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Sexual orientation and gender identity disparities in substance use disorders during young adulthood in a united states longitudinal cohort*

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Abstract

Background—This study examined associations of sexual orientation and gender identity with prevalence of substance use disorders (SUDs) and co-occurring multiple SUDs in the past 12-month during young adulthood in a United States longitudinal cohort.

Methods—Questionnaires self-administered in 2010 and 2015 assessed probable past 12-month nicotine dependence, alcohol abuse and dependence, and drug abuse and dependence among

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Contributors

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S. Bryn Austin helped with study design, reviewed the manuscript and gave critical feedback.
Laura Katuska helped with data collection and reviewed the manuscript.
Heather L. Corliss obtained the funding, conceptualized the paper, and reviewed and revised the manuscript.
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Author Disclosures

Conflict of Interest

We have no potential conflicts of interest to disclose.

12,428 participants of an ongoing cohort study when they were ages 20–35 years. Binary or multinomial logistic regressions using generalized estimating equations were used to estimate differences by sexual orientation and gender identity in the odds of SUDs and multiple SUDs, stratified by sex assigned at birth.

Results—Compared with completely heterosexuals (CH), sexual minority (SM; i.e., mostly heterosexual, bisexual, lesbian/gay) participants were generally more likely to have a SUD, including multiple SUDs. Among participants assigned female at birth, adjusted odds ratios (AORs) for SUDs comparing SMs to CH ranged from 1.61–6.97 (ps<.05); among participants assigned male at birth, AORs ranged from 1.30–3.08, and were statistically significant for 62% of the estimates. Apart from elevated alcohol dependence among gender minority participants assigned male at birth compared with cisgender males (AOR: 2.30; p<.05), gender identity was not associated with prevalence of SUDs.

Conclusions—Sexual and gender minority (SGM) young adults disproportionately evidence SUD, as well as co-occurring multiple SUDs. Findings related to gender identity and bisexuals assigned male at birth should be interpreted with caution due to small sample sizes. SUD prevention and treatment efforts should focus on SGM young adults.

Keywords

Sexual Orientation; Gender Identity; LGBT; Substance Use Disorders (SUDs); Young Adults; Longitudinal Cohort

1. Introduction

Substance use disorders (SUDs) affect more than 20 million individuals in the United States (U.S.) annually, increasing risk for psychiatric disorders, chronic diseases, and disruptions to social, family, and work lives (Patel et al., 2016; Whiteford et al., 2013). SUD prevalence peaks during young adulthood (Center for Behavioral Health Statistics and Quality, 2016), with co-occurrence of multiple SUDs also common during this time period, which increases clinical severity and complicates treatment (Falk et al., 2008; Moss et al., 2015). Previous research has established that, compared to completely heterosexual (CH) and cisgender individuals (i.e., gender identity corresponds with sex assigned at birth), sexual and gender minorities (SGMs; i.e., those identifying as lesbian, gay, bisexual, or transgender [LGBT], with same-sex sexual attractions or behaviors, or with a gender identity different than their birth sex) engage in greater substance use beginning in adolescence and extending throughout life (Buchting et al., 2017; Corliss et al., 2014; Day et al., 2017; De Pedro et al., 2017; De Pedro and Shim-Pelayo, 2018; Gerend et al., 2017; Gonzales et al., 2016; Newcomb et al., 2014; Talley et al., 2014). Despite evidence of SGMs' disproportionate substance use, only a small proportion of studies on substance use have assessed sexual orientation (2.3–6.5%) or gender identity (1.9–2.3%) (Flentje et al., 2015). Even fewer have examined more serious SUD outcomes by sexual orientation or gender identity or have focused on SUDs during young adulthood (Coulter et al., 2018; Goldberg et al., 2013; Kerridge et al., 2017; Medley, 2016). The present study addresses these gaps by examining associations between SGM statuses and past 12-month prevalence of SUDs in a community cohort of U.S. young adults.

SGM disparities in SUDs persist because SGMs use substance to cope with SGM-related minority stressors, including self-stigma and interpersonal and structural-level discrimination (Felner et al., in press; McCabe et al., 2009a). Disparities may also be driven by differences in substance use norms within SGM communities (Felner et al., in press). For example, research indicates that sexual minorities (SMs) perceive greater availability of substances and have more tolerant use norms than do heterosexuals (Cochran et al., 2012; Mereish et al., 2017). Additionally, gender minority (GM) youth may perceive less risk associated with substance use than cisgender youth (Day et al., 2017).

1.1 Sex Assigned at Birth, Sexual Orientation, Age, and SUD Risk

Research has found persistent variation in SUD risk by sex. In the general population, men experience single and co-occurring SUDs at higher levels than women (Falk et al., 2008). Among SMs, however, sex differences are typically reduced or even reversed, with greater sexual orientation disparities among adult women compared to men, and especially elevated rates among bisexual women (Coulter et al., 2018; Goldberg et al., 2013; Kerridge et al., 2017; McCabe et al., 2018; Medley, 2016). Nonetheless, studies have rarely tested whether sex modifies relationships between sexual orientation and SUDs by including interaction terms in statistical models.

Prevalence of SUDs tends to peak around age 25 and declines with age (Merikangas and McClair, 2012). Research examining SUDs among SMs, however, suggests a slower age-normative decline (Evans-Polce et al., 2019; Hughes et al., 2006; McKirnan and Peterson, 1989). Rarely have researchers compared sexual orientation or gender identity disparities in SUDs among individuals older than 25 years with those in younger age groups. Knowledge of how the magnitude of sexual orientation and gender identity differences in SUDs vary by birth sex and age can help identify subgroups in need of interventions.

