Changes in sexual identity and substance use during young adulthood

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Abstract

Background: Sexual identity is dynamic, and changes in identity (e.g., from heterosexual to lesbian, gay, bisexual, or queer [LGBQ+]) are common during young adulthood. It is not well-understood how sexual identity changes may be associated with substance use risk.

Methods: Two waves of data (baseline: October, 2018–October, 2019; follow-up: May–October, 2020) were used from a prospective cohort of young adults (N=1,896; mean age=21.2). Frequency of past 30-day use and new initiation of five substance use outcomes (alcohol, any tobacco, e-cigarettes, cannabis, illicit drugs) were compared across four groups: consistently heterosexual (N=1,567), consistently LGBQ+ (N=244), heterosexual to LGBQ+ (N=65), and LGBQ+ to heterosexual (N=20).

Results: Consistently LGBQ+ (vs. consistently heterosexual) participants reported greater frequency of past 30-day use of alcohol (aOR=1.34, 95% CI=1.04–1.72), any tobacco products (aOR=1.88, CI=1.34–2.63), e-cigarettes (aOR=1.49, CI=1.01–2.19), cannabis (aOR=1.36, CI=1.01–1.84), and illicit drugs (aOR=2.84, CI=1.77–4.56). Heterosexual to LGBQ+ (vs. consistently heterosexual) participants reported greater frequency of past 30-day use of any tobacco products (aOR=1.87, CI=1.06–3.33) and illicit drugs (aOR=2.48, CI=1.10–5.62), and had greater risk of initiating alcohol (aRR=1.82, CI=1.02–3.25) and cannabis use (aRR=2.90, CI=1.81–4.64). LGBQ+ to heterosexual (vs. consistently LGBQ+) participants reported lower frequency of past 30-day use of alcohol (aOR=0.35, CI=0.14–0.88) and any tobacco products (aOR=0.15, CI=0.03–0.80).

Conclusions: Identifying as LGBQ+ was associated with increased risk for frequent substance use, and newly adopting an LGBQ+ identity was associated with increased risk for new substance use initiation. Prevention and treatment interventions may need to tailor messaging to young people who have newly adopted an LGBQ+ identity.

Abbreviations

LGBQ+: Lesbian, gay, bisexual, queer, pansexual

Introduction

Compared to their heterosexual peers, sexual minority-identified (e.g., lesbian, gay, bisexual, queer, pansexual; "LGBQ+") young people experience stark disparities in use of, and dependence on, a range of both legal and illicit substances (Goldbach et al., 2014; Watson et al., 2018). For instance, among young adults (ages 18-25) in the 2018 National Survey on Drug Use and Health, 64% of LGBQ+ participants (vs. 54% of heterosexual participants) reported past 30 day alcohol use, 33% (vs. 21% of heterosexual participants) reported past 30 day cannabis use, and 27% (vs. 16% of heterosexual participants) reported lifetime cocaine use (The Trevor Project, 2020). LGBQ+ substance use disparities emerge early in adolescence (Fish et al., 2021; Marshal et al., 2008; Marshal et al., 2009), increasing the risk for problematic substance use in adulthood and resulting in even greater health disparities (Schuler & Collins, 2019; US Department of Health and Human Services, 2014). It is thus vital to identify the myriad factors that contribute to the onset of LGBQ+ substance use disparities among young people.

Despite being a well-known risk factor for problematic substance use, sexual identity is not static, but shifts and evolves across the life course (Mock & Eibach, 2012) – particularly during adolescence and young adulthood (Kaestle, 2019; Rosario et al., 2006; Savin-Williams et al., 2012). While 2.65% of adult women and 1.60% of adult men experienced a change in sexual identity over a 10-year period (Mock & Eibach, 2012), a recent systematic review found that estimates of identity change during adolescence and young adulthood ranged from 6% to 30% across probability samples in the United States, Australia, Croatia, and New Zealand, though there were noted variations in how changes were measured, and importantly, in the length of follow-up across studies (Srivastava et al., 2022). Most substance use research, however – including longitudinal studies – has assessed sexual identity at a single point in time. This is

problematic because measuring sexual identity at a single time point doesn't capture the heterogeneity in the timing and duration of sexual identity, which may mask important subgroup differences in substance use risk (e.g., between consistently and newly LGBQ+ identified young people). There may be unique risks associated with changing sexual identities vs. maintaining a consistent sexual identity. Indeed, prior studies have shown that LGBQ+ youth who have changed identities (and more specifically, adopted a bisexual identity) were at increased risk for both cigarette smoking (Harlow et al., 2021) and alcohol use (Fish & Pasley, 2015). Further, a study by Feinstein et al. (2019) found an increased number of sexual identity changes to be associated with greater weekly alcohol consumption among young adult sexual minority women. Studies with contemporary youth and young adults are needed, which assess whether shifts in sexual identity are associated with different patterns of use for a wide range of substances.

