss et al., 2008) and rates of drug use among sexual minority adolescents are significantly higher than their heterosexual counterparts (Corliss et al., 2010). Finally, exploratory analyses examined whether differences existed in route of administration of primary problem substances

between LGB and heterosexual individuals and whether differences in primary problem substance of abuse varied across race and ethnicity.

Methods

This study used data from substance abuse treatment programs within the County of San Francisco, California. Data were collected by substance abuse treatment programs at treatment admission for any individual who received county or state-funded substance abuse treatment within San Francisco County between the dates of July, 2007 and December, 2009. In total, 14,015 individuals sought treatment during this time with their treatment admission information being documented by substance abuse counselors when they entered treatment. A de-identified version of the database was provided to the research team and deemed exempt from institutional review.

Each client who entered treatment during the specified time period had their treatment record in the database, as well as any previous treatment records. As such, there were 107,470 total treatment episodes within the database, representing multiple treatment attempts for each individual (represented by a unique client identifier). For the purposes of this study, the last or more recent treatment record was selected for each individual. Individuals with only one treatment episode in the database were identified as having their treatment record document their initial treatment episode in San Francisco. Individuals were included in this study if they identified their sex as male or female, identified their sexual orientation as heterosexual, lesbian, gay, or bisexual, and did not identify as transgender. Analyses of transgender individuals are reported elsewhere (Flentje, Heck, & Sorensen, 2014).

Measures

The database used items from the California Outcomes Measurement System, which was used previously in other peer reviewed research (e.g., Brecht & Urada, 2011; Conner, Hampton, Hunter, & Urada, 2011; Evans, Jaffe, Urada, & Anglin, 2011; Gonzales, Brecht, Mooney, & Rawson, 2011; Swartz, 2010). The following outcomes were included in the database and were used for this study:

primary problem substance of use, frequency of use of this substance, age first used this substance, and route of administration of primary drug of abuse. When measuring days of use, the form queried the 30 days prior to treatment admission: "In the past 30 days: Days used primary substance." This particular study only used data from San Francisco County, as San Francisco was one of the few places that tracked sexual orientation at treatment admission. Sexual orientation was queried with the following response options: "Lesbian: Female/Female," "Gay: Male/Male," "Bisexual: Both Male & Female," "Heterosexual," "Decline to Answer," and "Unsure."

Analyses

All analytical models were performed separately for male and female participants. Because participant sex and sexual orientation are necessary categories for grouping individuals in these analyses, those who answered "decline to answer" or "don't know" for sex or sexual orientation were excluded from analyses. Demographic differences by participant sexual orientation were examined using chi-square analysis to compare race (White versus non-White), ethnicity (Hispanic versus non-Hispanic), and initial treatment episode in the county (first and only episode versus more than one episode). Analysis of variance was used to compare participants by sexual orientation on age and years of education.

Next, multinomial regression models were used to predict primary substance of abuse (alcohol as the reference category) and route of administration for primary substance of abuse (oral was the reference category). These reference categories were selected because oral consumption of alcohol is the most common substance used and the most common substance for which treatment is sought in the United States (Aldworth, 2009). To examine differences in primary problem substance by race and ethnicity among LGB individuals, multinomial regression models were constructed for only LGB individuals (run separately by sex), entering race and ethnicity, and covarying bisexual orientation, age, and initial treatment episode.

To test for differences in age at which participants first used their primary problem substance, multiple regression models were conducted entering gay/lesbian status, bisexual status, age, race,

ethnicity, and initial treatment episode. The first multiple regression models included individuals with any primary problem substance, while subsequent models were constructed such that they only included individuals with the same primary problem substance (i.e., all individuals with alcohol as their primary problem substance, a second with all individuals with cocaine as the primary problem substance).

To determine the best distribution to fit the data documenting the frequency of use at treatment admission, the –countfit- function was used in Stata (Long and Freese, 2005). We compared the Poisson, negative binomial, zero-inflated Poisson, and zero-inflated negative binomial distributions. In all cases, the zero inflated negative binomial distribution was the best fit, thus we chose to use this distribution for these analyses. Once again, these analyses were first calculated for individuals with any primary problem substance, then calculated separately for only individuals with the same primary problem substance.