1.2 Gender Identity and SUD Risk

Research on how gender identity is associated with SUD risk is severely lacking, with available studies using small, subgroup samples (Flentje et al., 2014; Keuroghlian et al., 2015; Reisner et al., 2016). Studies also frequently lack cisgender comparison groups, preventing quantification of gender identity differences. Although most available research has examined substance use, rather than SUDs, among GMs, there is reason to suspect elevated SUD risk given GMs' 2–4 times higher likelihood of using substances compared to their cisgender peers (Coulter et al., 2015; Day et al., 2017; De Pedro et al., 2017; Gerend et al., 2017; Tupler et al., 2017).

1.3 SGM Differences in Types of Drugs Used Among Those with SUDs

Research indicates that addiction potential, mortality risk, effective treatment, clinical outcomes, and public health impacts vary across drugs used (Magill and Ray, 2009; Nutt, 1996; Volkow et al., 2015). Given these implications, information on how sexual orientation and gender identity is associated with specific drug types can inform efforts to address SUD disparities.

1.4 Study Aims

This study analyzed data from the longitudinal Growing Up Today Study (GUTS) when participants were aged 20–35 to estimate sexual orientation and gender identity differences in probable SUDs. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria were used to assess past 12-month nicotine dependence, alcohol abuse/dependence, drug abuse/dependence, any SUD, and co-occurring multiple SUDs (2 or more). Because research demonstrates sex differences in associations between sexual orientation and substance outcomes (Hughes et al., 2016; Schuler et al., 2018), we estimated statistical interactions between 1) sexual orientation and birth sex, and 2) gender identity and birth sex, and present birth-sex-stratified estimates. We hypothesized that SGMs would be more likely than non-SGMs of their same birth sex to meet criteria for SUDs, and that sexual orientation differences would be larger among participants assigned female at birth compared to those assigned male. Additionally, we estimated statistical interactions between 1) sexual orientation and age, and 2) gender identity and age. We hypothesized that sexual orientation and gender identity differences in SUD risk would be larger in older (26–35 years) versus younger (20–25 years) periods. Among participants meeting criteria for a past 12-month drug use disorder, we examined associations of sexual orientation and gender identity with past 12-month specific drug use.

2. Methods

2.1 Participants and Procedures

Data are from two ongoing GUTS cohorts: GUTS1 and GUTS2. In 1996, GUTS1 participants (N=16,882) were aged 9–14 at baseline. In 2004, GUTS2 participants (N=10,923) were aged 10–15 at baseline. GUTS participants are children of Nurses' Health Study II (NHSII) participants. For GUTS1, 34,174 NHSII participants with eligible children were contacted to request permission to invite their children to join the cohort. For GUTS2, 20,700 NHSII participants with eligible children were similarly contacted. NHSII participants provided information on 26,765 (GUTS1) and 17,280 (GUTS2) eligible children, who were mailed an invitation to participate and a sex-specific questionnaire. More information about GUTS is available elsewhere (Field et al., 1999; Field et al., 2014). Data collection procedures (self-administered paper or web-based questionnaires) were approved by Partners Healthcare IRB.

The current analysis includes 17,496 observations from 8,701 GUTS1 and 3,727 GUTS2 participants of: (1) wave 2010 (GUTS1 only; 51% response rate) and (2) a 2015–2017 GUTS Substance Substudy (GUTS1 and 2; 73% response rate among 13,340 recent responders invited to participate). The proportion of participants included in the current analysis was lower among those assigned male (32.4%) compared to those assigned female (55.2%; $p<.0001$) at birth due to greater attrition among males. Participants from the Midwest (44.8%), South (43.0%), and Northeast (43.6%) regions of the U.S. were less likely to be included in the analysis than participants from the West (48.9%; $p<.0001$). Additionally, included participants were younger at baseline than those excluded (mean age 12.1 vs. 12.2 years; $p<.0001$). No difference by race/ethnicity was observed ($p=.37$).

2.2 Measures

Sexual orientation—Since 1999, GUTS questionnaires have consistently measured sexual orientation with a question from the Minnesota Adolescent Health Survey (Remafedi et al., 1992) that concurrently taps two dimensions (attraction and identity): “Which one of the following best describes your feelings?”, with response options: 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), or 6) not sure. We included the following categories in analysis: completely heterosexual (CH), mostly heterosexual (MH), bisexual (BI), and lesbian/gay (LG) (mostly and completely homosexual combined). “Not sure” or missing information on sexual orientation were excluded from analysis due to small numbers (n=5). We modeled participants’ sexual orientation response as time-varying and corresponding with the timing of their SUD assessment to account for potential changes in reports between 2010 and 2015.

Gender identity—At baseline, GUTS gathered information on birth sex. In 2010, 2014, and 2016, GUTS assessed participants’ gender identity: “How do you describe yourself?”, and response options: (1) Male, (2) Female, (3) Transgender, or (4) “None of the above” (2010) or “Do not identify as male, female or transgender” (2014, 2016). We classified participants as GMs if they selected a response of transgender or none of the above, or if there was discordance between their gender identity and birth sex.