Young adulthood is a time when many individuals engage in identity exploration (Arnett, 2000; Cote, 2006) while also beginning to experiment more regularly with substance use (Johnston et al., 2021; US Department of Health and Human Services, 2014), and there are several reasons why sexual identity change might be expected to be associated with substance use among young people. It is possible that the process of undergoing any change in sexual identity (whether adopting an LGBQ+ or a heterosexual identity) brings about novel stressors (e.g., managing a new identity, deciding whether to reveal it publicly) and experiences (e.g., questions and possible dismissal from friends and family) that are in turn associated with using substances to cope. However, it is also possible that adopting an LGBQ+ identity specifically – and any associated social environmental changes that accompany the identity change (e.g., potential new exposure to LGBQ+ related stigma, bullying, and discrimination (Goldbach et al., 2015; Krueger et al., 2020)) – might be more directly associated with increased substance use.

Additional research is needed to assesses whether and how sexual identity change (and more specifically, adoption of an LGBQ+ identity) is associated with distinct patterns of substance use.

The Present Study

This study used two consecutive waves of data (2019 – 2020) from a longitudinal cohort survey of young adults to assess whether changes in sexual identity during follow-up, and the direction of change, are associated with lifetime use of various substances, frequency of current substance use, and with new substance use initiation.

Methods

Study design

Data were from a prospective cohort of young adults in Southern California, originally recruited in fall 2013 from 10 Los Angeles, CA metropolitan area high schools, when students were in 9th grade (mean age=14.1; n=3,396). Participants have since been surveyed repeatedly, with biannual surveys throughout high school and approximately annual surveys following the completion of high school in 2017. Further details about the study design can be found elsewhere (Leventhal et al., 2015). For the present analyses, data from the first post-high school wave ("baseline;" conducted October, 2018 – October, 2019; mean age=19.7) were used because this was the first wave at which participants were asked to report their sexual identities. Data from the subsequent wave ("follow-up;" conducted May – October, 2020; mean age=21.2) served as the follow-up time point. All participants who completed both waves of data collection, and who

provided sexual identity information at both waves were included in the current study (n=1,896). The study was approved by the Institutional Review Board at [REDACTED FOR REVIEW].

Measures

Substance use was assessed at both baseline and follow-up. At each wave, participants were asked to report on their lifetime substance use using the question, "have you ever used the following substances in your life?" (no, yes). Five categories of substances were assessed: alcohol (a full drink, including a can of beer, glass of wine, wine cooler, or shot of liquor), any tobacco products (including cigarettes, e-cigarettes, IQOS or other heated tobacco devices, snus, nicotine pouches, cigars, cigarillos, hookah), e-cigarettes specifically, cannabis (including smoking, electronic, edible, synthetic, concentrates), and other illicit substances (including use of prescription painkills, stimulants, or sedatives without a doctor's advice, heroin, cocaine, methamphetamine, heroin, ecstasy). In addition to lifetime use, frequency of use in the prior 30 days was assessed at each wave for each substance use outcome using the question, "In the last 30 days, how many total days have you used... [substance]?" (0 days, 1-2 days, 3-5 days, 6-9 days, 10-19 days, 20-29 days, all 30 days). For analysis, responses were collapsed into 5 categories due to small cell sizes across the more frequent use categories: 0 days, 1-2 days, 3-5 days, 6-9 days, 10 or more days.

Sexual identity was assessed at both baseline and follow-up using the question, "do you consider yourself to be:" (single choice: asexual, bisexual, gay, straight, lesbian, pansexual, queer, questioning or unsure, another identity not listed here, prefer not to disclose). Participants were categorized as either heterosexual (straight) or LGBQ+ (lesbian, gay, bisexual, pansexual, queer, another identity). Those selecting "asexual," "questioning or unsure," or "prefer not to

disclose" were marked as missing for sexual identity. Asexual individuals can (and do) identify as either heterosexual or as LGBQ+ (DeLuzio Chasin, 2011). Similarly, participants indicating that they were "questioning or unsure," or who preferred not to disclose a sexual identity could not accurately be categorized as either heterosexual or LGBQ+. Thus, these groups were marked as missing for sexual identity. Using sexual identity from both waves, we created a 4-level variable for analysis: consistently heterosexual, consistently LGBQ+, heterosexual to LGBQ+, LGBQ+ to heterosexual.

