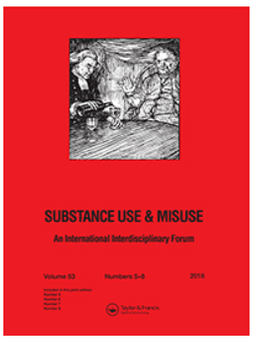

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ORIGINAL ARTICLE

Substance Use among Sexual Minorities: Has it Actually Gotten Better?

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ABSTRACT

Background: Despite efforts to decrease substance use, rates among sexual minority youth (SMY) remain higher than among heterosexuals. Substance use is a leading contributor to morbidity and mortality in adulthood, and SMY's use of substances is related to poorer mental and emotional health. *Objectives*: We sought to document the trends in substance use for a large sample of youth over 14 years with special attention to SMY. In addition, we tested whether there were disparities in substance use behaviors between SMY and heterosexual youth. Last, we examined changes in disparities over time in substance use among SMY. *Methods*: We analyzed data from 8 waves of the Massachusetts YRBS ($N = 26{,}002$, $M_{age} = 16$), from 1999 to 2013, to investigate trends and disparities in current tobacco, alcohol, and cannabis use for heterosexual youth and SMY. We used logistic regression interaction models to test whether these disparities have widened or narrowed for SMY, as compared to heterosexuals, over the span of 14 years. *Results*: In absolute terms, substance use rates decreased for nearly all youth between 1999 and 2013. There were striking disparities in substance use between heterosexual youth and all sexual minority subgroups. These disparities in substance use narrowed among males but remained unchanged or worsened among females. *Conclusions/Importance*: Trends in substance use are changing over time, but not in the same ways for all sexual minority subgroups. Patterns are worsening for females. These findings suggest that we need to address the needs of LGB populations in novel ways.

KEYWORDS
Alcohol use; tobacco; marijuana use; LGB; trends

Young people in the United States have demonstrated promising reductions in use of some substances (CDC, 2016a, b, c), reductions which have the potential to positively influence their health trajectories into adulthood (Arnett, 2005, Hawkins, Catalano, & Miller, 1992). This is important because substance use is a leading contributor to morbidity and mortality in adulthood, and adolescence is the critical developmental period in which experimentation often occurs, and substance use habits are initiated (Mistry et al., 2015). Furthermore, given vulnerable subgroups share a disproportionate amount of burden related to substance use and misuse, it is important to explore whether substance use prevalence systematically varies across these subgroups to better address particular challenges experienced by today's diverse youth.

Vulnerable and stigmatized youth—in particular, sexual minority youth (SMY), persistently reports higher rates of marijuana (Hatzenbuehler, Jun, Corliss, & Austin, 2015) and cigarette use (Corliss et al., 2013; Marshal, Friedman, Stall, & Thompson, 2009; Russell, Driscoll, & Truong, 2002) than their heterosexual peers; binge drinking data reflect similar disparities (Fish, Watson, Russell, & Saewyc, 2017; Talley, Hughes, Aranda, Birkett, & Marshal, 2014) with a notable difference that some research has shown greater sexual orientation disparities among female than male peers (Fish et al., 2017; Ott et al., 2013; Rosario et al., 2014). Furthermore, research reveals persistent disparities in use for sexual minority youth across multiple demographics, including earlier age of initiating use (see Mistry et al., 2015) and higher rates of alcohol use among sexual minority female youth as compared with their heterosexual female counterparts (Eisenberg & Wechsler, 2003; Institute of Medicine, 2011; McCabe, Boyd, Hughes, & d'Arcy, 2003). However, many of these previous studies were unable to disentangle differences across subgroups of sexual minority individuals (i.e., lesbian, gay, bisexual identified) due to small sample sizes, leaving a clear gap in knowledge. An exception is a recent study that reported trends and disparities in alcohol use among Canadian heterosexual and sexual minority youth (Fish et al., 2017); the authors found prominent age-adjusted differences in life-time

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alcohol use, age of onset, past 30-day drinking and heavy episodic drinking between heterosexual and sexual minority young people. Might these patterns be different in patterns of substance use for youth in a different geographic region: Such as Massachusetts? In this paper, we focus on advancing the understanding of substance use patterns over time, particularly for sexual minority youth of various orientations (e.g., lesbian, gay, bisexual), so to provide an important foundation for reducing the potential harms of substance use.

