



Published in final edited form as:

Addict Behav. 2010 May ; 35(5): 517–521. doi:10.1016/j.addbeh.2009.12.019.

Sexual Orientation and Drug Use in a Longitudinal Cohort Study of U.S. Adolescents

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Abstract

Adolescents with a minority sexual orientation (e.g., lesbian, gay, bisexual) are more likely to use substances than their heterosexual peers. This study aimed to increase understanding of the development of drug use in this vulnerable population by: 1) comparing longitudinal patterns of past-year illicit drug use (e.g., marijuana, cocaine, ecstasy) and misuse of prescription drugs among minority sexual orientation youth relative to heterosexual youth and, 2) examining how sexual orientation subgroup, gender, and age relate to variation in risk of drug use. Data come from the Growing Up Today Study, a community-based cohort of adolescents who were assessed three times between 1999–2005 with self-administered questionnaires when they ranged in age from 12 to 23 years (N=12,644; 74.9% of the original cohort). Multivariable repeated measures generalized estimating equations using modified Poisson regression was used to estimate relative risks.

Participants indicating their sexual orientation was mostly heterosexual, bisexual, or lesbian/gay were more likely than completely heterosexual youth to report past-year illicit drug use and misuse of prescription drugs. Gender was an important modifier; bisexual females were most likely to report

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Contributors

Drs. Corliss and Austin designed the study. Dr. Corliss and Ms. Wylie conducted data analysis. Dr. Wypij provided statistical consultation. All authors participated in data interpretation. Dr. Corliss wrote the first draft of the manuscript. All authors contributed to critical revisions of the manuscript for important intellectual content and have approved the final manuscript. Drs. Corliss, Austin, and Frazier obtained funding.

Conflict of Interest

All authors declare that they have no conflicts of interest.

drug use. Age was also an important modifier of risk; differences in drug use between minority sexual orientation and heterosexual youth were larger during adolescence (12–17 years) than during emerging adulthood (18–23 years). Research must focus on identifying reasons why minority sexual orientation youth are at disproportionate risk for drug use. Such information is essential for developing interventions that are critically needed to reduce drug use in this population. Efforts need to begin early because large sexual orientation disparities in drug use are evident by adolescence.

Keywords

illicit drug use; prescription drug misuse; adolescence; young adult; sexual orientation; gay; lesbian; bisexual; heterosexual; epidemiology; longitudinal study

1. Introduction

Adolescents who identify as lesbian, gay, or bisexual, or who report same-sex attractions and/or relationships are at disproportionate risk for using drugs (Marshal, et al., 2008). Evidence of sexual orientation disparities in adolescent drug use comes primarily from cross-sectional studies of high school (e.g., Faulkner & Cranston, 1998; Garofalo, Wolf, Kessel, Palfrey, & DuRant, 1998) or college (e.g., Eisenberg & Wechsler, 2003; Ford & Jasinski, 2006; McCabe, 2005) samples. These studies have found that minority sexual orientation youth are more likely than heterosexuals to report use of marijuana, cocaine, and other illicit drugs, and prescription drug misuse.

Despite evidence of greater drug use in this population, outstanding questions remain. There is uncertainty whether drug use vulnerability varies by age or developmental period (e.g., adolescence, young adulthood). Younger age of use is associated with worse sequelae (Fergusson, Boden, & Horwood, 2006; Lubman, Yucel, & Hall, 2007). There is also uncertainty about how gender and sub-group status (e.g., lesbian/gay, bisexual) influence risk of adolescent drug use. Sexual orientation disparities in substance use may be larger in females than males (Russell, Driscoll, & Truong, 2002). A community-based study of gay, lesbian, and bisexual youth found that females were more likely to report substance use than males (Rosario, Hunter, & Gwadz, 1997). In contrast, studies with general adolescent samples find that males are more than or equally as likely as females to report drug use (Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). Studies also suggest that among females, bisexuals are at elevated risk for drug use compared to lesbians or heterosexuals (Eisenberg & Wechsler, 2003; Ford & Jasinski, 2006; Russell, et al., 2002). However, the extent to which gender and sexual orientation sub-group differences emerge during adolescence and how differences may vary across developmental periods remain understudied.