Covariates. Sex at birth was assessed with the question, "what is your sex assigned at birth?" (female, male). Race/ethnicity was assessed using the question "please choose one term that best describes you," (American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Pacific Islander, White, Multiracial, Other), which was collapsed into a 6-level variable (Latinx, Asian/Pacific Islander, White, Black/African American, Other, Multiracial). Current enrollment in a degree program was assessed with the question, "are you currently enrolled in a degree program?" (yes, no, don't know). Participants selecting "don't know" were coded as missing. Subjective financial status was assessed with the question, "Considering your own income and the income from any other people who help you, how would you describe your overall personal financial situation?" (Live comfortably, meet needs with a little left, just meet basic expenses, don't meet basic expenses).

Missing values for sex at birth (N=8) were imputed using the sex provided at study recruitment. All other missing covariates (degree program enrollment: N=113 perceived financial status: N=12) were imputed using predictive mean matching (Little, 1988) with race/ethnicity, sex at birth, and parental education as predictors.

Data analysis:

Distribution of sociodemographic characteristics were calculated for the full sample, and then compared by sexual identity group using Chi-square tests. Prevalence of lifetime substance use at follow-up was then calculated for each substance type, separately by sexual identity group. Then, to evaluate the associations between sexual identity change and past 30-day frequencies of each substance use outcome at follow-up, we fit a series of ordered logit regressions to obtain odds ratios (OR) and 95% confidence intervals (CI). Each model was adjusted for the covariates and baseline frequency of use of that substance. Two sets of models were run: one with consistently heterosexual as the referent group, and one with consistently LGBQ+ as the referent group. Next, to examine the associations between sexual identity change and new initiation (new lifetime use) of each substance use outcome at follow-up, we fit modified poisson regresssions with robust standard errors to obtain risk ratios (RR) and 95% CI (Zou, 2004). The initiation models were adjusted for the covariates and were restricted to those who had never used that substance at baseline. As with the frequency of use models, two sets of models were run: one with consistently heterosexual as the referent group, and one with consistently LGBQ+ as the referent group. Finally, while we did not have sufficient sample size to test whether changes between specific identities (e.g., from heterosexual to pansexual or from gay to bisexual) were associated with the substance use outcomes, the specific sexual identities endorsed at follow-up were tabulated by sexual identity at baseline in supplemental analyses. Data were analyzed using Stata version 17.

Results

Sample characteristics are reported in Table 1. Within the sample (n = 1,896), 82.7% (n = 1,567) of participants reported a heterosexual identity at both baseline and follow-up, while 12.9% (n = 244) reported an LGBQ+ identity at both waves. Nearly 5% of the sample changed identities over the course of follow-up, with 3.4% (n = 65) reporting a heterosexual identity at baseline and an LGBQ+ identity at follow-up, and 1.1% (n = 20) reporting an LGBQ+ identity at baseline and a heterosexual identity at follow-up. A majority of the sample (60.3%) were female and Latinx (55.7%), with 18.5% identifying as Asian/Pacific Islander and 13.0% identifying as White. Nearly three quarters of the sample (71.4%) were currently enrolled in a degree program at baseline, and nearly half (45.8%) reported that they lived comfortably financially.

Membership in the four sexual identity groups differed across several sociodemographic charcteristics including sex at birth, enrollment in a degree program, and perceived financial status. Compared to males, a smaller proportion of females consistently identified as heterosexual (78.9% vs. 88.3%), but larger proportions identified consistently as LGBQ+ (15.9% vs, 8.2%) or adopted an LGBQ+ identity over the course of follow-up (4.1% vs. 2.4%; χ^2 = 29.4; p<0.001). Compared to those currently enrolled in a degree program, a slightly smaller proportion of those not enrolled identified consistently as heterosexual (80.8% vs. 83.4%), while a slightly larger proportion identified consistently as LGBQ+ (15.5% vs. 11.8%; χ^2 = 7.1; p = 0.068). A larger proportion of respondents reporting that they lived comfortably identified consistently as heterosexual (86.8%), compared to other groups (range = 74.4% – 82.7%). Conversely, a smaller proportion of those reporting that they lived comfortably identified consistently as LGBQ+ (9.3%), compared to other groups (range = 12.5% – 18.2%; χ^2 = 47.9; p<0.001). There were no racial/ethnic differences between sexual identity groups (χ^2 = 11.4; p = 0.722).