These disparities in substance use behaviors are oftentimes explained through the minority stress model (Meyer, 2003), which suggests that stigma and prejudice are in part responsible for the stressors and disparities experienced by LGBTQ individuals. This model posits that LGBTQ individuals face additional and unique stressors—such as stigma and discrimination—that place them at such increased risk for poorer health than heterosexual individuals. It is important to note that specific to sexual minorities, the past decade has experienced rapid social changes in regards to social acceptance and legal rights (Harrison & Michelson, 2017). For example, over the span of 14 years examined in this study (1999–2013), same-sex marriage was legalized in some states (including Massachusetts, the focus of this study), pro-LGBTQ legislation was passed in many areas, and celebrities publicly disclosed their LGBTQ sexual orientations in increasing numbers (Harrison & Michelson, 2017). We hypothesize that in part related to these rapid changes, there may be improvements in the substance use disparities found among SMY.

This study

Insights from the extant literature support existence of substance use disparities, and the need to focus on the unique risks of sexual minority young people. What is unclear from the literature is whether or not observed disparities are persisting or changing over time. This is imperative to further explore because foundational knowledge of trends in disparities data can inform our understanding of how substance use patterns and prevalence may be disproportionally burdening some youth, yet not others. If sexual minorities are burdened with higher prevalence of substance use, and these patterns are not decreasing over time, it would suggest that increased resources and attention should be paid to SMY. The purpose of this study, therefore, is threefold: (1) to document the trends in substance use for a large sample of youth, disaggregated by sexual orientation, over the span of 14 years, (2) to explore and confirm whether there are disparities in substance use behaviors between lesbian/gay and bisexual male and female adolescents as compared to heterosexual youth, and (3) to examine changes in disparities over time in use substance use among sexual minority youth, as compared with their heterosexual peers.

Method

Data

Data were drawn from the Massachusetts Youth Risk Behavior Survey (MYRBS), a population-based survey developed by the U.S. Centers for Disease Control and Prevention (CDC) and administered every 2 years to a sample of public high school students across the state. We used data from 8 biennial surveys from 1999 through 2013. For each survey wave, the CDC conducted systematic sampling with probability proportional to enrollment in grades 9 through 12 (for more information on the MYRBS survey and sampling/weight information, see Matthews, Blosnich, Farmer, & Adams, 2014).[1]

Sample

We utilized a pooled dataset of 8 biennial survey waves from MYRBS grouped into 4 waves to increase the sample size of sexual minority youth at each time point. Pooled waves included similar patterns and substance use prevalence for study participants. To be included, participants must have provided a valid response to the item asking about sexual orientation. The final pooled sample included 26,002 participants aged 12 to 18 ($M_{age} = 16.04$); sexual orientation subgroups did not significantly differ by age. The year with the fewest participants was in 2009 (2721), and the most participants were surveyed in 1999 (4415).

Measures

Age and Sex. Participants indicated their age in number of years, and their sex as male or female.

Ethnicity. Self-reported response options included American Indian or Alaska Native, Asian, Black or African American, Hispanic/Latino, Native Hawaiian or Other Pacific Islander, and White. A Multiracial category was used for youth that checked multiple categories, and American Indian or Alaska Native, Asian, and Native Hawaiian or Other Pacific Islander were grouped together to form an 'Other' category.

[1] The YRBS is a CDC survey administered nationally and in almost every state across the United States. In recent years, CDC has encouraged but not required states to include a question about sexual orientation. However, Massachusetts developed the sexual orientation identity question in 1995 and has been one of the few states to include this item since then to allow testing long-term trends; thus, we use the MYRBS to conduct this study.

Sexual orientation. Sexual orientation was measured using a single item: "Which of the following best describes you?" Response options were "heterosexual (straight)," "bisexual," "gay or lesbian," and "not sure." For purposes of this trends and disparities study, we did not include youth who answered "not sure" as research has indicated uncertainty regarding how to classify this group of youth (see French et al., 1996).