For the multinomial, linear, and zero-inflated negative binomial regression models, gay and bisexual orientation (dummy coded, with heterosexual as reference group), race (white/non-white), ethnicity (Hispanic/not Hispanic), age, and initial treatment episode (first and only treatment episode in the county/more than one treatment episode) were entered in the models. Race and ethnicity were included as dichotomous variables to enhance the stability of the models. Due to the large number of comparisons being made, the alpha level for all analyses was set at .001 to reduce the chance of study-wise type I error. This alpha level was selected tolerating considerably less than a one percent chance of a type I error with the analyses that correspond to the study hypotheses.

Results

Participants

Demographic information for participants is described in Table 1. Individuals who endorsed transgender identities ($n = 199$) were excluded from the study. Within the remaining sample ($N = 13,445$) 4 individuals selected "other" and 1 selected "unknown" in response to

the question querying sex. For sexual orientation, 135 individuals "declined to answer" and 75 individuals answered "unsure." Additionally, 22 people identified as gay males, and endorsed a female sex, and 1 individual identified as a lesbian female and endorsed a male sex. These individuals were eliminated from analyses, as their group for the purposes of these analyses was unclear. The final sample for which complete sexual orientation and sex information was available consisted of 13, 211 individuals.

Table 1. Demographic information by sex and sexual orientation

	Overall sample (*N*=13,211)	Male Participants (*n* = 9330)			Female Participants (*n* = 3881)		
		Heterosexual (*n*=8318)	Gay (*n*=797)	Bisexual (*n*=215)	Heterosexual (*n*=3452)	Lesbian (*n*=156)	Bisexual (*n*=273)
Age (*M, SD*)	38.10 (13.48)	39.24 (13.42)	39.81 (10.78)	39.89 (11.19)	35.70 (13.81)	36.12 (11.17)	33.44(12.16)
Education in years (*M, SD*)	11.92 (2.53)	11.81 (2.41)	14.07 (2.64)	12.78 (2.22)	11.65 (2.51)	12.54 (2.17)	12.21 (2.61)
Ethnicity *n* (%)							
Not Hispanic	10778 (81.6%)	6756 (81.2%)	666 (83.6%)	194 (90.2%)	2815 (81.5%)	122 (78.2%)	225 (82.4%)
Mexican/Mexican American	1048 (7.9%)	682 (8.2%)	52 (6.5%)	6 (2.8%)	274 (7.9%)	14 (9.0%)	20 (7.3%)
Cuban	59 (0.4%)	43 (0.5%)	5 (0.6%)	4 (1.9%)	7 (0.2%)	0 (0.0%)	0 (0.0%)
Puerto Rican	185 (1.4%)	106 (1.3%)	8 (1.0%)	2 (0.9%)	56 (1.6%)	5 (3.2%)	8 (2.9%)
Other Hispanic/Latino	1141 (8.6%)	731 (8.8%)	66 (8.3%)	9 (4.2%)	300 (8.7%)	15 (9.6%)	20 (7.3%)
Race *n* (%)							
White	4705 (35.6%)	2779 (33.4%)	535 (67.1%)	137 (63.7%)	1093 (31.7%)	59 (37.8%)	102 (37.4%)
Black	4844 (36.7%)	3201 (38.5%)	81 (10.2%)	40 (18.6%)	1385 (40.1%)	56 (35.9%)	81 (29.7%)
Native American/Alaska Native	174 (1.3%)	86 (1.0%)	10 (1.3%)	5 (2.3%)	68 (2.0%)	2 (1.3%)	3 (1.1%)
Asian American/Pacific Islander	738 (5.6%)	512 (6.2%)	24 (3.0%)	4 (1.9%)	178 (5.2%)	11 (7.1%)	9 (3.3%)
Multi Racial	678 (5.1%)	332 (4.0%)	63 (7.9%)	14 (6.5%)	213 (6.2%)	12 (7.7%)	44 (16.1%)
Other race	2071 (15.7%)	1407(16.9%)	84 (10.5%)	15 (7.0%)	515 (14.9%)	16 (10.3%)	34 (12.5%)
First treatment episode in SF *n* (%)	3871 (28.8%)	2279 (27.4%)	286 (35.9%)	42 (19.5%)	1030 (29.8%)	39 (25.0%)	73 (26.7%)