[Table 1]

Figure 1 illustrates rates of lifetime substance use at follow-up, separated by sexual identity group. Consistently LGBQ+ identified participants reported a higher lifetime rate of alcohol use (90.6%, n = 221/244) as compared to consistently heterosexual-identified participants (84.6%, n = 1,326/1,567; χ^2 = 10.3; p = 0.017). Those currently identifying as LGBQ+ at follow-up reported higher rates of lifetime tobacco use (consistently LGBQ+: 73.8%, n = 180/244; heterosexual to LGBQ+: 80.0%, n = 52/65) as compared to consistently heterosexual participants (63.4%, n = 993/1,567; χ^2 = 18.5; p < 0.001). Similarly, participants identifying as heterosexual at baseline and LGBQ+ at follow-up reported higher lifetime use of e-cigarettes (75.4%, n = 49/65), compared to consistently heterosexual-identified participants (57.1%, n = 895/1,567; χ^2 = 12.9; p = 0.005). Participants currently identifying as LGBQ+ at follow-up were also more likely to report cannabis use in their lifetimes (consistently LGBQ+: 80.7%, n = 197/244, heterosexual to LGBQ+: 89.2%, n = 58/65) as compared to consistently heterosexual-identified participants (66.2%, n= 1,038/1,567; χ^2 = 33.8; p < 0.001). Similarly, LGBQ+ identified participants reported using illicit drugs at higher rates (consistently LGBQ+: 37.3%, n = 91/244; heterosexual to LGBQ+: 41.5%, n = 27/65) than consistently heterosexual-identified participants (24.0%, n = 376/1,567; χ^2 = 27.7; p < 0.001).

[Figure 1]

Frequency of substance use in the prior 30 days was assessed by sexual identity group, controlling for covariates and baseline frequency of use (Table 2). Compared to consistently heterosexual-identified participants, consistently LGBQ+ identified participants reported greater increases in alcohol use frequency (aOR = 1.34, 95% CI =1.04–1.72; p = 0.023). Compared to consistently heterosexual-identified participants, both consistently (aOR = 1.88, 95% CI = 1.34–

2.63; $p < 0.001$) and newly-LGBQ+ identified participants (aOR = 1.87, 95% CI = 1.06–3.33; p = 0.032) reported greater frequency of using any tobacco products at higher rates. Consistently LGBQ+ identified participants also reported using e-cigarettes at a greater frequency than consistently heterosexual-identified participants (aOR = 1.49, 95% CI = 1.01–2.19; p = 0.004). Consistently LGBQ+ identified participants (aOR = 1.36, 95% CI = 1.01–1.84; $p < 0.041$) and newly LGBQ+ identified participants (aOR = 1.66, 95% CI = 0.99–2.79; p = 0.054) reported a greater frequency of cannabis use, compared to consistently heterosexual-identified participants. Finally, both consistently LGBQ+ identified (aOR = 2.84, 95% CI = 1.77–4.56; $p < 0.001$) and newly LGBQ+ identified respondents reported higher rates of illicit drug use (aOR = 2.48, 95% CI = 1.10–5.62; p = 0.029), compared to consistently heterosexual-identified participants.

When compared to consistently LGBQ+ participants, LGBQ+ to heterosexual participants reported lower frequency of using alcohol (aOR = 0.35, 95% CI = 0.14–0.88; p = 0.026) and any tobacco products (aOR = 0.15, 95% CI = 0.03–0.80; p = 0.026).

[Table 2]

New initiation of each substance at follow-up, among those who had never used that substance at baseline was compared across the sexual identity groups, controlling for covariates (Table 3). Compared to consistently heterosexual-identified participants, those newly adopting an LGBQ+ identity had higher risk of initiating alcohol use (aRR = 1.82; 95% CI = 1.02–3.25; p = 0.044) and cannabis use (aRR = 2.90; 95% CI = 1.81–4.64, p = 0.001) over the course of follow-up. There were no differences noted between consistently heterosexual-identified participants and other groups in initiation for any tobacco products or illicit drugs outcomes.

When compared to consistently LGBQ+ participants, LGBQ+ to heterosexual participants had greater risk of initiating cannabis use (aRR = 2.64, 95% CI = 1.33–5.25; p = 0.006).

[Table 3]

Supplemental results

Identity changes between baseline and follow-up are reported in Supplemental Tables 1 and 2. Table S1 examines identity changes among participants endorsing identities that were included in this study. The majority of participants who identified as straight at baseline also identified as straight at follow-up (96%), but among those changing from a straight identity to an LGBQ+ identity, the majority adopted a bisexual identity (78.5%, n = 51/65). The majority of participants identifying as LGBQ+ at baseline selected the same identity at follow-up (lesbian/gay: 83.3%, n = 45/54; bisexual: 80.4%, n = 127/158; pansexual/queer/other: 61.5%, n = 32/52), though a sizeable minority of participants identifying as pansexual/queer/other at baseline identified as bisexual at follow-up (21.2%; n = 11/52).