Substance use disorders—Past 12-month nicotine dependence, alcohol abuse/dependence, and drug abuse/dependence were assessed in 2010 and 2015–2017 with questions adapted from the National Survey on Drug Use and Health (NSDUH) corresponding to DSM-IV criteria for SUDs (American Psychiatric Association, 1994). We coded responses as evidencing or not evidencing symptoms of dependence (e.g., tolerance, withdrawal) and abuse (e.g., failure to fulfill major role obligation, physically hazardous), classifying participants as having probable substance dependence if they endorsed 3 or more of 7 dependence symptoms and as having probable abuse if they endorsed at least 1 of 4 abuse symptoms. We then created 4 SUD variables: nicotine dependence (dichotomous, yes versus no), alcohol use disorder (3-categories; none, abuse only, and dependence), drug use disorder (3-categories; none, abuse only, and dependence), and co-occurring multiple SUDs (3-categories; no SUD, one SUD, and two or more SUDs).

GUTS questionnaires cover multiple health-related topics. Thus, to reduce participant burden, questions assessing drug use disorder for marijuana and other drugs were combined into a single set of questions. Although less comprehensive than the NSDUH’s assessment of each drug separately, our approach is supported by findings that marijuana and other drug use frequently co-occur, and they have similar impacts on well-being (e.g., on school enrollment and employment) (Arria et al., 2013a; Arria et al., 2013b; Fergusson et al., 2008; Mack et al., 2017; Moss et al., 2015).

Drug use—Past 12-month use of marijuana, cocaine, heroin, MDMA/ecstasy, LSD/mushrooms, methamphetamine, amphetamines, and nonmedical use of prescription

benzodiazepines, painkillers, sleeping pills, and stimulants were assessed in 2010 and 2015–2017. Inhalants was assessed in 2010.

Covariates—Race/ethnicity (non-Hispanic White versus other), region of residence (Northeast, West, South, Midwest), cohort (GUTS1, GUTS2), and age at the time of SUD assessment (dichotomized into 20–25 years versus 26–35 years) were included in analyses as potential confounders.

2.3 Statistical Analyses

Analyses were stratified by birth sex (assigned female, assigned male at birth). Unadjusted prevalences of past 12-month SUD outcomes were examined for each sexual orientation and gender identity subgroup. We estimated multivariable associations of SGM statuses with SUDs using generalized estimating equations with exchangeable correlations structure to account for non-independence of sibling clusters and repeated measures among individuals (Liang and Zeger, 1986). When exchangeable correlation structure did not yield convergence for three models estimating drug type (see Table 5), we used independence correlation structure. For nicotine dependence, binary logistic regression estimated adjusted odd ratios (AOR). For alcohol use disorders, drug use disorders, and co-occurring SUDs, multinomial logistic regression estimated AOR. To test whether birth sex modified relationships between sexual orientation and SUDs and gender identity and SUDs, we included sexual-orientation-by-sex and gender-identity-by-sex interaction terms. To test whether age modified relationships between sexual orientation and SUDs and gender identity and SUDs, we included sexual-orientation-by-age and gender-identity-by-age interaction terms stratified by birth sex. To estimate sexual orientation and gender identity differences in past 12-month use of specific drugs, we used binary logistic regression. In these analyses, we combined LGB participants into one category due to small sample sizes. In all models, CH and cisgender participants were referent groups. Corresponding 95% confidence intervals (CI) and p-values were estimated. Multivariable models adjusted for age, race/ethnicity, cohort, region of residence, and birth sex (for models testing for sex-at-birth interactions). All analyses were performed with SAS software, version 9.4, with a significance level of 0.05.

3. Results

3.1 Sociodemographic Characteristics of Participants

Sociodemographic distributions of participants' observations are presented in Table 1. Approximately 19% of observations from participants assigned female at birth were mostly heterosexual, 3% were bisexual, 2% were lesbian, and 0.7% were GMs. Of observations from participants assigned male at birth, approximately 10% were mostly heterosexual, 1% were bisexual, 5% were gay, and 1% were GMs. More than 60% of observations were from participants aged 26–35, while less than 40% from participants aged 20–25.

3.2 Prevalence of Past 12-Month SUDs by Sexual Orientation and Gender Identity

Table 2 presents past 12-month prevalences of SUDs by sexual orientation and gender identity stratified by sex assigned at birth. In most instances, prevalences of all SUD outcomes were higher among SGMs compared with non-SGMs. Comparisons within sexual

minorities found one statistically significant difference, with the prevalence of drug dependence higher among bisexual women compared MH women.

3.3 Interactions of Birth Sex with Sexual Orientation and Gender Identity on SUDs

In numerous instances, birth sex modified relationships with sexual orientation, with sexual-orientation differences larger among participants assigned female compared to assigned male at birth. Differences between MHs and CHs were larger among individuals assigned female for nicotine dependence (p=.02), alcohol abuse (p=.03), alcohol dependence (p=.02), drug dependence (p=.01), one SUD (p=.001), and multiple co-occurring SUDs (p=.01). Although differences between bisexuals and CHs were generally larger among individuals assigned female than assigned male, statistical significance was observed only for drug dependence (p=.006) and marginally for multiple co-occurring SUDs (p=.068), likely due to low power resulting from the small number of bisexual males. Differences between lesbian and gay participants compared to CHs were also larger among individuals assigned female than assigned male for nicotine dependence (p=.002), drug abuse (p=.04), drug dependence (p=.02), and multiple co-occurring SUDs (p=.003). Gender-identity-by-birth-sex interactions were not significant (ps>.05). For more information, see Appendix Table 1.

3.4 Multivariable Associations of Sexual Orientation and Gender Identity with SUDs

Table 3 presents the multivariable associations of sexual orientation, gender identity, and other covariates with SUDs among participants assigned female at birth. The odds of evidencing each SUD and co-occurring multiple SUDs were greater among all SM groups compared to CHs. Associations between gender identity and SUDs were not statistically significant.