There were differences in the proportions of lesbian, gay, bisexual, and heterosexual individuals who endorsed White versus non-White race among males (chi-square [2] =422.24, *p* <.001) but not females (chi-square [2] =6.01, *p* = .049, see Table 1 for percentages). Differences in rates of lesbian, gay, bisexual, and

heterosexual orientations were not detectable at an alpha level of $p<.001$ across Hispanic/non-Hispanic ethnicity for males (chi-square [2] =13.52, p = .001) nor for females (chi-square [2] =1.28, p = .528). There was no difference in age across different categories of sexual orientation for males (F[2]=0.90, p = .406) or females (F[2]=3.63, p = .027). There were, however, significant differences in level of education across sexual orientation for males (F[2]=327.22, p <.001) and females (F[2]=15.20, p < .001), with higher education among the gay and bisexual men and the lesbian and bisexual women. Among men, there were differences across sexual orientation in whether or not this was their first and only treatment episode within the county (chi-square [2] =33.74, p <.001), but these differences were not present among women (chi-square [2] =2.70, p = .259, see Table 1 for percentages).

Primary Problem Substance

Specific substances of abuse that were reported as the primary problem when entering treatment are reported in Table 2. Identifying as gay (Adj. OR: 6.43, 99.9% CI: 4.55, 9.09) or bisexual (Adj. OR: 2.94, 99.9% CI: 1.46, 5.94) were predictive of primary methamphetamine use, over the reference category of "other" drug. Being gay was predictive of lower odds of endorsing primary heroin use (Adj. OR: 0.35, 99.9% CI: 0.22, 0.56), but being gay or bisexual did not predict differences on other substances versus the reference category of alcohol (for full results, see Table 2). Among women, lesbian or bisexual sexual orientation was not predictive of differences in primary problem substance.

Table 2: Primary problem substance and route of administration by sex and sexual orientation and adjusted odds ratios and 99.9% confidence intervals for multinomial regression analyses (separately by sex), adjusted for age, race, ethnicity, and initial treatment episode

	Male Participants			Female Participants		
	Heterosexual *n* (%) reference group	Gay *n* (%) Adj. OR (99.9% CI)	Bisexual *n* (%) Adj. OR (99.9% CI)	Heterosexual *n* (%) reference group	Lesbian *n* (%) Adj. OR (99.9% CI)	Bisexual *n* (%) Adj. OR (99.9% CI)
Problem substance						
Alcohol (reference group)	2145 (26.8%)	206 (26.2%)	50 (23.7%)	661 (21.2%)	45 (29.8%)	60 (23.0%)

	Male Participants			Female Participants		
	Heterosexual *n* (%) reference group	Gay *n* (%) Adj. OR (99.9% CI)	Bisexual *n* (%) Adj. OR (99.9% CI)	Heterosexual *n* (%) reference group	Lesbian *n* (%) Adj. OR (99.9% CI)	Bisexual *n* (%) Adj. OR (99.9% CI)
Cocaine	2014 (25.2%)	93 (11.8%) 0.77 (0.50, 1.20)	46 (21.8%) 1.24 (0.62, 2.51)	707 (22.7%)	37 (24.5%) 0.93 (0.44, 1.97)	62 (23.8%) 1.04 (0.55, 1.98)
Heroin	2068 (25.8%)	73 (9.3%) 0.35 (0.22, 0.56)*	54 (25.6%) 0.92 (0.47, 1.79)	947 (30.4%)	34 (22.5%) 0.73 (0.35, 1.54)	63 (24.1%) 0.81 (0.43, 1.55)
Marijuana	859 (10.7%)	37 (4.7%) 0.93 (0.48, 1.81)	11 (5.2%) 0.95 (0.28, 3.18)	322 (10.3%)	9 (6.0%) 0.51 (0.15, 1.75)	27 (10.3%) 0.84 (0.35, 1.98)
Methamphetamine	619 (7.7%)	350 (44.5%) 6.43 (4.55, 9.09)*	46 (21.8%) 2.94 (1.46, 5.94)*	329 (10.5%)	17 (11.3%) 0.85 (0.34, 2.15)	38 (14.6%) 1.05 (0.50, 2.18)
Other	299 (3.7%)	28 (3.6%) 0.83 (0.41, 1.68)	4 (1.9%) 0.46 (0.08, 2.61)	154 (4.9%)	9 (6.0%) 1.042 (0.33, 3.28)	11 (4.2%) 0.74 (0.24, 2.28)
Route of administration						
Oral (reference group)	2434 (30.7%)	232 (29.6%)	56 (26.8%)	802 (26.1%)	51 (34.0%)	69 (26.3%)
Smoked	2982 (37.6%)	284 (36.2%) 1.61 (1.16, 2.23)*	63 (30.1%) 1.16 (0.62, 2.20)	1178 (38.4%)	52 (34.7%) 0.73 (0.38, 1.41)	104 (39.7%) 0.98 (0.57, 1.70)
Injection (IV or intramuscular)	1991 (25.1%)	209 (26.7%) 1.01 (0.72, 1.43)	83 (39.7%) 1.47 (0.81, 2.66)	920 (30.0%)	38 (25.3%) 0.75 (0.37, 1.51)	72 (27.5%) 0.99 (0.54, 1.80)
Inhalation	520 (6.6%)	59 (7.5%) 1.67 (0.99, 2.82)	7 (3.3%) 0.69 (0.18, 2.63)	168 (5.5%)	9 (6.0%) 1.06 (0.36, 3.13)	17 (6.5%) 1.16 (0.45, 2.96)