A recent meta-analysis and methodological review underscored the large gaps in understanding how sexual orientation is related to longitudinal substance use and identifying the most vulnerable subgroups (Marshal, et al., 2008). Our study objectives were to: 1) estimate sexual orientation differences in longitudinal patterns of past-year drug use among youth across ages 12 to 23 years; 2) examine if gender modified sexual orientation differences in risk of past-year drug use; and 3) explore whether developmental period [adolescence versus emerging adulthood (Arnett, 2000)] modified associations between sexual orientation and drug use.

2. Methods

2.1. Study Participants

Data come from the Growing Up Today Study (GUTS), a longitudinal cohort study of children of Nurses' Health Study II participants (Brigham and Women's Hospital and Harvard Medical

School, 2009) begun in 1996 when the adolescents were between ages 9–14 years (N=16,882). Participants predominately self-identified as non-Hispanic white (93%). More information about GUTS is available elsewhere (Field, et al., 1999). Institutional review board approval was obtained from Brigham and Women’s Hospital.

Participants providing information on sexual orientation and drug use on at least one of three survey waves (1999, 2001, and 2003) were included in the analysis (N=12,644; 74.9% of original cohort). Among these participants, 64.8% responded to all 3 waves, 21.8% responded to 2 waves, and 13.4% responded to 1 wave. Sexual orientation reported in 1999 was unrelated to the number of waves of participation ($p > .05$).

2.2. Measures

2.2.1. Sexual Orientation—The sexual orientation question included on each of the 3 survey waves asked: “Which of the following best describes your feelings?” Response options were (1) completely heterosexual (attracted to persons of the opposite sex), (2) mostly heterosexual, (3) bisexual (equally attracted to men and women), (4) mostly homosexual, (5) completely homosexual (gay/lesbian, attracted to persons of the same sex), and (6) not sure. We combined “mostly homosexual” and “completely homosexual” into one lesbian/gay category because of the small number of respondents who chose these options. “Not sure” responses were excluded from analyses due to their small numbers and concentration at younger ages.

2.2.2. Drug Use—Participants were queried about their past-year use of marijuana, ecstasy (MDMA), cocaine, heroin, amphetamines (methamphetamine, speed), and LSD/mushrooms (psilocybin) on the three survey waves. In addition to examining these drugs individually, we created a composite variable that included reports of any use of the illicit drugs other than marijuana. Participants were asked if they used any of the following drugs without a doctor’s prescription: sleeping pills (Rohypnol, barbiturates, downers), pain killers (Percodan, codeine, Oxycontin), stimulants (Ritalin, Adderall) and benzodiazepines (Valium, Xanax, Librium). We combined any past-year misuse of prescription drugs into one category. Drug use variables were dichotomized into reports of any versus no past-year use.

2.3. Statistical Analyses

We conducted repeated measures analyses using GUTS data gathered from three survey waves. Gender-specific age-standardized prevalences of past-year drug use for each sexual orientation group were estimated. Multivariable generalized estimating equations (GEE) repeated measures modified Poisson regression (Zou, 2004) was used to estimate adjusted risk ratios (RR) and 95% confidence intervals (CI) for past-year drug use comparing mostly heterosexual, bisexual, and lesbian/gay respondents to same-sex heterosexual respondents. Models controlled for age, region of residence (West, Midwest, Northeast, South), and race/ethnicity (non-Hispanic white, other). GEE variance estimates account for the non-independent repeated measures from the same individual and the sibling clusters (Fitzmaurice, Laird, & Ware, 2004; Liang & Zeger, 1986).

We investigated whether gender and age [adolescence (12–17 years) versus emerging adulthood (18–23 years)] modified relationships between sexual orientation and marijuana use, any illicit drug other than marijuana, and prescription drug misuse. Models examining modification by gender included both genders and sexual-orientation-by-gender interaction terms. Models assessing modification by age were stratified by gender and included sexual-orientation-by-age interaction terms.

3. Results

3.1. Sexual Orientation Differences in Past-Year Prevalence of Drug Use

Mostly heterosexual, bisexual, and lesbian/gay youth were more likely to report using a variety of drugs in the prior year than their heterosexual peers (Table 1). Sexual orientation differences in drug use were generally larger among females and bisexuals. When gender modified the relationship between sexual orientation and drug use, the elevated risk experienced by sexual minorities relative to heterosexuals was larger among females than males. Gender-by-sexual-orientation statistical interactions comparing differences between mostly heterosexual females and males to differences between heterosexual females and males were significant for any illicit drug use other than marijuana ($p=.02$) and misuse of prescription drugs ($p=.03$) (interactions not included in Table 1). Gender-by-sexual-orientation interactions for bisexuals were significant for marijuana ($p=.01$) and marginally significant for any illicit drug other than marijuana ($p=.09$).