Table 4 presents the multivariable associations of sexual orientation, gender identity, and other covariates with SUDs among participants assigned male at birth. All SM groups had elevated odds for nicotine dependence and one SUD compared to CHs. MHs also had elevated odds of alcohol dependence, drug abuse and dependence, and having 2 or more SUDs. Gay men also evidenced elevated odds for alcohol abuse and dependence, drug dependence, and having 2 or more SUDs compared to CHs. GMs had significantly higher odds of alcohol dependence than their cisgender peers. Like patterns observed among participants assigned female, associations between gender identity and SUDs were frequently smaller than associations of sexual orientation with SUDs.

3.5 Interactions of Age with Sexual Orientation and Gender Identity

Statistical interactions between sexual-orientation-by-age and gender-identity-by-age were non-significant (all ps>.05), except for drug abuse among bisexual females, where differences between bisexuals and CHs were larger during ages 26–35 compared to 20–25 (p=.04). In most instances, prevalences of SUD outcomes across sexual orientation and gender identity groups were lower in the older versus younger age group.

3.6 Multivariable Associations of Sexual Orientation and Gender Identity with Types of Drugs Used

Table 5 presents the prevalence and multivariable associations of sexual orientation and gender identity with past 12-month drug use among participants evidencing a drug use disorder, stratified by birth sex. Regardless of sexual orientation and gender identity, marijuana was the most prevalent drug reported. Among participants assigned female, LGBs were more likely than CHs to report using MDMA/ecstasy and LSD/mushrooms and GMs were more likely than their cisgender counterparts to report using LSD/mushrooms. Among those assigned male, LGBs were more likely than CHs to report using methamphetamine and inhalant and GMs were more likely than cisgender peers to report using heroin, amphetamines, inhalants, and non-medical use of prescription painkillers. No differences were found between MH and CH in the prevalence of types of drugs used.

4. Discussion

4.1 Summary of Main Findings

Our study quantified sexual orientation and gender identity differences in SUD risk during young adulthood, when SUD prevalence in the general U.S. population is high (Center for Behavioral Health Statistics and Quality, 2016). We examined SUDs based on DSM-IV criteria including nicotine dependence, alcohol abuse and dependence, drug abuse and dependence, and multiple co-occurring SUDs. Aligning with previous literature (Goldberg et al., 2013; Kerridge et al., 2017; McCabe et al., 2009b), we found that SM status was associated with greater odds of past 12-month SUDs among young adults assigned female, and to a lesser extent among those assigned male. Co-occurrence of 2 or more SUDs in the past 12-months was also more common among SMs compared CHs, aligning with previous studies of lifetime SUD co-occurrence (Lee et al., 2015; Medley, 2016; Mereish et al., 2015).

Contrary to our hypothesis, age-related declines in SUD prevalence were largely similar across sexual orientation and gender identity groups. This finding may be due, in part, to our sample age range (20–35 years) and age periods compared in analysis (20–25 versus 26–35). Previous studies have shown differential age-related declines in alcohol problems between SMs and heterosexuals and noted the largest sexual orientation differences in ages 40 or older (Fredriksen-Goldsen et al., 2013; Hughes et al., 2006; McKirnan and Peterson, 1989). An analysis of representative U.S. data showed declines in the prevalence of tobacco and alcohol disorders among SMs between ages 26–35 but increases in prevalence between the mid-30s to mid-40s (Evans-Polce et al., 2019).

We uniquely examined how GM status is related to risk for SUDs. This is an important contribution as studies assessing SUDs by gender identity are limited and typically focused on substance use instead of abuse (Buchting et al., 2017; Coulter et al., 2015; Gerend et al., 2017; Keuroghlian et al., 2015; Reisner et al., 2016). In contrast to findings related to sexual orientation, we did not find consistent evidence of greater prevalence of SUDs among GMs after accounting for sexual orientation in statistical models. The only exception is that GMs assigned male evidenced elevated odds for alcohol dependence. This lack of evidence,

however, should be interpreted with caution considering small numbers of GM participants in GUTS and previous evidence indicating their disproportionate substance use (Buchting et al., 2017; Day et al., 2017; De Pedro et al., 2017; De Pedro and Shim-Pelayo, 2018; Gerend et al., 2017). Additional studies quantifying associations between gender identity and SUDs are needed.

4.2 SUDs among SM Assigned Female at Birth

Among the general population, more people assigned male at birth report probable SUDs than do people assigned female at birth (Agabio et al., 2017; Chou et al., 2016; Evans et al., 2018). In contrast, we found SMs assigned female generally had similar or higher levels of SUDs compared to SMs assigned male, and sexual-orientation differences were larger in assigned females than assigned males. One reason is that comparisons between SM and CH women will yield relatively large effect sizes because CH women have the lowest levels of SUDs of all groups defined by sexual orientation and birth sex. Beyond this explanation, there is little insight into why SM women are at especially elevated risk, though some have proposed that SM women are at greater risk for minority-specific stressors and mood disorders, resulting in greater risk for SUDs (Goldberg et al., 2013; McCabe et al., 2009b).

4.3 Drug Use and SGM Status Among Those with Drug Use Disorder

Among participants with a drug use disorder, we found that some subgroups of SGMs had elevated odds of reporting use of certain drugs (e.g., ecstasy, LSD, methamphetamine, inhalants) compared with CHs and cisgender participants. Studies examining sexual orientation or gender identity differences in drug use among individuals with drug use disorders are rare; however, cross-sectional studies with participants of the NSDUH found that SM adults were significantly more likely than heterosexuals to report past-year marijuana and other drug use (Medley, 2016; Schuler et al., 2018). This indicates that SGMs may be more likely to use different substances than non-SGMs, which has implications for screening, intervention, and treatment (Magill and Ray, 2009; Volkow et al., 2015).