*Indicates an analysis where *p* <.001

When only male LGB individuals were considered, race (White/non-White) and ethnicity (Hispanic or Latino/non-Hispanic) were not predictive of primary substance of abuse over the reference category of alcohol, except in predicting cocaine use, for which, among gay and bisexual men, non-White individuals were at higher risk of primary cocaine use (Adj. OR 4.83 99.9% CI: 2.08, 11.22). For LGB women, race and ethnicity did not predict primary substance of abuse over the reference category of alcohol, except for cocaine use, in which case non-White individuals were at higher risk of primary

cocaine use (Adj. OR 6.40, 99.9% CI: 1.91, 21.40) while Hispanic individuals were at lower risk of primary cocaine use (Adj. OR 0.24, 99.9% CI: 0.06, 0.99). Complete results of these analyses are reported in Table 3.

Table 3. Results of multinomial regression analyses using race and ethnicity to predict primary problem substance among LGB individuals (separately by sex, adjusted for bisexual orientation, age, and initial treatment episode)

	Male LGB Individuals		Female LGB Individuals	
	Non-White	**Hispanic**	**Non-White**	**Hispanic**
	Adj. OR (99.9% CI)	Adj. OR (99.9% CI)	Adj. OR (99.9% CI)	Adj. OR (99.9% CI)
Problem substance (alcohol as reference)				
Cocaine	4.83[*] (2.08, 11.22)	0.34 (0.10, 1.13)	6.40 (1.91, 21.40)[*]	0.24 (0.06, 0.99)[*]
Heroin	0.87 (0.33, 2.33)	0.86 (0.23, 3.19)	0.92 (0.32, 2.67)	0.63 (0.16, 2.50)
Marijuana	2.20 (0.61, 8.01)	0.83 (0.18, 3.94)	2.51 (0.49, 12.88)	0.47 (0.09, 2.58)
Methamphetamine	1.22 (0.59, 2.52)	1.04 (0.42, 2.57)	0.71 (0.20, 2.51)	1.25 (0.29, 5.40)
Other	0.81 (0.14, 4.65)	0.42 (0.03, 6.61)	1.49 (0.26, 8.40)	0.42 (0.04, 4.43)

[*]Indicates analysis for which $p < .001$

Route of Administration

Route of administration for the primary substance of abuse when entering treatment is reported in Table 2. When examining route of administration of primary substance among men, being gay was predictive of more primary use via smoking (Adj. OR: 1.61, 99.9% CI: 1.16, 2.23) over the reference category of oral administration, while for bisexual men there was no difference. Among men, neither gay nor bisexual status was predictive of injecting or inhaling the primary substance over the reference category of oral administration. Among women, neither lesbian nor bisexual orientation was predictive of primary substance smoking, injection use, nor inhalation over the reference category of oral administration. Complete results of these analyses are reported in Table 2.

Age of Primary Problem Substance Initiation

Table 4 displays the summary statistics for the ages at which individuals first used their primary problem substances. Results of multiple regression analyses indicate that gay men began using their

primary problem substance at older ages that their heterosexual counterparts (B=4.52, t =14.03, p<.001, semi partial R^2=.018), but this effect was not observed for bisexual men. For women, there were no differences by sexual orientation in the age that the primary problem substance was first used.