Table S2 also reports changes in identity between baseline and follow-up, but additionally includes participants endorsing asexual and questioning/unsure identities. It is interesting to note that 70.2% (n = 40/57) of asexual participants at baseline identified as straight at follow-up, while 19.3% (n = 11/57) maintained an asexual identity. Additionally, 36.9% (n = 14/38) of questioning/unsure participants at baseline identified as straight at follow-up, while 42.1% (n = 16/38) maintained a questioning/unsure identity (see Table S2).

Discussion

This study assessed how sexual identity – and in particular, consistency vs. changes in sexual identity – during young adulthood were associated with several substance use outcomes. In general, both continuously and newly LGBQ+ identified young adults reported greater lifetime substance use and greater recent frequency of use compared to consistently heterosexual-identified young adults. This finding is consistent with prior research showing substantial disparities in substance use by sexual identity (Goldbach et al., 2014; Watson et al., 2018).

Further, over the course of follow-up, participants who newly adopted an LGBQ+ identity were more than twice as likely as consistently heterosexual-identified young adults to initiate cannabis use and nearly twice as likely to initiate alcohol use use. Conversely, there were no differences observed between consistently LGBQ+ and consistently heterosexual participants in substance use initiation. We also did not find increased risk for any of the substance use outcomes among those switching from an LGBQ+ to heterosexual identity over follow-up, compared to those who consistently identified as heterosexual. While the small number of respondents in this group (N = 20) may have impacted our ability to detect significant substance use differences between these groups, our results did show that compared to consistently LGBQ+ participants, newly heterosexual-identified participants had decreased risk for frequent alcohol and any tobacco use.

Together, these findings all suggest that substance use initiation co-occurs with the adoption of an LGBQ+ identity – namely, that adopting an LGBQ+ identity specifically is more closely associated with increased substance use risk, while adopting a heterosexual identity may be associated with decreased risk. This conclusion is consistent with findings from a recent study assessing sexual identity on a continuous scale from exclusively heterosexual to exclusively

homosexual, which showed that shifting away from a heterosexual identity was associated with increased psychological distress among young women, while shifting towards one was associated with reduced psychological distress (Campbell et al., 2022). Additional studies are needed to explore the unique factors linking sexual identity developmental processes with substance use initiation and trajectories of use among young people.

While we were not able to identify the specific pathway(s) linking the adoption of a new sexual identity with substance use behaviors here, these findings do *not* suggest that encouraging LGBQ+ young people to adopt a heterosexual identity would mitigate substance use risk. Ample research has indicated that efforts to change young persons' identities from LGBQ+ to heterosexual (i.e., "conversion therapy") have negative impacts on young peoples' health and wellbeing, including increased risk for sucidality (Flentje et al., 2013; Green et al., 2020; Ryan et al., 2020). Instead, it is likely that social and psychological changes that occur when one adopts an LGBQ+ identity contribute to substance use risk among young adults (Goldbach & Gibbs, 2017), though there are few empirical studies on this topic. For instance, compared to consistently LGBQ+ identified young people, those adopting an LGBQ+ identity may newly be developing an understanding of anti-LGBQ+ stigma and might possibly experience it for the first time – without the supportive networks or coping strategies in place that consistently LGBQ+ young adults who are more connected to the LGBQ+ community may have (Garcia et al., 2020; Roberts & Christens, 2021). Conversely, those switching from an LGBQ+ to a heterosexual identity may find they have reduced exposure to such minority stressors, compared to the levels they experienced prior, when they identified as LGBQ+. Additional research is needed to understand the unique factors linking these shifts in sexual identity to substance use over time, as it will provide needed evidence for public health and clinical substance use prevention and harm

reduction interventions – in turn, helping to reduce LGBQ+ young adult disparities in substance use.