Outcome variables

Past month cigarette use. One item stated, "During the past 30 days, on how many days did you smoke cigarettes?" Responses ranged from 0 (*0 days*) to 7 (*all 30 days*). The item was recoded as 0 (*did not smoke cigarettes in the past month*) and 1 (*smoked cigarettes at least once in the past month*).

Past month binge drinking. Participants were asked, "During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?" Seven response options ranged from 0 (*0 times*) to 7 (*20+ times*); we recoded these responses as a dichotomous variable to indicate never binge drinking (responses of 0 times), and ever binge drinking (1+ times).

Past month marijuana use. Participants were asked, "During the past 30 days, how many times did you use marijuana?" Responses ranged from 0 (*0 times*) to 6 (*40 or more times*). We recoded this variable as 0 (*never used marijuana in the past month*) and 1 (*used marijuana 1 or more times in the past month*).

Analyses

Using a sophisticated new trend data analysis technique (Homma, Zumbo, & Saewyc, 2016), we documented the ways in which disparities may be changing over time. We used SPSS Complex Samples 22 to adjust for the complex survey design of the MYRBS. All analyses are adjusted for age and ethnicity (White reference group), and reported separately for males and females. Our first aim was to trace the prevalence of substance use—we used crosstab analyses; we report the prevalence of our three substance use variables in each grouped survey wave and separately for each sexual orientation subgroup. In addition, we report odds ratios, obtained using logistic regressions, to test whether the odds of substance use have increased or decreased since 1999/2001.

Our second aim was to document potential disparities in substance use across sexual orientation subgroups. We used logistic regressions and reported the relevant odds ratios to describe disparities in substance use for gay/lesbian and bisexual male and female youth compared to their heterosexual counterparts of the same sex.

Our third aim was to explore whether disparities have narrowed or widened since 1999/2001.We used logistic regressions with wave-by-orientation interaction terms to test the main effects of sexual orientation (reference heterosexual of the same sex) and wave (reference 1999/2001) and orientation-by-wave. That is, we examine a ratio of ratios (odds ratio for given wave of disparity divided by odds ratio for reference wave) to determine if a gap in substance use outcome has widened or narrowed over time for a particular subgroup compared to the heterosexual reference group of the same sex. For more information about how this method was developed, see Homma et al.'s (2016) methodology paper on calculating the changes in disparities over time.

Results

Table 1 presents the sample demographics. Most participants were heterosexual youth, but the percentage of heterosexual participants consistently declined over time (from 95.1% to 94.4% of males, and 93.9% to 89.1% of females). The proportion of sexual minority youth increased every wave for both gay, lesbian, and bisexual males and female participants, with the exception that fewer participants identified as gay males in 2011/2013 wave compared to 2007/2009.

We were first interested in the prevalence and trends of substance use over time for sexual orientation subgroups (see Table 2). In Tables 2–4, parameter estimates that are in bold indicate statistical significance. In general, rates of past month binge drinking, marijuana use, and cigarette use declined for nearly all subgroups since 1999/2001. Notably, reports for past month binge drinking declined among gay males from 62% in 1999/2011 to 28% in 2011/2013; decreases were observed in both male and female heterosexual participants, and in bisexual males. However, in the same time span, past month marijuana use increased among lesbian females from 43% to 56%. Temporary increases in prevalence over time were observed for lesbian females; specifically, lesbian youth

Table 1. Sample sizes* and percents** of the MYRBS sample disaggregated by sexual orientation, survey year, and sex.

	1999/2001	2003/2005	2007/2009	2011/2013
Male				
Heterosexual	4,054 (95.1%)	3,279 (95.4%)	2,712 (94.6%)	2,565 (94.4%)
Bisexual	60 (1.3%)	46 (1.3%)	52 (1.8%)	54 (2.0%)
Gay	37 (0.8%)	41 (1.2%)	64 (2.1%)	47 (1.7%)
Female				
Heterosexual	3,902 (93.9%)	3,306 (93.0%)	2,630 (90.7%)	2,397 (89.1%)
Bisexual	133 (3.3%)	153 (4.1%)	182 (6.3%)	177 (6.8%)
Lesbian	15 (0.4%)	25 (0.6%)	36 (1.2%)	35 (1.4%)

Note. *Sample sizes are unweighted Ns; **Percents are weighted. Within each Wave/sex group, percents do not add up to 100% because youth who answered "not sure" on the sexual identity question are not included here.