Table 4. Age in years of first use of primary problem substance by sex, sexual orientation, and each specific primary problem substance, and results of multiple regression analyses using sexual orientation to predict age of first use of primary problem substance (separate analyses by sex, adjusted for age, race, ethnicity, and initial treatment episode)

	Male Participants			Female Participants		
	Heterosexual *M* (*SD*)	Gay *M* (*SD*)	Bisexual *M* (*SD*)	Heterosexual *M* (*SD*)	Lesbian *M* (*SD*)	Bisexual *M* (*SD*)
	reference	*B* *p*	*B* *p*	reference	*B* *p*	*B* *p*
Age of first primary problem use for **all** primary problem substances	18.55 (9.03)	23.16 (9.99) 4.52[*] <.001	19.90 (9.40) 1.03 .081	17.97 (9.87)	18.56 (8.73) 0.48 .452	17.73 (8.72) 0.36 .497
Age of first **alcohol** use when alcohol is the primary problem substance	14.83 (5.07)	15.57 (5.70) 1.07 .005	14.38 (7.28) −.04 .956	15.69 (6.57)	13.16 (5.36) −1.67 .089	14.10 (7.70) −1.36 .118
Age of first **cocaine** use when cocaine is the primary problem substance	22.78 (9.09)	26.91 (10.01) 3.63[*] <.001	24.17 (10.09) 0.72 .561	23.31 (8.61)	22.89 (7.93) −0.15 .899	21.48 (7.56) −0.51 .607
Age of first **heroin** use when heroin is the primary problem substance	21.16 (7.92)	23.34 (7.88) 2.54 .007	20.80 (7.21) −.115 .916	21.95 (7.67)	20.62 (6.38) −1.90 .096	20.44 (7.04) −0.49 .620
Age of first **marijuana** use when marijuana is primary problem substance	14.10 (5.02)	17.43 (5.05) 1.98 .018	12.64 (6.44) −2.18 .136	13.39 (4.88)	15.44 (5.64) 1.55 .295	13.00 (2.20) −0.39 .674
Age of first **methamphetamine** use when methamphetamine is primary problem substance	22.02 (8.60)	27.35 (8.72) 4.67[*] <.001	23.65 (8.76) 1.13 .347	20.09 (7.42)	22.41 (5.15) 0.80 .593	20.42 (7.74) 0.18 .870

[*]*B* met the p<.001 criterion

Next, the age of primary problem substance initiation for all individuals reporting the same primary problem substance was predicted by categories of sexual orientation. When compared to heterosexual males, gay status remained a significant predictor of later age of initiation of cocaine use (B=3.63, t =4.08, p<.001, semi partial R^2=.006) and methamphetamine use (B=4.67, t =8.45, p<.001, semi partial R^2=.053). Gay male status did not predict later age of initiation of alcohol, heroin, or marijuana (complete results in Table 5). Bisexual status among men was not predictive of differences

in age of initiation of primary substances. Among women, differences did not emerge.

Table 5. Frequency of use and results of zero-inflated negative binomial regression for primary problem substance in 30 days prior to treatment by sex, sexual orientation, and each specific primary problem substance (separate analyses by sex, adjusted for age, race, ethnicity, and initial treatment episode)

	Male Participants			Female Participants		
	Heterosexual *Mdn, M (SD)*	**Gay** *Mdn, M (SD)*	**Bisexual** *Mdn, M (SD)*	**Heterosexual** *Mdn, M (SD)*	**Lesbian** *Mdn, M (SD)*	**Bisexual** *Mdn, M (SD)*
	reference	*B* *p*	*B* *p*	reference	*B* *p*	*B* *p*
Days of use for all primary problem substances in past 30 days	5.00, 11.41 (12.20)	3.00, 8.75 (11.00)	6.00, 11.92 (12.10)	2.00, 9.39 (12.14)	2.00, 9.57 (11.67)	2.00, 10.43 (12.51)
		−0.26* <.001	−0.02 .845		−0.18 .848	0.07 .38
Days of **alcohol** use among persons with alcohol as primary problem substance	14.00, 14.78 (12.18)	7.50, 12.10 (11.75)	15.00, 16.42 (12.48)	6.00, 12.30 (12.69)	8.00, 12.51 (12.22)	8.50, 12.78 (12.39)
		−0.13 .064	0.06 .634		0.09 .575	−0.05 .726
Days of **cocaine** use among persons with cocaine as primary problem substance	4.00, 10.05 (11.07)	4.00, 8.75 (10.35)	6.50, 10.57 (10.43)	4.00, 9.83 (11.71)	0.00, 8.16 (11.62)	1.00, 9.44 (11.94)
		−0.09 .541	0.02 .907		0.02 .916	0.11 .491
Days of **heroin** use among persons with heroin as primary problem substance	5.00, 11.31 (12.86)	2.0, 9.92 (13.05)	5.0, 12.15 (12.61)	3.00, 10.42 (12.72)	1.00, 6.56 (10.92)	3.00, 11.59 (13.44)
		−0.08 .593	−0.01 .941		−0.11 .566	0.03 .857
Days of **marijuana** use among persons with marijuana as primary problem substance	8.00, 12.14 (12.11)	20.00, 19.22 (11.78)	12.00, 12.55 (12.37)	4.00, 9.91(11.90)	22.00, 19.22 (9.11)	12.00, 15.48 (14.17)
		0.25 .105	0.09 .775		0.33 .308	0.40 .070
Days of **methamphetamine** use among persons with methamphetamine as primary problem substance	2.0, 7.14 (10.07)	1.0, 4.90 (7.84)	2.50, 8.72 (11.37)	0.00, 7.62(11.28)	0.00, 5.53 (9.27)	0.00, 5.58 (8.96)
		−0.56* <.001	0.09 .702		−0.51 .098	−0.42 .080

