



Published in final edited form as:

J Adolesc Health. 2019 February ; 64(2): 186–193. doi:10.1016/j.jadohealth.2018.07.005.

Sexual Minority Youth Report High-Intensity Binge Drinking: The Critical Role of School Victimization

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Abstract

Purpose: To examine standard binge drinking (4 drinks for females, 5 drinks for males) and high-intensity binge drinking (8 drinks for females, 10 drinks for males) among heterosexual and sexual minority youth in the US and whether reports of school-based victimization mediate this association.

Methods: Survey data are from the 2015 Youth Risk Behavior Survey (YRBS; $n = 10,839$, $M_{age} = 16.07$). Logistic regression adjusted for race/ethnicity and age compared rates of standard and high-intensity binge drinking among heterosexual and sexual minority youth and whether experiences of school-based victimization mediated this association. Effects were tested in full sample and sex-stratified models.

Results: Lesbian and bisexual girls and girls with male and female partners were more likely than heterosexual girls to report standard rates of binge drinking. Lesbian girls and girls reporting male and female sexual partners were more likely than heterosexual girls to report high-intensity binge drinking in the past 30 days. Compared with heterosexual boys, gay boys were significantly less likely to participate in high-intensity binge drinking. School-based victimization mediated all significant associations between sexual minority status and standard and high-intensity binge drinking, with the exception of lesbian girls.

Conclusion: Lesbian and behaviorally bisexual girls have elevated risk for high-intensity binge drinking relative to heterosexual girls. Findings point to the importance of policies that reduce school-based victimization as these experiences are associated with higher rates of standard and high-intensity binge drinking among sexual minority girls.

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Supplementary data

Supplementary data related to this article can be found at doi:10.1016/j.jadohealth.2018.07.005.

Conflict of interest: The authors have no conflict of interest to disclose.

Keywords

Sexual minority; LGB; High-intensity binge drinking; Alcohol; Adolescents; YRBS

Binge or heavy episodic drinking – defined as consuming 4 or more drinks for women and 5 or more drinks for men within a 2 hour time frame [1] – is an important health indicator. Short-term consequences of binge drinking include injury, alcohol poisoning, or death, and long-term consequences range from family and work problems to alcohol use disorders, liver damage, and other serious physical health problems [2,3]. New research, however, documents that some youth report drinking two- and three-times the cutoff point for the standard definition of binge drinking, a behavior known as high-intensity binge drinking [4–6]. Thus, the reliance on the standard cutoff values for binge drinking may underestimate the degree to which youth engage in excessive and potentially deadly rates of alcohol use [7]. Given the serious health consequences of binge drinking [3], and the elevated risk for these consequences at higher rates of use [2], the identification of groups at risk for high-intensity binge drinking is an important public health goal [8].

Sexual minority youth (SMY) and alcohol use

There has been growing attention to the health of lesbian, gay, and bisexual (LGB; i.e., sexual minority) youth [9]. Compared with heterosexuals, SMY are more likely to report recent alcohol use, binge drinking, and younger age of first alcohol use [10,11]. SMY are over 2.5 times as likely as heterosexual youth to report recent alcohol use and are 34% more likely to report recent binge drinking [12]. Importantly, despite overall declines in underage alcohol use, sexual orientation disparities in alcohol use remain largely unchanged since the early 2000s, and in some cases, are widening [11,13]. These findings are particularly concerning given that early and frequent experiences with alcohol use increase risk for heavy alcohol use and alcohol use disorders in adulthood [14].

Notably, there are documented differences in risk for alcohol use among SMY, namely, by sex and sexual identity [15]. A number of studies, for example, show more robust sexual orientation differences among females relative to males [12,16,17]. In their meta-analysis, Marshal et al. [12] found that the effect of sexual minority status on substance use was nearly two times larger for girls relative to boys. Studies also find more robust sexual orientation disparities in alcohol use for bisexual, relative to gay and lesbian, youth [12]. Data pooled from the 2005 and 2007 YRBS found that bisexual youth were more likely to report lifetime drinking, past 30-day drinking, past 30-day binge drinking, a greater number of drinking days, and younger age of onset than heterosexual youth [16]. Comparatively, lesbian and gay youth only indicated a greater number of drinking days relative to heterosexual youth.

SMY alcohol use and school-based victimization

Researchers and practitioners need to understand the structural and interpersonal factors that make SMY vulnerable to excessive alcohol use, particularly those that inform prevention strategies [15]. Sexual orientation health disparities, including substance use, are largely

attributed to experiences of anti-LGB stigma as well as elevated rates of bullying and victimization [9,18,19]. In the CDC's landmark report on the health of SMY, 34% of LGB youth experienced bullying on school property relative to 19% of heterosexual youth. Findings from a recent meta-analysis also indicated that SMY experience moderately higher levels of school-based harassment and victimization than heterosexual peers [20]. In their meta-analysis, Goldbach et al. [19] found that victimization was among the strongest predictors of SMY substance use. Therefore, school-based victimization may represent an amendable mediating factor in the association between sexual minority status and high-intensity binge drinking.

As with alcohol use, studies also highlight differences in the experience of school-based victimization among SMY. In their meta-analysis on sexual orientation and school-based victimization, Toomey and Russell [21] noted that effect sizes were larger for studies where boys constituted a greater proportion of the analytic sample. Other reviews note that sexual minority boys, relative to sexual minority girls, are more likely to experience severe forms of victimization such as physical assault [22]. Furthermore, preliminary studies suggest that the strength of the association between victimization and substance use varies among SMY. Birkett et al. [23], for example, found that the association between victimization and substance use was strongest for youth questioning their sexual identity, relative to LGB or heterosexual youth. Thus, school-based victimization may be a more influential mediating factor for boys relative to girls, and for unsure youth relative to LGB youth.