Table 2. Trends in substance use, disaggregated by sexual orientation subgroup, between 1999/2001 and 2011/2013.

	1999/2001	2003/2005	2007/2009	2011/2013	Trend 99/01–03/05 OR (95% CI)	Trend 99/01–07/09 OR (95% CI)	Trend 99/01–11/13 OR (95% CI)
Past month binge drinking							
Male							
Heterosexual	36.4%	28.1%	26.2%	21.9%	**0.68 (0.60, 0.77)**	**0.63 (0.55, 0.72)**	**0.49 (0.42, 0.58)**
Bisexual	53.7%	32.3%	30.0%	27.9%	**0.38 (0.21, 0.69)**	**0.34 (0.20, 0.58)**	**0.28 (0.16, 0.51)**
Gay	61.6%	44.8%	45.3%	28.1%	**0.47 (0.27, 0.84)**	**0.45 (0.28, 0.74)**	**0.16 (0.09, 0.29)**
Female							
Heterosexual	28.5%	23.9%	24.2%	18.1%	**0.78 (0.66, 0.91)**	**0.80 (0.69, 0.93)**	**0.55 (0.46, 0.65)**
Bisexual	41.8%	46.6%	39.8%	28.1%	1.23 (0.85, 1.79)	0.90 (0.50, 1.38)	**0.56 (0.38, 0.84)**
Lesbian	51.3%	55.9%	53.6%	36.1%	1.07 (0.81, 1.41)	1.07 (0.64, 1.80)	**0.43 (0.21, 0.88)**
Past month marijuana use							
Male							
Heterosexual	33.9%	29.4%	29.1%	29.8%	**0.82 (0.71, 0.94)**	**0.80 (0.70, 0.92)**	**0.84 (0.74, 0.96)**
Bisexual	56.8%	32.7%	41.6%	30.1%	**0.32 (0.15, 0.71)**	0.81 (0.47, 1.37)	**0.33 (0.20, 0.55)**
Gay	44.5%	43.5%	40.0%	30.5%	0.88 (0.48, 1.62)	0.66 (0.41, 1.04)	**0.35 (0.23, 0.52)**
Female							
Heterosexual	26.7%	22.9%	20.7%	20.4%	**0.81 (0.68, 0.96)**	**0.71 (0.60, 0.84)**	**0.70 (0.59, 0.83)**
Bisexual	49.5%	48.3%	39.5%	44.8%	1.00 (0.64, 1.56)	0.62 (0.38, 1.02)	0.83 (0.52, 1.32)
Lesbian	42.8%	72.0%	45.3%	56.4%	**4.65 (2.03, 10.64)**	1.04 (0.34, 3.20)	2.25 (0.91, 5.56)
Past month cigarette use							
Male							
Heterosexual	26.9%	19.6%	16.7%	13.2%	**0.66 (0.58, 0.77)**	**0.55 (0.46, 0.66)**	**0.41 (0.34, 0.49)**
Bisexual	51.8%	38.5%	39.7%	21.5%	**0.51 (0.33, 0.80)**	0.56 (0.31, 1.02)	**0.25 (0.13, 0.46)**
Gay	64.0%	41.1%	39.6%	26.4%	**0.44 (0.22, 0.87)**	**0.35 (0.18, 0.69)**	**0.16 (0.08, 0.32)**
Female							
Heterosexual	27.7%	19.5%	13.7%	8.9%	**0.62 (0.52, 0.75)**	**0.41 (0.34, 0.49)**	**0.25 (0.20, 0.31)**
Bisexual	63.8%	55.4%	44.5%	31.3%	0.75 (0.49, 1.16)	**0.46 (0.30, 0.69)**	**0.29 (0.19, 0.43)**
Lesbian	45.2%	75.1%	43.8%	37.0%	**3.68 (1.68, 8.07)**	1.07 (0.50, 2.28)	0.89 (0.35, 2.29)

Note. Data were weighted and adjusted for grade and ethnicity. OR in bold indicates $p < 0.05$; OR: Odds ratio. CI: Confidence interval.

had nearly 5 times the odds of smoking marijuana in the past month and had nearly 4 times the odds of smoking cigarettes in the past month in 2003/2005 compared to 1999/2001, though by the final wave (2011/2013), these increases over baseline were no longer significant. Of the other statistically significant changes over time, all other sexual orientation groups had lower odds of reporting substance use over time.