3.2. Sexual Orientation Differences in Drug Use by Developmental Period

Age-specific prevalences and adjusted risk ratios indicated elevated risk for drug use in both age periods for most sexual minority groups compared to heterosexuals (Table 2). However, sexual orientation differences were larger in adolescence than emerging adulthood. In 12–17 year olds, risk ratios associated with sexual minority subgroups ranged from 2 to 7. In the older group of 18–23 year olds, risk ratios diminished, though most remained significant. All sexual-orientation-by-age-group interactions were significant ($p<.05$) for marijuana use. Sexual-orientation-by-age-group interactions for any illicit drug use other than marijuana were significant for gay males ($p<.0001$) and bisexual females ($p=.003$) and suggestive for bisexual males ($p=.09$). Sexual-orientation-by-age-group interactions for misuse of prescription drugs were significant for gay males ($p=.04$) and bisexual females ($p=.049$).

4. Discussion

Results of this study demonstrate a heightened risk of past-year drug use among minority sexual orientation youth. In fact, drug use prevalences observed among the sexual minorities in GUTS were much higher than prevalences observed among same-aged respondents of the representative 2002 National Survey of Drug Use and Health, suggesting that sexual minority youth who are children of health care professionals are not protected from drug use.

While supporting previous findings (e.g., Boyd, McCabe, & d'Arcy, 2003; Hahm, Wong, Huang, Ozonoff, & Lee, 2008; McCabe, Boyd, Hughes, & d'Arcy, 2003; Orenstein, 2001), our study builds on the existing literature by illuminating how drug use risk associated with sexual orientation is modified by gender and age. Among heterosexuals, males had higher prevalence of past-year drug use than females. Conversely, this pattern was reversed for minority sexual orientation youth, with females showing higher prevalence than males. This was evident even for amphetamine use, which is commonly known to be a problem among gay and bisexual males (Cabaj, Galanter, & Kleber, 2008), but less recognized as a drug that may also be used by lesbian and bisexual females. When gender modified associations between sexual orientation and drug use, larger sexual orientation differences were observed among females than males. Bisexual females had the highest past-year prevalence of drug use for all drug categories examined except heroin. These findings are congruent with a recent meta-analysis finding that sexual orientation disparities in substance use were largest in females and bisexuals (Marshall, et al., 2008). Possible explanations for these inequalities must be examined and may include psychosocial factors related to gender expression, gender differences in how young women and men experience and cope with the stress of stigma and discrimination, biological

factors, or joint effects of these factors (Rosario, Schrimshaw, & Hunter, 2008; Wilson & Rahman, 2005).

While sexual minority youth in this study were at elevated risk of past-year drug use during adolescence and emerging adulthood, disparities were amplified during adolescence when youth may be less well equipped developmentally to cope with the challenges of having a minority sexual orientation in a stigmatizing environment. This potential age disparity is alarming because younger onset of substance use is a robust predictor of later substance dependence (Anthony & Petronis, 1995; Grant & Dawson, 1998; Lynskey, Vink, & Boomsma, 2006). Community studies of lesbian, gay, and bisexual youth suggest that younger age of recognizing and disclosing a minority sexual orientation are risk factors for experiencing maltreatment and poorer mental health (D'Augelli, et al., 2005; Hershberger, Pilkington, & D'Augelli, 1997; Pilkington & D'Augelli, 1995). It is possible that such vulnerabilities may also increase drug use risk.

The extent that sexual orientation differences in age of onset of drug use may contribute to disparities in developmental outcomes and substance disorders requires further investigation. Sexual minority adults may suffer disproportionately from dysfunctional drug use (Cochran, Ackerman, Mays, & Ross, 2004) and substance/abuse dependence compared to heterosexuals (Meyer, 2003). Sexual minorities also experience barriers to accessing services for substance problems (Corliss, Grella, Mays, & Cochran, 2006); when they do present for treatment, they may display greater co-morbid psychopathology and substance problems than heterosexuals (Cochran & Cauce, 2006). Given that substance abuse treatment programs typically do not address the needs of lesbian, gay, and bisexual individuals (Cochran, Peavy, & Robohm, 2007; Matthews & Selvidge, 2005), prevention efforts are vital.