*B met the p<.001 criterion

Frequency of Primary Problem Substance Use

Table 5 displays the frequency with which primary problem substances were used in the 30 days prior to treatment by sex, sexual orientation, and primary problem substance. Among men, gay status was a significant predictor of less days using their primary substance (*B*=−0.26, *z* =−5.84, *p*<.001) but being bisexual was not. Among women, neither bisexual nor lesbian status were significant predictors of the number of days they used this substance.

Next, the frequency of use in the 30 days prior to treatment initiation for all individuals reporting the same primary problem substance was predicted by categories of sexual orientation. The analyses were conducted separately by gender and the complete results are available in Table 5. Among men for whom methamphetamine was the primary problem substance, gay status predicted less methamphetamine use ($B= -0.56$, $z = -5.11$, $p<.001$), but among other primary substances, gay status did not emerge as a good predictor. Bisexual status among men was not a good predictor of days of use prior to entering treatment. Among women, neither lesbian nor bisexual status were significant predictors of more or less days of primary problem substance use when examined separately by primary problem substance.

Discussion

This is the first study to our knowledge to examine the characteristics of LGB individuals entering substance abuse treatment in a large, ethnically diverse, urban community. Overall, we found multiple differences in substance use behaviors between gay men and their heterosexual counterparts; however, greater primary problem methamphetamine use was the only difference observed among bisexual men, and no differences between lesbian and bisexual women and their heterosexual counterparts were detected. Notably, many of the differences that were detected ran counter to our expectations, which were based on previous research (Cochran & Cauce, 2006).

Among gay men, we found that there was approximately 6.5 times the likelihood of endorsing primary methamphetamine use, but a lower likelihood of primary heroin use, when compared to alcohol use. Similarly, bisexual men were nearly 3 times as likely to endorse primary methamphetamine use than alcohol use. Research prior to the time period of this study indicated that methamphetamine use among sexual minority men in San Francisco was on the decline (Vaudrey et al., 2007); our findings suggest that gay and bisexual men are still seeking treatment for problems with methamphetamine use at higher rates than their heterosexual counterparts. This finding points to the need for continued efforts to reduce methamphetamine use among the male sexual minority community.

Research by Cochran, Grella, and Mays (2012) supported the idea that social norms among sexual minority communities may contribute to higher levels of substance use in these communities. Similarly, social norms around substance use, such as a higher tendency to smoke a substance could also contribute to the frequency of the behavior. In our study, we found that gay men were more likely to smoke their primary problem substance. This outcome, however, may be confounded with the higher incidence of primary methamphetamine use that was observed within the sample, thereby limiting this finding. Notably, this relationship was not similarly observed within the bisexual group, which also had elevated treatment seeking for methamphetamine use. This may suggest that norms among the gay community are substantially different from norms among the bisexual male community. This finding indicates the need to separate gay and bisexual men within research, so that accurate conclusions can be drawn about the specific populations, which can vary considerably. Specifically, in this case, grouping gay and bisexual men together may have resulted in a "wash out" of the effects.