4.4 Strengths/Limitations

The DSM-IV defined separate criteria for substance abuse and dependence, whereas in the updated DSM-5, abuse and dependence are combined into a single SUD diagnosis (e.g., alcohol use disorder). Studies comparing DSM-IV and DSM-5 SUD diagnostic criteria have shown increases (Agrawal et al., 2011; Bartoli et al., 2015; Goldstein et al., 2015; Kelly et al., 2014; Mewton et al., 2011; Peer et al., 2013), no differences (Bartoli et al., 2017; Hasin et al., 2013; Proctor et al., 2012), and decreases (Goldstein et al., 2015; Tuithof et al., 2014) in prevalence. Increases in SUD prevalences under DSM-5 may relate to the inclusion of “diagnostic orphans” in diagnoses—those who meet one or two DSM-IV criteria for dependence, but none for abuse (Peer et al., 2013; Proctor et al., 2012). Nonetheless, concordance of DSM-IV and DSM-5 diagnoses are acceptable, with concordance increasing with severity (Compton et al., 2013; Dawson et al., 2013; Denis et al., 2015), suggesting that our findings are likely similar to those resulting had we used DSM-5 criteria. Further research is needed to clarify this issue.

GUTS participants are not representative of the U.S. population as they are children of registered nurses and predominantly non-Hispanic White. The prevalence of SUDs in GUTS, however, is comparable to same-aged participants of the NSDUH (Substance Abuse and Mental Health Services Administration, 2017), as is the distribution of SGMs enrolled in GUTS compared to population-based studies (Corliss et al., 2014; Krueger et al., 2018). Additionally, GUTS participants were not enrolled based on their sexual orientation or gender identity.

GUTS assessed sexual orientation with a single item tapping both identity and attraction. This limits direct comparisons between our findings and other studies assessing dimensions of sexual orientation (i.e., identity, attraction, and behavior) separately because research indicates these dimensions have different associations with substance involvement (McCabe 2005; McCabe 2009; Drabble 2005; Boyd 2019). Further, despite the large sample size, we were limited in our ability to detect within group differences among SGMs.

Despite these limitations, our study is strengthened by including multiple SGM subgroups, enabling examination of heterogeneous outcomes that may otherwise be obscured when combining SGM categories. Future research should include more diverse, nationally representative samples to enable examination of interactions between sexual orientation, gender identity, and other sociodemographic factors to further identify higher-risk SGM subgroups.

4.5 Clinical and Public Health Relevance

Among the general population, young adults with SUDs experience disproportionate economic and public health burdens and have low utilization of SUD treatment (Center for Behavioral Health Statistics and Quality, 2016). For SGM young adults, these issues may be even more persistent, with one study finding that less than 4% of the 14–20% of SMs needing treatment actually accessing treatment (Medley, 2016). Specific barriers to treatment among SGMs include a lack of targeted interventions, differences in coping strategies and psychiatric comorbidities, discrimination within healthcare settings, lack of provider knowledge about SGM health needs, and lack of insurance (Hughes et al., 2016; Lee et al., 2016; Lyons et al., 2015; McCabe et al., 2013). Consequently, increasing access to treatment alone may be insufficient to address SGM SUD disparities. Efforts should also focus on bolstering the provision of culturally tailored, SGM affirming treatment which promotes resilience, coping, and wellness. Further, given high co-morbidity with other mental disorders, interventions are needed which integrate psychological and SUD treatment (Lee et al., 2015; Mereish et al., 2015).

5. Conclusions

There is increased risk for substance use and disorders among SGM young adults, yet few studies have estimated sexual orientation and gender identity differences in SUDs during this developmental period when risk peaks. Our findings highlight the importance of examining sexual orientation and gender identity differences in assessing risk for SUDs among young adults.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Sexual minority young adults had elevated prevalence of past 12-month SUD.
- Sexual minorities were more likely to evidence multiple co-occurring SUDs.
- Orientation disparities in SUD were larger in people assigned female at birth.
- Gender-identity differences in SUD were smaller than sexual-orientation differences.
- Future research on SUDs should include sexual orientation and gender identity.

Table 1.

Characteristics of repeated measures observations of Growing Up Today Study participants aged 20–35 years, by sex assigned at birth (2010, 2015).

	Assigned Female at Birth (N=11,832)				**Assigned Male at Birth (N=5,664)**		
Characteristic	***N***		***%***		***N***		***%***
Sexual Orientation							
Completely heterosexual	8,907		75.3		4,777		84.3
Mostly heterosexual	2,296		19.4		562		9.9
Bisexual	387		3.3		52		0.9
Gay/lesbian	242		2.1		273		4.8
Gender Identity							
Cisgender	11,747		99.3		5,603		98.9
Gender minority	85		0.7		61		1.1
Age, years							
20–25	4,405		37.2		2,177		38.4
26–35	7,427		62.8		3,387		61.6
Race/Ethnicity							
White	10,986		92.9		5,275		93.1
Other	846		7.2		389		6.9
Cohort							
GUTS1	9,276		78.4		4,493		79.3
GUTS2	2,556		21.6		1,171		20.7
Region of Residence							
West	2,080		17.6		1,112		19.6
Midwest	3,793		32.1		1,820		32.1
South	2,136		18.1		950		16.8
Northeast	3,823		32.3		1,782		31.5

Note: N equals the number of observations over repeated measures. Percentages within variables sum to 100% except for rounding error.