Next, we investigated disparities across survey waves and sexual orientation subgroups (see Table 3). Some

Table 3. Odds ratios and 95% confidence intervals, by year (99/01–11/13): comparisons by sexual orientation.

	1999/2001	2003/2005	2007/2009	2011/2013
Past month binge drinking				
Male				
Heterosexual	ref	ref	ref	ref
Bisexual	**2.10 (1.10, 4.00)**	1.21 (0.55, 2.63)	1.44 (0.67, 3.08)	1.41 (0.64, 3.14)
Gay	**3.42 (1.31, 8.92)**	2.09 (0.97, 4.50)	**2.17 (1.15, 4.06)**	1.01 (0.49, 2.10)
Female				
Heterosexual	ref	ref	ref	ref
Bisexual	1.65 (1.10, 2.47)	**2.85 (2.05, 3.95)**	**2.00 (1.43, 2.80)**	**1.86 (1.28, 2.71)**
Lesbian	3.09 (0.87, 10.89)	**4.70 (1.32, 16.76)**	**4.85 (1.91, 12.29)**	2.47 (0.86, 7.09)
Past month marijuana use				
Male				
Heterosexual	ref	ref	ref	ref
Bisexual	**2.54 (1.42, 4.55)**	1.12 (0.53, 2.37)	**2.08 (1.22, 3.56)**	1.08 (0.61, 1.89)
Gay	1.94 (0.77, 4.87)	1.75 (0.79, 3.86)	1.60 (0.91, 2.80)	0.77 (0.42, 1.42)
Female				
Heterosexual	ref	ref	ref	ref
Bisexual	**2.56 (1.70, 3.85)**	**3.22 (2.23, 4.65)**	**2.43 (1.66, 3.55)**	**3.40 (2.33, 4.96)**
Lesbian	2.00 (0.58, 6.95)	**8.08 (1.99, 32.76)**	**3.79 (1.36, 10.60)**	**5.24 (2.54, 10.81)**
Past month cigarette use				
Male				
Heterosexual	ref	ref	ref	ref
Bisexual	**2.94 (1.57, 5.51)**	**2.54 (1.24, 5.23)**	**3.71 (1.91, 7.20)**	1.94 (0.91, 4.15)
Gay	**4.94 (2.00, 12.18)**	**2.82 (1.29, 6.20)**	**3.12 (1.48, 6.59)**	1.79 (0.89, 3.60)
Female				
Heterosexual	ref	ref	ref	ref
Bisexual	**4.48 (3.27, 6.12)**	**5.24 (3.50, 7.82)**	**5.02 (3.59, 7.01)**	**5.21 (3.35, 8.08)**
Lesbian	2.37 (0.68, 8.22)	**13.61 (5.93, 31.25)**	**6.56 (2.70, 15.96)**	**7.44 (3.04, 18.21)**

Note. Data were weighted and adjusted for grade and ethnicity. 95% confidence intervals are in parentheses, Odd ratio in bold indicates $p < 0.05$.

Table 4. Trends in alcohol, cigarette, and marijuana use: interactions between sexual orientation and year.