Regardless, these results do suggest that substance use (an in particular, alcohol and cannabis use) prevention interventions should target newly LGBQ+ identified young people and those who are actively grappling with and coming to terms with their sexual identities. The majority of current substance use prevention methods lack a specialized focus on LGBQ+ youth. Of the existing 911 SAMHSA substance use treatment program listings in the United States and Puerto Rico in 2007, only 11.8% offered specialized services for LGBQ+ clients, and of those, 70.8% of the services offered to LGBQ+ clients "were no different from services offered to the general population" (Cochran et al., 2007). Additionally, existing LGBTQ+ tailored programs such as the U.S. Food and Drug Administration's "This Free Life" tobacco use prevention campaign, tend to target those populations exclusively while omitting cisgender, heterosexual individuals (Food and Drug Administration, 2022). As a result, these programs may fail to capture those who are currently questioning their identities or who were, until recently heterosexual-identified, which this study found to be associated with higher levels of substance use initiation and frequency of use. Thus, determining best practices to identify and include individuals whose identities are still developing or changing is vital to develop effective LGBTQ+ tailored substance use prevention programs.

Limitations

This study has several limitations. First, these data are drawn from an ongoing cohort survey study of a diverse sample of young adults from Southern California. Thus, these results may not be representative of young adults regionally or nationwide. However, the sample was

similar to population characteristics of Los Angeles, CA in terms of race/ethnicity and educational attainment (US Census Bureau, 2019). Second, we also had several limitations due to small sample size. Given the relatively small number of LGBQ+ participants in the sample, we examined all LGBQ+ identities as a single category, and were unable to examine different LGBQ+ identities, and the adoption of individual identities separately (e.g., from heterosexual to bisexual, from pansexual to heterosexual, from gay to queer). This is an area of needed study, given prior evidence that changing to a bisexual identity, more specifically, may be associated with especially high risk for substance use (Fish & Pasley, 2015; Harlow et al., 2021). Similarly due to small sample size, while we noted sex differences in sexual identity change (with higher percentages of young females reporting changes, compared to young males), we were unable to examine whether associations between identity change and substance use varied by sex. We were also unable to assess whether changes in gender identity (e.g., from cisgender to transgender or non-binary) were associated with substance use. While we statistically controlled for sociodemographic characteristics, prevention and treatment interventions will need to be tailored to meet the needs of the clients they serve. Finally, the follow-up wave of data collection occurred between May–August, 2020, around the beginning of the COVID-19 pandemic and associated lockdowns, when overall substance use increased in certain groups and decreased in others. While sexual identity change-based disparities in substance use should not theoretically be affected by the pandemic, we cannot rule out the possibility that COVID-19 related stress (Salerno et al., 2020) and differential coping behaviors observed between LGBQ+ and heterosexual young adults (Krueger et al., 2021) contributed to our findings.

Conclusion

This study provides evidence in support of the association between LGBQ+ identity and substance use. Specifically, we found that both consistently and newly-LGBQ+ (vs. consistently heterosexual) identified young adults reported higher lifetime prevalence and higher frequency of current use, while newly-heterosexual (vs. consistently LGBQ+) identified young adults reported lower frequency of current substance use. Further, those newly adopting an LGBQ+ identity were at increased risk for initiating new substance use. Future prevention and intervention work should consider how best to tailor their messages to young people who have newly adopted an LGBQ+ identity and those actively exploring their sexual identity to help prevent substance use initiation.

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Table 1. Sample characteristics, full sample and separately by sexual identity