Table 2.

Past 12-month prevalences of substance use disorders among Growing Up Today Study participants aged 20–35 years, by sex assigned at birth (2010, 2015).

	Nicotine			***Alcohol Use Disorder***						***Drug Use Disorder***						***Number of SUDs***					
	Dependence			**Abuse**			**Dependence**			**Abuse**			**Dependence**			**One SUD**			**Two SUDs**		
Characteristic	**N**	**%**	**p-value**	**N**	**%**	**p-value**	**N**	**%**	**p-value**	**N**	**%**	**p-value**	**N**	**%**	**p-value**	**N**	**%**	**p-value**	**N**	**%**	**p-value**
Assigned Female at Birth																					
Sexual Orientation																					
Comp. hetero.	530	6.0		425	4.8		316	3.6		45	0.5		160	1.8		972	10.9		238	2.7	
Mostly hetero.	**311**	**13.6**	<0.001	**193**	**8.4**	<0.001	**184**	**8.0**	<0.001	**33**	**1.4**	<0.001	**148**	**6.5**	<0.001	**468**	**20.4**	<0.001	**179**	**7.8**	<0.001
Bisexual	**76**	**19.6**	<0.001	**28**	**7.3**	0.016	**28**	**7.3**	<0.001	**10**	**2.6**	<0.001	**44**	**11.5**	<0.001	**101**	**26.1**	<0.001	**40**	**10.3**	<0.001
Lesbian	**44**	**18.2**	<0.001	**19**	**7.9**	0.018	**23**	**9.6**	<0.001	**6**	**2.5**	<0.001	**18**	**7.5**	<0.001	**49**	**20.3**	<0.001	**28**	**11.6**	<0.001
Gender Identity																					
Cisgender	950	8.1		661	5.6		540	4.6		91	0.8		360	3.1		1569	13.4		476	4.1	
Gender minority	11	12.9	0.159	4	4.7	0.850	**11**	**12.9**	0.003	**3**	**3.5**	0.033	**10**	**11.8**	0.0001	**21**	**24.7**	0.002	**9**	**10.6**	0.006
Assigned Male at Birth																					
Sexual Orientation																					
Comp. hetero.	449	9.4		365	7.7		367	7.7		75	1.6		267	5.6		839	17.6		305	6.4	
Mostly hetero.	**81**	**14.4**	0.002	52	9.3	0.091	**66**	**11.8**	0.001	**17**	**3.1**	0.006	**67**	**12.0**	<0.001	**125**	22.2	0.001	**68**	**12.1**	<0.001
Bisexual	**12**	**23.1**	0.004	5	9.8	0.488	6	11.8	0.266	2	3.9	0.184	5	9.8	0.186	**18**	34.6	0.002	5	9.6	0.143
Gay	**37**	**13.6**	0.049	**28**	**10.3**	0.044	**42**	**15.4**	<0.001	6	2.2	0.362	**27**	**10.0**	0.007	**77**	28.2	<0.001	**29**	**10.6**	0.002
Gender Identity																					
Cisgender	569	10.2		444	8.0		469	8.4		99	1.8		358	6.4		1042	18.6		399	7.1	
Gender minority	10	16.4	0.406	6	9.8	0.372	**12**	**19.7**	0.003	1	1.6	0.993	8	13.1	0.072	**17**	**27.9**	0.041	8	13.1	0.079

Note: N equals the number of observations over repeated measures. Prevalence shown are unadjusted. Bivariate P-values comparing completely heterosexuals to sexual minorities and cisgenders to gender minorities estimated by generalized estimating equations with exchangeable correlation structure. Associations in bold are $p < .05$.

Table 3.

Results of multivariable generalized estimating equations regression models estimating past 12-month substance use disorders among Growing Up Today Study participants aged 20–35 years assigned female at birth (2010, 2015).