A consistent finding was that gay men reported later initiation of primary problem substances, and this effect was observable at the individual substance level for both cocaine and methamphetamine. This is in contrast to prior research, which indicated no difference in age of initiation (Cochran & Cauce, 2006). There are several possible implications of these findings. As an early age of alcohol and drug use initiation has been linked to later misuse or dependence (Hawkins et al., 1997; King & Chassin, 2007), later initiation could be a protective factor or be reflective of less severe substance use among the gay male community. Conversely, as we know that there are higher rates of substance and alcohol use disorders among sexual minority populations, the finding of later initiation of primary substances may suggest that a unique pathway to substance use disorders exists for this demographic. This pathway may be influenced by such factors related to life as a sexual minority, such as: victimization (McLaughlin, Hatzenbuehler, Xuan, & Conron, 2012), parental or peer rejection or support (Padilla, Crisp, & Rew, 2010), the coming out process (Rosario, Scrimshaw, & Hunter, 2002; Talley, Sher, & Littlefield, 2010), or community specific substance use patterns (Cochran, Grella, & Mays, 2012). It is also possible that substance use, methamphetamine use in particular, is serving a specific function

among gay men, specifically being used to increase sexual pleasure or stamina (Green & Halkitis, 2006). Clinicians working with gay men should take into account that there could be a unique pattern of development of substance use disorders among this group, and consider important contributing factors to substance use.

In contrast to our hypothesis, we found that among gay men, there was less primary problem substance use in the days leading up to treatment admission. These findings are in contrast to Cochran & Cauce (2008) who found that LGB individuals used substances at a higher rate prior to treatment than their heterosexual counterparts. This finding suggests a potential strength for gay men, in that they are using their primary problem substance less frequently than their heterosexual counterparts. One limitation in this analysis, however, is the possibility that poly substance use is occurring, which could not be accounted for in this study and should be accounted for in future research among this population.

Furthermore, the social context in which substance abuse treatment is initiated is likely to differ between gay men and their heterosexual counterparts. Gay men, relative to heterosexual men, may be more comfortable seeking substance abuse treatment, especially in a city like San Francisco where the likelihood of receiving LGB-affirmative services is higher (Cochran, Peavy, & Robohm, 2007). In turn, an alternative explanation for our findings could be that heterosexual men experience more impediments when seeking treatment, which results in delayed entry into treatment and more risk behaviors upon treatment admission.

When the findings of this study are considered together, a potential picture emerges. Gay men appear to have a unique pattern of substance use characterized by more primary methamphetamine use, lower frequency of substance use prior to entering treatment, and a later age of initiation of their primary substance. Taken together, this may indicate a pattern of using a substance, such as methamphetamine, initiated in later life, in a non-daily binge manner. This pattern has clinical implications, in that the individual seeking treatment may not fit the profile that the clinician is accustomed to seeing, yet is still experiencing a severity of symptoms that result in a desire and/or willingness to seek treatment.

A notable finding from this study is that there were no differences between LGB and heterosexual women. Among LGB women, neither lesbian nor bisexual status predicted which substance treatment was being sought for, the amount of use of this substance at treatment admission, the age at which this substance was first used, nor the route of administration by which it was used. These findings do not replicate the work of Cochran and Cauce (2006). Such findings can be contextualized using Meyer's (2003) minority stress theory, which posits that experiencing and internalizing societal stigma based upon one's minority group status may place LGB individuals at increased risk. While Cochran and Cauce (2006) found generally greater substance use severity among LGB individuals, we did not. It is possible that minority stress processes are minimized in a San Francisco, a community that has a reputation for acceptance and equal protection of sexual minorities, and has often been at the forefront of procuring rights, such as marriage (Herek, 2006), for sexual minority people. Minority stress theory also accounts for factors such as "community cohesiveness" (Meyer, 2003 p.677) and specifies that such factors may reduce the burden of minority stress. In support of this idea, recent research has suggested that greater proportions of same-sex couples in the community can be a protective factor for sexual minority individuals (Hatzenbuehler, Keyes, McClaughlin, 2011). If such an effect were to exist it would undoubtedly influence the health of sexual minority individuals living in San Francisco. As such, differences in patterns of substance use found among gay men, but not similarly observed among women, may reflect differences in the pathway to and function of substance use (e.g., to enhance sexual experiences, as reported in Green & Halkitis, 2006) rather than a generalized effect of minority stress as may have been observed in previous research by Cochran and Cauce (2006).