Study limitations include limited generalizability because GUTS is not a representative sample and the majority of participants are non-Hispanic white. Nonetheless, participants were enrolled into GUTS independent of their sexual orientation. Thus, findings are presumably less biased than what is characteristic of samples recruited through gay community settings. In addition, findings are based on self-reports of drug use. Longitudinal studies may also suffer from attrition bias, but how loss-to-follow-up might influence sexual orientation estimates of drug use is not known.

5. Conclusions

This study provides further evidence that minority sexual orientation is a risk indicator for illicit drug use and misuse of prescription drugs during adolescence. Despite evidence that minority sexual orientation youth are at elevated risk for a variety of health concerns, including drug use, the health professions do not effectively address the specific needs of this population (Corliss, Shankle, & Moyer, 2007; Sanchez, Rabatin, Sanchez, Hubbard, & Kalet, 2006; Tesar & Rovi, 1998). While the reasons that these youth are at high risk for substance use are not completely understood, societal stigma of homosexuality is believed to play an important role. The American Academy of Pediatrics recognizes sexual minority youths' unique health concerns and has issued guidelines for their care (Frankowski, 2004). Providers should routinely ask youth about their sexual orientation and substance use and refer those needing additional support to culturally-competent and appropriate services. Additional efforts and resources are required to reduce the health disparities affecting this population. Efforts should focus on young minority sexual orientation adolescents because vulnerability is heightened during this developmental period.

Acknowledgments

This study was funded by grants DA23610, HD45763, DK46834, and HL03533 from the National Institutes of Health, grant RSGPB-04-009-01-CPPB from the American Cancer Society, and the Robert Wood Johnson Foundation. Drs. Corliss and Austin were also supported by the Leadership Education in Adolescent Health Project, Maternal and Child Health Bureau, Health Resources and Services Administration grant 6T71-MC00009-16. The authors would like to thank the participants of the Growing Up Today Study and the members of the Growing Up Today Study research team whose dedication made this study possible.

Role of Funding Sources

Funding sources had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

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Table 1

Past-year drug use^a by sexual orientation among female and male youth (12–23 years) in the GUTS cohort (1999–2005)

Drug use by gender	Age-standardized prevalence (%)						Adjusted RR (95% CI) ^b		
	Completely Heterosexual	Mostly Heterosexual	Bisexual	Lesbian/Gay	Mostly Heterosexual	Bisexual	Lesbian/Gay	Bisexual	Lesbian/Gay
Marijuana									
Female	18.6	42.8	59.9	49.6	1.97*	(1.82, 2.13)	2.63*	(2.35, 2.98)	1.74* (1.29, 2.36)
Male	20.9	41.9	38.5	32.1	1.87*	(1.65, 2.13)	1.72*	(1.29, 2.30)	1.56* (1.21, 2.01)
Any illicit drug other than marijuana									
Female	4.4	17.5	31.1	21.0	3.40*	(2.91, 3.97)	5.13*	(4.05, 6.50)	3.07* (1.70, 5.55)
Male	5.9	15.0	20.4	13.3	2.32*	(1.78, 3.03)	2.87*	(1.64, 5.03)	1.89* (1.17, 3.06)
Ecstasy									
Female	1.8	8.0	14.8	8.7	3.91*	(3.07, 4.97)	6.68*	(4.74, 9.40)	4.56* (2.12, 9.87)
Male	1.7	4.2	12.3	7.4	2.19*	(1.23, 3.90)	6.27*	(3.01, 13.1)	2.92* (1.34, 6.39)
Cocaine									
Female	1.8	7.2	9.8	6.9	3.38*	(2.61, 4.39)	4.06*	(2.60, 6.34)	3.57* (1.58, 8.08)
Male	2.4	7.1	3.2	6.8	2.67*	(1.73, 4.13)	1.29	(0.34, 4.85)	2.48* (1.23, 5.00)
Heroin									
Female	0.1	0.9	0.8	0	7.80*	(3.97, 15.3)	5.49*	(1.21, 24.9)	--- c
Male	0.2	1.0	1.3	2.6	5.33*	(1.84, 15.5)	7.35	(0.92, 58.8)	6.61* (1.44, 30.3)
Amphetamines									
Female	1.3	5.7	14.7	8.3	3.98*	(2.94, 5.38)	9.35*	(6.34, 13.8)	4.56* (1.30, 16.1)
Male	1.5	5.6	6.2	4.5	3.71*	(2.32, 5.96)	3.90*	(1.34, 11.2)	3.07* (1.30, 7.27)
LSD/Mushrooms									
Female	2.3	9.7	19.3	14.3	3.84*	(3.10, 4.76)	6.40*	(4.64, 8.81)	4.91* (2.64, 9.12)
Male	4.2	11.5	8.0	8.2	2.33*	(1.66, 3.25)	1.46	(0.53, 4.03)	1.87* (1.04, 3.35)
Misuse of prescription drugs									