	Model 1 : Nicotine		**Model 2: Alcohol Use Disorder**				**Model 3 : Drug Use Disorder**				**Model 4: No. of Substance Disorders**			
	Dependence		**Abuse**		**Dependence**		**Abuse**		**Dependence**		**One SUD**		**Two+ SUDs**	
Characteristic	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**
Sexual Orientation														
Completely heterosexual	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Mostly heterosexual	**2.42**	(2.07–2.84)	**1.96**	(1.63–2.36)	**2.53**	(2.08–3.08)	**3.05**	(1.93–4.82)	**3.89**	(3.06–4.95)	**2.32**	(2.03–2.64)	**3.71**	(3.00–4.60)
Bisexual	**4.00**	(2.98–5.38)	**1.61**	(1.08–2.41)	**2.10**	(1.37–3.22)	**5.32**	(2.46–11.5)	**6.97**	(4.72–10.3)	**3.28**	(2.55–4.22)	**5.62**	(3.77–8.38)
Lesbian	**3.82**	(2.63–5.54)	**1.88**	(1.13–3.13)	**2.86**	(1.73–4.72)	**4.94**	(1.94–12.6)	**4.34**	(2.58–7.29)	**2.37**	(1.66–3.38)	**5.66**	(3.56–9.00)
Gender Identity														
Cisgender	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Gender minority	0.80	(0.39–1.67)	0.65	(0.24–1.77)	1.84	(0.86–3.94)	2.13	(0.38–11.9)	1.69	(0.77–3.72)	1.32	(0.76–2.30)	1.37	(0.54–3.45)
Age, Years														
20–25	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
26–35	**0.75**	(0.66–0.86)	**0.71**	(0.61–0.84)	**0.66**	(0.55–0.80)	**0.56**	(0.37–0.85)	**0.55**	(0.44–0.69)	**0.72**	(0.64–0.80)	**0.61**	(0.50–0.74)
Race/Ethnicity														
White	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Other	1.09	(0.82–1.45)	0.78	(0.56–1.09)	0.76	(0.52–1.12)	1.01	(0.47–2.16)	1.12	(0.75–1.68)	**0.74**	(0.58–0.94)	1.14	(0.79–1.64)
Cohort														
GUTS1	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
GUTS2	**0.43**	(0.35–0.52)	**1.22**	(1.01–1.47)	**0.72**	(0.57–0.92)	0.87	(0.53–1.42)	**1.76**	(0.57–1.00)	**0.82**	(0.71–0.94)	**0.54**	(0.41–0.71)
Region of Residence														
West	1.00	-	1.00	-	1.00	-	1.00	-	.00	-	1.00	-	1.00	-
Midwest	**1.51**	(1.20–1.89)	1.05	(0.82–1.34)	0.83	(0.63–1.10)	0.70	(0.38–1.30)	0.91	(0.65–1.26)	1.01	(0.85–1.21)	1.25	(0.93–1.69)
South	**1.35**	(1.07–1.69)	0.93	(0.70–1.22)	0.91	(0.67–1.24)	0.97	(0.45–1.83)	0.67	(0.75–1.00)	0.89	(0.73–1.08)	1.19	(0.86–1.65)
Northeast	**1.29**	(1.00–1.67)	1.08	(0.85–1.37)	1.14	(0.88–1.48)	0.80	(0.51–1.43)	1.03	(0.45–1.41)	1.08	(0.91–1.28)	1.32	(0.99–1.77)

Associations in bold are $p < .05$. Binary and multinomial logistic regression with exchangeable correlation structure estimated adjusted odds ratios (AOR) and 95% confidence intervals (CI). Participants without the substance use disorder were the referent group.

Table 4.

Results of multivariable generalized estimating equations regression models estimating past 12-month substance use disorders among Growing Up Today Study participants aged 20–35 years assigned male at birth (2010, 2015).

	Model 1: Nicotine		Model 2: Alcohol Use Disorder				Model 3: Drug Use Disorder				Model 4: Number of SUDs			
	Dependence		Abuse		Dependence		Abuse		Dependence		One SUD		Two+ SUDs	
Characteristic	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**
Sexual Orientation														
Completely heterosexual	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Mostly heterosexual	**1.65**	(1.27–2.14)	1.31	(0.96–1.78)	**1.71**	(1.27–2.30)	**2.13**	(1.26–3.62)	**2.29**	(1.69–3.12)	**1.51**	(1.21–1.89)	**2.31**	(1.71–3.11)
Bisexual	**3.08**	(1.51–6.24)	1.30	(0.53–3.20)	1.48	(0.61–3.61)	2.73	(0.59–12.63)	1.69	(0.66–4.34)	**2.62**	(1.43–4.82)	2.02	(0.73–5.58)
Gay	**1.58**	(1.08–2.33)	**1.52**	(1.00–2.30)	**2.35**	(1.58–3.50)	1.52	(0.65–3.54)	**1.85**	(1.17–2.91)	**2.03**	(1.48–2.77)	**2.16**	(1.37–3.41)
Gender Identity														
Cisgender	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Gender minority	1.11	(0.48–2.55)	1.37	(0.60–3.15)	**2.30**	(1.12–4.69)	0.74	(0.09–6.42)	1.68	(0.68–4.19)	1.47	(0.82–2.63)	1.78	(0.63–5.01)
Age, Years														
20–25	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
26–35	**0.62**	(0.53–0.72)	**0.75**	(0.61–1.91)	**0.62**	(0.51–0.76)	0.71	(0.47–1.08)	**0.69**	(0.56–0.85)	**0.73**	(0.64–0.84)	**0.54**	(0.44–0.67)
Race/Ethnicity														
White	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Other	0.86	(0.57–1.30)	**1.48**	(1.02–2.16)	0.99	(0.65–1.50)	0.38	(0.12–1.19)	0.97	(0.60–1.56)	1.02	(0.75–1.40)	0.99	(0.62–1.56)
Cohort														
GUTS1	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
GUTS2	**0.44**	(0.34–0.56)	0.88	(0.69–1.12)	**0.50**	(0.37–0.67)	1.08	(0.68–1.72)	**0.73**	(0.55–0.97)	**0.69**	(0.57–0.83)	**0.50**	(0.37–0.67)
Region of Residence														
West	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Midwest	0.95	(0.73–1.24)	0.99	(0.74–1.32)	0.81	(0.61–1.09)	0.79	(0.44–1.42)	**0.50**	(0.36–0.70)	0.85	(0.69–1.04)	**0.72**	(0.53–0.99)
South	0.98	(0.76–1.28)	1.20	(0.87–1.66)	0.97	(0.70–1.34)	1.13	(0.60–2.13)	**0.61**	(0.42–0.88)	1.03	(0.81–1.30)	0.90	(0.60–1.28)
Northeast	1.12	(0.84–1.50)	1.07	(0.80–1.44)	0.86	(0.72–1.27)	0.90	(0.51–1.60)	**0.72**	(0.53–0.97)	1.02	(0.83–1.26)	0.81	(0.64–1.09)

Associations in bold are $p < .05$. Binary and multinomial logistic regression with exchangeable correlation structure estimated adjusted odds ratios (AOR) and 95% confidence intervals (CI). Participants without the substance use disorder were the referent group.