Additionally, previous research has not always supported a one-dimensional understanding of sexual minority stress among women. Specifically, Bostwick et al. (2010) reported that that the increased odds of mental health disorders are less consistent for sexual minority women than men. Future research is needed to identify the specific processes that may increase health-promoting behaviors among sexual minorities, or more generally increase coping among this community. With that in mind, these results should be replicated in other communities and settings.

The sample size of LGB individuals in this study allowed us to look at differences in primary substance based on race and ethnicity. We found that there were distinct differences among LGB individuals, with non-White individuals being more likely to seek treatment for cocaine use, and among LGB women, Hispanic ethnicity being associated with less likelihood of cocaine use. This suggests that when considering substance use trajectories of LGB individuals who are also racial and/or ethnic minorities, the multiple identities may all contribute to the individual use trajectories.

One limitation of this study is that the participants were drawn from the geographical area of San Francisco County, and thus results found here may not be generalizable to other areas. San Francisco is known as a location that has a high population of LGB individuals (Gates & Ramos, 2008) and an environment and community that is affirming of LGB identities, thus some hypothesized effects of minority stress may be considerably diminished. Furthermore, the way sexual orientation was operationalized was primarily a measure of identity (e.g., "lesbian"), but included examples that could also reflect sexual behavior or attraction (e.g., "lesbian: female/female") for LGB individuals but not for heterosexual individuals (for whom there was no corresponding example). Thus, despite the importance of the findings reported herein, caution should be taken when comparing our results to those from other studies. Our findings highlight the importance of assessing sexual orientation within the context of substance abuse treatment and underscore the need for large-scale surveillance systems and treatment databases that measure multiple domains of sexual orientation with the most up to date and psychometrically sound methods.

Overall this study is an important step toward identifying the unique needs of LGB individuals entering substance abuse treatment. This study employed a treatment seeking sample and as such its results cannot be generalized to the broader sexual minority population. While the study's location in San Francisco is a weakness in some respects, in other ways it is a strength. Cochran & Cauce (2006) suggested that within Washington State, there was likely an underreporting of LGB status. While this may have also occurred in San Francisco, and sexual minority individuals may have "declined to answer" questions about sexual orientation, underreporting of sexual

orientation is likely minimized in San Francisco. This study is also limited by the self-report of participants to treatment programs, which may be biased, but effects of self-report likely would not have varied systematically by identified sexual orientation. The data used in this investigation were also created for evaluation rather than research purposes, thus did not include measures that should be included in future work (e.g., socio-economic status). As a result, some questions of interest could not be investigated. For instance, this study was limited to the examination of the primary problem substance for which individuals were seeking treatment, because this is how substance use was queried and recorded at treatment admission. As such, polysubstance use could not be accounted for within this study, which is a significant limitation, because polysubstance use appears to be common among specific sexual minority populations, such as gay men (Halkitis, Green, & Mourgues, 2005). Notably, San Francisco discontinued asking about sexual orientation at the conclusion of this data collection due to a change in software systems. Very few substance abuse treatment systems ask about sexual orientation, which makes it difficult to assess the needs of sexual minorities who are seeking treatment. As such, this particular data set offered a unique opportunity to examine sexual orientation based differences in substance use for those seeking treatment.

Collectively, the results indicate that gay men have unique patterns of substance use, which may indicate the need for targeted programs. Lesbian and bisexual women, however, do not appear to differ from heterosexual women on patterns of substance use for which they seek treatment. The results indicate that, when considering substance use and dependence, it may be useful to think about issues of non-equivalence between gay, bisexual, and heterosexually identified males. The present findings point to the need for additional research on the psychosocial characteristics and substance use behaviors of sexual minority persons entering substance abuse treatment to resolve discrepancies that exist in the literature and identify replicable results. Additionally, the present study did not investigate psychosocial factors that could influence the likelihood of treatment success (e.g., presence of supportive family members; involvement in recovery-oriented activities; health status; involvement in criminal justice system, etc). Future research should examine whether such factors vary by sexual orientation, in an effort to

continue to delineate the needs of sexual minority clients in substance abuse treatment.

Acknowledgments

Footnotes

[1]Sexual minority is a term used here to describe individuals whose sexual behavior or attraction is not confined to the opposite sex, or whose sexual orientation identification is not heterosexual. Lesbian, gay, and bisexual (LGB) denote an individual's identification as one of these specific categories of sexual minority. Thus, LGB is used here when identification is being described, whereas sexual minority is used as a larger "umbrella term" to describe non-heterosexually oriented individuals defined through identity, behavior, or both.

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