Drug use by gender	Age-standardized prevalence (%)				Adjusted RR (95% CI) ^b		
	Completely Heterosexual	Mostly Heterosexual	Bisexual	Lesbian/Gay	Mostly Heterosexual	Bisexual	Lesbian/Gay
Female	5.7	16.6	27.8	16.5	2.74*	4.07*	1.84 (0.87, 3.88)
Male	6.0	11.4	16.4	13.0	1.92*	2.58*	2.04* (1.29, 3.21)

Abbreviations: RR, Risk Ratio; CI, Confidence Interval.

^aResults based on repeated measures observations. Among females, number of observations is 15051 completely heterosexual, 1313 mostly heterosexual, 259 bisexual, and 63 lesbian. Among males, number of observations is 9667 completely heterosexual, 391 mostly heterosexual, 63 bisexual, and 130 gay.

^bMultivariable generalized estimating equations models adjust for age, race/ethnicity, and region of residence. All within-gender comparisons used completely heterosexual individuals as the referent group.

^cCannot be estimated because no lesbians reported heroin use.

* Statistically significant ($p < .05$).

Table 2
Age-specific past-year drug use^a by sexual orientation among female and male youth in the GUTS cohort (1999–2005)

Drug use by gender and age period (years)	Prevalence (%)					Adjusted RR (95% CI) ^b		
	Completely Heterosexual	Mostly Heterosexual	Bisexual	Lesbian/Gay	Mostly Heterosexual	Bisexual	Lesbian/Gay	
Females								
Marijuana								
12–17	11.6	35.8	60.2	50.0	2.42*	3.53*	2.57*	(1.49, 4.42)
18–23	27.6	56.8	67.2	55.3	1.81*	2.41*	1.81*	(1.36, 2.40)
Any illicit drug other than marijuana								
12–17	2.7	12.9	28.9	25.0	3.94*	7.62*	4.85*	(1.54, 15.3)
18–23	6.7	25.6	35.9	25.5	3.38*	4.94*	3.18*	(1.76, 5.76)
Misuse of prescription drugs								
12–17	5.2	15.1	31.3	18.8	2.62*	5.19*	2.71	(0.86, 5.59)
18–23	6.4	20.0	25.9	12.8	3.01*	3.77*	1.94	(0.87, 4.30)
Males								
Marijuana								
12–17	12.9	33.6	32.4	33.9	2.24*	2.05*	2.09*	(1.45, 3.02)
18–23	32.5	56.2	50.0	40.5	1.64*	1.44*	1.28	(0.93, 1.77)
Any illicit drug other than marijuana								
12–17	3.0	8.5	18.9	17.9	2.45*	5.07*	4.46*	(2.42, 8.25)
18–23	10.0	25.7	23.1	10.8	2.55*	1.91	1.07	(0.55, 2.05)
Misuse of prescription drugs								
12–17	4.6	7.7	18.9	16.1	1.64*	3.97*	3.16*	(1.72, 5.81)
18–23	8.1	17.4	11.5	12.2	2.25*	1.68	1.55	(0.84, 2.86)

Abbreviations: RR, Risk Ratio; CI, Confidence Interval.

^aResults based on repeated measures observations. Among females, number of observations is 15051 completely heterosexual, 1313 mostly heterosexual, 259 bisexual, and 63 lesbian. Among males, number of observations is 9667 completely heterosexual, 391 mostly heterosexual, 63 bisexual, and 130 gay.

^bMultivariable generalized estimating equations models adjust for age, race/ethnicity, and region of residence. All within-gender comparisons used completely heterosexual individuals as the referent group.

* Statistically significant ($p < .05$).