Table 5.

Prevalence and results of multivariable generalized estimating equations logistic regression models estimating past 12-month drug use by sexual orientation and gender identity among Growing Up Today Study participants aged 20–35 years who evidenced past 12-month drug use disorder (2010, 2015).

	Sexual Orientation							Gender Identity			
	CH	Mostly Heterosexual			Gay/Lesbian/Bisexual			Cisgender	Gender Minority		
Type of Drug	*%*	*%*	*OR*	*95% CI*	*%*	*OR*	*95% CI*	*%*	*%*	*OR*	*95% CI*
Assigned Female at Birth											
Marijuana	86.3	90.1	1.47	(0.78–2.80)	94.9	2.78	(0.91–8.43)	89.1	92.3	0.91	(0.16–5.07)
Cocaine	27.8	33.7	1.35	(0.87–2.10)	25.6	0.90	(0.50–1.65)	29.9	23.1	0.69	(0.15–3.09)
Heroin	2.0	3.9	1.91	(0.50–7.22)	6.4	3.09	(0.80–11.9)	3.1	15.4	4.33	(0.60–31.1)
MDMA/ecstasy	15.6	21.0	1.55	(0.91–2.65)	30.8	**2.35**	**(1.24–4.44)**	20.2	23.1	0.72	(0.19–2.77)
LSD/mushrooms	18.1	26.5	1.64	(0.99–2.71)	33.3	**1.92**	**(1.03–3.59)**	22.8	61.5	**4.17**	**(1.15–15.1)**
Methamphetamine	4.4	3.9	0.84	(0.27–2.62)	0.0			3.3	7.7	9.82	(0.31–309)
Amphetamines *	6.8	9.9	1.59	(0.77–3.28)	7.7	1.15	(0.43–3.11)	8.2	7.7	0.87	(0.11–6.94)
Inhalants	3.6	4.3			4.8			4.3	0.0		
Non-Medical Use of Prescription Drugs											
Benzodiazepines	29.8	28.7	0.99	(0.63–1.55)	34.6	1.36	(0.77–2.40)	30.4	23.1	0.67	(0.18–2.45)
Painkillers	31.2	24.9	0.73	(0.45–1.17)	33.3	1.14	(0.65–2.02)	29.1	30.8	1.19	(0.37–3.82)
Sleeping pills	7.8	7.7	1.07	(0.51–2.24)	6.4	0.81	(0.27–2.45)	7.5	7.7	1.21	(0.12–12.2)
Stimulants	25.9	23.2	0.87	(0.55–1.39)	24.4	0.87	(0.45–1.67)	24.2	38.5	2.17	(0.69–6.84)
Assigned Male at Birth											
Marijuana	91.8	94.1	1.51	(0.56–4.13)	90.0	0.99	(0.31–3.18)	92.3	77.8	0.28	(0.05–1.57)
Cocaine	33.3	41.7	1.19	(0.71–1.98)	47.5	1.51	(0.72–3.17)	35.5	66.7	3.09	(0.64–15.0)
Heroin	4.4	7.1	1.45	(0.49–4.34)	2.5	0.41	(0.08–2.17)	4.4	22.2	**13.9**	**(3.05–63.0)**
MDMA/ecstasy	21.1	27.4	1.17	(0.66–2.07)	35.0	1.85	(0.91–3.78)	23.0	44.4	2.06	(0.47–8.96)
LSD/mushrooms	29.0	36.9	1.33	(0.79–2.24)	22.5	0.65	(0.29–1.46)	29.5	44.4	2.01	(0.43–9.43)
Methamphetamine	2.3	4.8	2.36	(0.69–8.13)	12.5	**6.63**	**(1.52–29.0)**	3.7	0.0		
Amphetamines	8.8	7.1	0.79	(0.31–2.02)	17.5	1.52	(0.55–4.24)	8.3	55.6	**8.49**	**(2.38–30.3)**

	Sexual Orientation							Gender Identity			
	CH	Mostly Heterosexual			Gay/Lesbian/Bisexual			Cisgender	Gender Minority		
Type of Drug	*%*	*%*	*OR*	*95% CI*	*%*	*OR*	*95% CI*	*%*	*%*	*OR*	*95% CI*
Inhalants*	4.8	5.9	1.33	(0.35–5.01)	40.0	**10.6**	**(3.40–33.1)**	7.4	57.1	**6.95**	**(1.16–41.7)**
Non-Medical Use of Prescription Drugs											
Benzodiazepines*	25.7	22.6	0.87	(0.48–1.60)	37.5	1.63	(0.77–3.42)	25.8	44.4	1.89	(0.56–6.45)
Painkillers	37.1	32.1	0.82	(0.49–1.37)	30.0	0.64	(0.28–1.47)	35.0	66.7	**6.19**	**(1.56–24.6)**
Sleeping pills	5.6	2.4	0.35	(0.08–1.47)	15.0	2.14	(0.79–5.82)	5.5	22.2	4.67	(0.98–22.4)
Stimulants	26.9	35.7	1.33	(0.75–2.36)	35.0	1.21	(0.57–2.59)	28.5	66.7	3.61	(0.68–19.2)

Completely heterosexuals and cisgenders are the referent groups. Models adjusted for age, race/ethnicity, cohort, and region of residence and used exchangeable correlation structure except models noted with an asterisk (*), which used independence correlation structure. Associations in bold are $p < .05$.