	Male OR[a] (95% CI)	Female OR[a] (95% CI)
Past month binge drinking		
Heterosexual by Year 99/01	ref	ref
Bisexual by Year 03/05	0.66 (0.24, 1.79)	1.15 (0.67, 1.96)
Bisexual by Year 07/09	0.67 (0.25, 1.80)	1.22 (0.73, 2.04)
Bisexual by Year 11/13	0.57 (0.21, 1.55)	**1.72 (1.04, 2.87)**
Gay/Lesbian by Year 03/05	0.32 (0.10, 1.00)	0.81 (0.16, 4.12)
Gay/Lesbian by Year 07/09	0.68 (0.22, 2.04)	1.59 (0.34, 7.53)
Gay/Lesbian by Year 11/13	0.65 (0.20, 2.14)	1.51 (0.26, 8.74)
Past month marijuana		
Heterosexual by Year 99/01	ref	ref
Bisexual by Year 03/05	**0.42 (0.19, 0.93)**	1.33 (0.77, 2.29)
Bisexual by Year 07/09	0.81 (0.37, 1.75)	0.93 (0.54, 1.61)
Bisexual by Year 11/13	0.43 (0.17, 1.11)	1.26 (0.73, 2.17)
Gay/Lesbian by Year 03/05	0.40 (0.14, 1.17)	2.60 (0.61, 11.05)
Gay/Lesbian by Year 07/09	0.80 (0.28, 2.29)	1.81 (0.36, 9.04)
Gay/Lesbian by Year 11/13	0.89 (0.27, 2.92)	4.14 (0.62, 27.46)
Past month cigarette smoking		
Heterosexual by Year 99/01	ref	ref
Bisexual by Year 03/05	0.65 (0.25, 1.70)	1.13 (0.68, 1.88)
Bisexual by Year 07/09	1.24 (0.51, 3.01)	1.11 (0.71, 1.74)
Bisexual by Year 11/13	0.86 (0.33, 2.21)	1.18 (0.71, 1.94)
Gay/Lesbian by Year 03/05	0.35 (0.12, 1.05)	3.07 (0.68, 13.86)
Gay/Lesbian by Year 07/09	0.60 (0.19, 1.86)	2.64 (0.59, 11.82)
Gay/Lesbian by Year 11/13	0.55 (0.17, 1.77)	**5.92 (1.31, 26.71)**

Note. Data were weighted. Odd ratio in bold indicates $p < 0.05$. ref: Reference group 1999/2001.
[a]The model included sexual orientation, survey year, ethnicity, and grade along with orientation-by-year interaction; OR: Odds ratio. CI: Confidence interval.

large disparities were found for bisexual, gay, and lesbian males and females. For example, in the most recent survey wave, lesbian and bisexual females were more likely to use marijuana in the past month compared to their female heterosexual counterparts. These disparities were more dramatic for cigarette usage for females: in 2003/2005, lesbian females had 13.6 times higher odds of smoking cigarettes in the past month compared to heterosexual females. Interestingly, while disparities in cigarette use, binge drinking, and marijuana use were found in the first three time points, there were no disparities in substance use for gay males in the most recent time point (2011/2013). Our next question was whether or not these disparities have widened or narrowed across survey waves.

Last, Table 4 presents the logistic regression models with interactions, which document changes in disparities over time. Three statistically significant changes in disparities emerged, indicating that the other disparities (presented in Table 3) have remained unchanged over time. Despite the absence of large disparities between gay and heterosexual males in 2011/2013, no significant reductions in the gap in substance use emerged in our interaction analyses. However, disparities narrowed over time for bisexual males compared to heterosexual males from 1999/2001 to 2003/2005. Disparities did not narrow for bisexual females, the gap in past month binge drinking widened between the first and final survey waves, as did the gap between lesbian and heterosexual females in cigarette smoking

Discussion

In this paper, we sought to answer three research questions: (1) have the overall documented trends in substance use among youth extended to sexual minority adolescents, (2) are there changes in the disparities in substance use between heterosexual and sexual minority young people, and (3) are these disparities changing over time? Related to research question 1, trends in substance use were strikingly positive, with declines in each form of substance use for all males and for heterosexual females from 1999/2001 to 2011/2013. Further, binge drinking and cigarette smoking dropped among bisexual females; only binge drinking declined for lesbian females. Related to the second research question, when we examined wave-by-wave prevalence in substance use and controlled for age and ethnicity, our results showed a striking sex difference in that SMY females consistently demonstrated high disparities in comparison to their heterosexual female counterparts. In addition, related to research question 3, differences between bisexual and heterosexual females in binge drinking and between lesbians and heterosexual females in tobacco use actually increased significantly from 1999/2001 to 2011/2013. These widening gaps can be attributed, not to increases among sexual minority females, but rather to stronger rates of decrease among their heterosexual peers.