|	Full Sample (N=1896)	Consistently Heterosexual (N=1567)	Consistently LGBQ+ (N=244)	Heterosexual to LGBQ+ (N=65)	LGBQ+ to Heterosexual (N=20)	P-Value
Sexual Identity (%)						
Consistently Heterosexual	82.7					
Consistently LGBQ+	12.9					
Heterosexual to LGBQ+	3.4					
LGBQ+ to Heterosexual	1.1					
Sex at birth (%)						<0.001
Female	60.3	78.9	15.9	4.1	1.1	
Male	39.7	88.3	8.2	2.4	1.1	
Race/Ethnicity (%)						0.722
Latinx	55.7	81.6	13.9	3.4	1.0	
Asian/Pacific Islander	18.5	85.8	9.7	3.4	1.1	
White	13.0	81.0	14.2	3.6	1.2	
Black/African American	4.1	91.0	6.4	2.6	0.0	
Other race/ethnicity	1.8	85.3	8.8	5.9	0.0	
Multiracial	6.9	80.0	15.4	3.1	1.5	
Enrolled in a degree program (%)						0.068
Yes	71.4	83.4	11.8	3.8	1.0	
No	28.6	80.8	15.5	2.4	1.3	
Perceived financial status (%)						<0.001
Live comfortably	45.8	86.8	9.3	3.2	0.7	
Meet needs with a little left	29.0	77.4	18.2	3.8	0.6	
Just meet basic needs	20.7	82.7	12.5	3.3	1.5	
Don't meet basic needs	4.5	74.4	16.3	3.5	5.8	
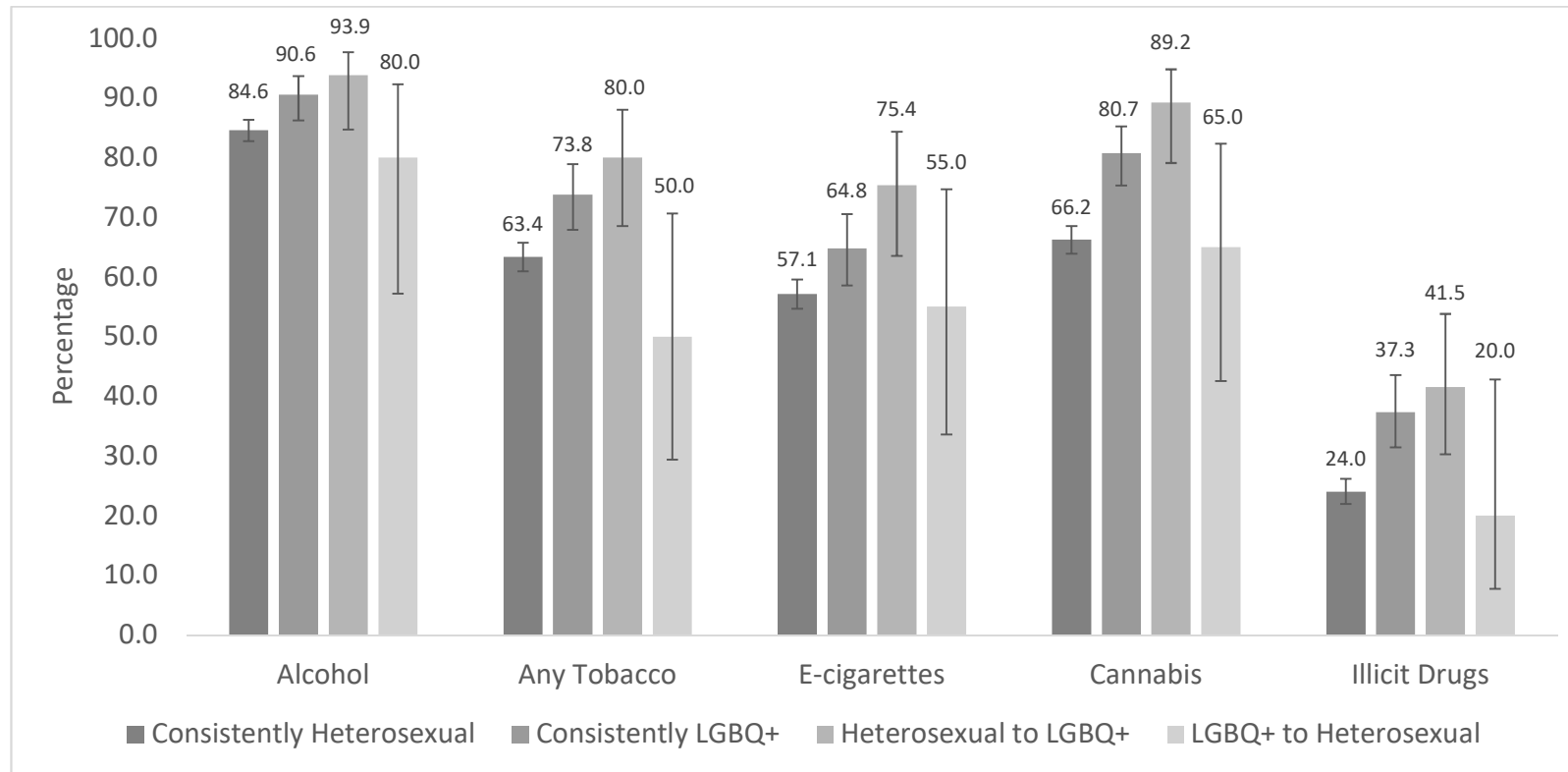
Figure 1. Lifetime substance use at follow-up by sexual identity

Table 2. Frequency of past 30 day substance use by sexual identity change category, Ordered logistic regressions

	aOR (95% CI)	P-value	aOR (95% CI)	P-value
Alcohol				
Consistently Heterosexual	Ref		0.75 (0.58, 0.96)	0.023
Consistently LGBQ+	1.34 (1.04, 1.72)	0.023	Ref	
Heterosexual to LGBQ+	1.05 (0.67, 1.67)	0.820	0.79 (0.48, 1.30)	0.354
LGBQ+ to Heterosexual	0.47 (0.19, 1.15)	0.098	0.35 (0.14, 0.88)	0.026
Any Tobacco Products				
Consistently Heterosexual	Ref		0.53 (0.38, 0.75)	<0.001
Consistently LGBQ+	1.88 (1.34, 2.63)	<0.001	Ref	
Heterosexual to LGBQ+	1.87 (1.06, 3.33)	0.032	1.00 (0.53, 1.88)	0.996
LGBQ+ to Heterosexual	0.29 (0.06, 1.46)	0.134	0.15 (0.03, 0.80)	0.026
E-Cigarettes				
Consistently Heterosexual	Ref		0.67 (0.46, 0.99)	0.044
Consistently LGBQ+	1.49 (1.01, 2.19)	0.004	Ref	
Heterosexual to LGBQ+	1.53 (0.81, 2.90)	0.192	1.03 (0.51, 2.10)	0.936
LGBQ+ to Heterosexual	0.27 (0.03, 2.11)	0.210	0.18 (0.02, 1.45)	0.107
Cannabis				
Consistently Heterosexual	Ref		0.73 (0.54, 0.99)	0.041
Consistently LGBQ+	1.36 (1.01, 1.84)	0.041	Ref	
Heterosexual to LGBQ+	1.66 (0.99, 2.79)	0.054	1.22 (0.69, 2.16)	0.496
LGBQ+ to Heterosexual	0.71 (0.26, 1.92)	0.500	0.52 (0.19, 1.45)	0.211
Illicit Drugs				
Consistently Heterosexual	Ref		0.35 (0.22, 0.57)	<0.001
Consistently LGBQ+	2.84 (1.77, 4.56)	<0.001	Ref	
Heterosexual to LGBQ+	2.48 (1.10, 5.62)	0.029	0.87 (0.37, 2.09)	0.762
LGBQ+ to Heterosexual	-	-	-	-

Notes. Outcome categories were 0 (0 days), 1 (1-2 days), 2 (3-5 days), 3 (6-9 days), 4 (10+ days) in the past 30 days. Each model was adjusted for covariates (sex at birth, race/ethnicity, degree program enrollment, perceived financial status) and frequency of using that substance at baseline.

Table 3. New initiation of substance use by sexual identity change category, Modified poisson regressions

	aRR	P-value	aRR	P-value
Alcohol				
Consistently Heterosexual	Ref		0.84 (0.56, 1.26)	0.402
Consistently LGBQ+	1.18 (0.79, 1.77)	0.402	Ref	
Heterosexual to LGBQ+	1.82 (1.02, 3.25)	0.044	1.53 (0.77, 3.03)	0.221
LGBQ+ to Heterosexual	0.64 (0.11, 3.69)	0.622	0.54 (0.09, 3.24)	0.503
Any Tobacco Products				
Consistently Heterosexual	Ref		1.29 (0.72, 2.30)	0.393
Consistently LGBQ+	0.78 (0.43, 1.39)	0.393	Ref	
Heterosexual to LGBQ+	1.54 (0.72, 3.29)	0.270	1.98 (0.78, 5.02)	0.152
LGBQ+ to Heterosexual	0.51 (0.09, 2.98)	0.456	0.66 (0.10, 4.14)	0.656
E-Cigarettes				
Consistently Heterosexual	Ref		1.10 (0.60, 2.00)	0.763
Consistently LGBQ+	0.91 (0.50, 1.66)	0.763	Ref	
Heterosexual to LGBQ+	2.21 (0.96, 5.09)	0.061	2.43 (0.89, 6.60)	0.082
LGBQ+ to Heterosexual	0.84 (0.12, 5.72)	0.858	0.92 (0.13, 6.67)	0.934
Cannabis				
Consistently Heterosexual	Ref		0.91 (0.53, 1.56)	0.734
Consistently LGBQ+	1.10 (0.64, 1.88)	0.734	Ref	
Heterosexual to LGBQ+	2.90 (1.81, 4.64)	0.000	2.64 (1.33, 5.25)	0.006
LGBQ+ to Heterosexual	1.12 (0.30, 4.22)	0.863	1.02 (0.25, 4.26)	0.974
Illicit Drugs				
Consistently Heterosexual	Ref		0.62 (0.18, 2.08)	0.440
Consistently LGBQ+	1.61 (0.48, 5.41)	0.440	Ref	
Heterosexual to LGBQ+	1.93 (0.31, 11.91)	0.480	1.20 (0.15, 9.43)	0.865
LGBQ+ to Heterosexual	-	-	-	-

Notes. Each model was adjusted for covariates (sex at birth, race/ethnicity, degree program enrollment, perceived financial status) and was limited to those who had never used that substance at baseline.