Consistent with studies that investigate other health disparities for sexual minority youth (e.g., Fish et al., 2017;

Watson et al., 2017), disparities in substance use for sexual minority females compared to heterosexual females appear to be widening over time. This is despite concerted efforts to eliminate substance use among all youth, and increasingly accepting views of same-sex relations and identities. There may be several factors contributing to the worsening substance use outcomes for sexual minority females. Recent research has found, for example, that rates of violence (e.g., threatened with a weapon at school, physical fights at school), unsafe schools (e.g., skipping school for feeling unsafe), and bullying have decreased over time for sexual minority males but not for lesbian and bisexual females (Goodenow, Watson, Adjei, Homma, & Saewyc, 2016). Another potential explanation involves the availability and levels of social support for LGB youth. Among 835 LGB youth from three large cities in the United States, scholars found that parent and teacher support was linked to lower depression and higher self-esteem for gay and bisexual males, but not lesbian females (Watson, Russell, & Grossman, 2016). Furthermore, Watson and colleagues (2016) found that higher levels of parent and teacher support were reported by gay and bisexual males compared to their female counterparts. Aside from parent and teacher support, perhaps school-based interventions such as GSAs and LGBTQ-inclusive policies might offer more effective support and visibility for gay and bisexual males than for lesbian and bisexual females (Porta et al., 2017).

Using the YRBS data in 2016, a CDC annual report analyzed health behaviors among heterosexual and sexual minority youth at both national and local levels (Kann, 2016). Unlike the current study, the CDC report did not disaggregate sexual identity subgroups, so nuanced comparisons cannot be made. However, there is evidence that for the LGB youth group as a whole, substance use has declined since 2013. Clearly, more attention should be paid to most recent national- and state-level data to further understand whether and how substance use prevalence has changed for certain LGB youth subgroups, and whether existing disparities are worsening or improving.

Limitations: Although the present study has the advantage of being based on successive population-based samples of high school students, it nevertheless has several limitations. Specifically, our results are based on single-item self-report measures for both sexual identity and substance use outcomes. Though these items represent widely used indicators of substance use, we acknowledge that there are other behaviors where disparities have been found among sexual minorities, such as age of first use and lifetime use of substances. In our preliminary findings, many of the trends and disparity patterns were similar as reported in this paper for these substance use behaviors. In addition, the YRBS asked participants to indicate their sex as male or female, but this excluded participants that may identify as transgender, non-binary, or something other than male or female. Future studies should use data with robust sex, gender identity, and sexual orientation measures. Further, our results assume that all public high school students in the state are equally likely to be attending school and participating in the biennial survey, although evidence indicates that sexual minority students are more likely than others to skip school due to feeling unsafe (Bontempo & D'Augelli, 2002). Last, the pooling of two survey waves (e.g., 2011 and 2013) to increase numbers, and thus statistical power, of LGB youth, is a potential limitation to our interpretation of findings. While no significant changes in patterns or prevalence of substance use were observed between pooled years, we acknowledge that this approach limits our ability to capture small year-to-year nuances.

The survey results are from a single state in the northeast United States, which may have an influence on results reported here. Of note, Massachusetts was the first state in the United States with same-sex marriage, the first to include sexual orientation as a measure on their YRBS, and one of the few states with publicly funded state commissions for LGBT youth. We suggest that given these unique qualities of Massachusetts, the participants in this study may be better off than youth from other states without such progressive initiatives for LGBT people. Additionally, the social context regarding substance use was unique in Massachusetts: possession of small amounts of marijuana was decriminalized (though not legalized) in Massachusetts in 2008. The state has a vigorous tobacco control program, funded by a special tax on tobacco sales; from the mid-1990s until 2002, the program supported strong antitobacco programs in schools and communities. To the extent that use of illicit substances is driven by the minority stress, stigma and discrimination experienced by LGBT youth, the declines among youth reported here may not be representative of what is happening in the rest of the country. For all of these reasons, it would be important to replicate our findings with data from other parts of the country, and the world.

Implications: Research should continue to track adolescent substance use, with special attention to both sex and sexual orientation. From results reported here, it appears that lesbian and bisexual females are not making the progress we observed among other youth. Finally, it will be important to conduct research investigating the links between social and psychological influences and substance use, and to strengthen and evaluate programs that consider minority stress in relation to addressing developmental inequalities faced by subgroups of adolescents.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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