The current study

Based on documented sexual orientation disparities in alcohol use, it is likely that SMY could be at elevated risk for high-intensity binge drinking. We therefore examined whether sexual minority and heterosexual youth differ in standard (4+/5+) and high-intensity binge (8+/10+) drinking using a large, national school-based sample of youth ages 12–18 years. We also examined whether experiences of physical victimization in schools – an experience that should be preventable through inclusive policies and programs [24] – mediated the association between sexual minority status and high-intensity binge drinking. Following analysis with the full sample, analyses were sex-stratified¹ given that adolescent girls and boys, generally, indicate different patterns of alcohol use [25] and sexual orientation disparities in alcohol use differ by sex [11,16,17].

Methods

Data are from the 2015 National Youth Risk Behavior Survey (YRBS) [26]. This national school-based survey conducted by the Centers for Disease Control and Prevention is designed to assess the prevalence of health risk behaviors among 9th to 12th-grade students in the US. The YRBS uses a 2-stage, cluster-sampling design for each city or state jurisdiction to acquire a representative sample of students for each participating US State. Youth were included if they provided a valid response to measures of sexual identity, sexual

¹Sex was measured by asking participants, “What is your sex?” with response options of male and female. The national YRBS did not measure gender identity.

behavior, high-intensity binge drinking, race/ethnicity, and age ($n = 10,839$). The University of Texas at Austin Institutional Review Board granted exemption from human subjects review for this study because the data are publically available and anonymous.

Measures

Sexual identity and sexual behavior.—Youth reported sexual minority status via two items: sexual identity and sex of sexual partners (i.e., sexual behavior). Sexual identity responses reflected youth who were heterosexual (straight), gay or lesbian, bisexual, or not sure. We include unsure youth in our analyses given that previous studies find unique associations between victimization and substance use for this group [23]. Youth indicated sexual behavior with partners who were female, male, female and male, or neither: Responses were recoded in conjunction with the participant's sex to reflect other-sex sexual partners, same-sex sexual partners, male and female sexual partners,² and no sexual partners.

Standard and high-intensity binge drinking.—A single item was used to assess standard and high-intensity binge drinking among youth: “During the last 30 days, what is the largest number of drinks you had in a row, that is, within a couple of hours?” Response options ranged from “I did not drink during the past 30 days” to “10 or more drinks”. Similar to previous studies [1,4–6], responses were recoded into four binary variables: Two that reflected standard binge drinking rates for girls (1 = *4 or more drinks*; 0 = *3 or less drinks*) and boys (1 = *5 or more drinks*; 0 = *4 or less drinks*) and two that captured two-times the standard binge drinking rate (i.e., high-intensity binge drinking) for girls (1 = *8 or more drinks*; 0 = *7 or less drinks*) and boys (1 = *10 or more drinks*; 0 = *9 or less drinks*).

School-Based Victimization.—We use 5 items from a previously validated 6-item³ measure to assess physical victimization at school [27]. Sample items include, “During the past 12 months, how many times were you in a physical fight on school property?” with response options ranging from 0 = *0 times* to 7 = *12 or more times*, and “During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school” with response options ranging from 0 = *0 days* to 4 = *6 or more days*. Items were summed (measure range 0–34).

Covariates.—Demographic covariates include race/ethnicity (coded as White, Black, Hispanic, Asian/Pacific Islander, and Other [i.e., American Indian, Alaska Native, and multiple non-Hispanic]), and age.

²Though we recognize that “both-sex” sex sexual partners is often used to denote participants who report sexual relationships with male and female partners, we elected to use more gender inclusive language as the term “both-sex” perpetuates a false gender binary.

³The original 6-item scale [27] includes one item that is no longer included on the YRBS: “During the past 12 months, how many times has someone stolen or deliberately damaged your property such as your car, clothing, or books on school property?”. We conducted confirmatory factor analysis to support our use of the 5-item scale: Results indicated that the 5-item factor demonstrated good model fit, $\chi^2(5) = 15.47, p < .001, RMSEA = .021, 90\% CI [.015, .027], CFI = .969, TLI = .938, SRMR = .029$, with all indicators loading strongly onto the single factor. Further, because the item regarding missing school “...because you felt you would be unsafe...” is not a direct measure of victimization, we also conducted a 4-item confirmatory factor analysis excluding that item. Results indicated that the 4-item factor demonstrated poor fit $\chi^2(6) = 3668.98, p < .001, RMSEA = .198, CFI = .797, TLI = .662, SRMR = .161$.

Statistical Analysis

All data management, preliminary data analysis, and logistic regression models were conducted in Stata 14.1. Due to the complex survey design of the YRBS and the modeling of categorical independent and dependent variables, Mplus 7.4 was used to test the indirect effect between sexual minority status and high-intensity binge drinking via school-based victimization. Mediation models were conducted in a path-analysis framework using the MODEL INDIRECT command with 5000 bootstrap draws to provide estimates of indirect effects and 95% bias-corrected confidence intervals. All analyses were design adjusted and weighted.

Results

Sample demographic characteristics are presented in Table 1. Approximately, 15.6% of youth in the YRBS reported binge drinking at the standard rate (4+ for girls, 5+ for boys); 5.3% reported high-intensity binge drinking (8+ for girls, 10+ for boys). There were no sex differences in the prevalence of standard binge drinking (OR = 1.08, 95% CI [0.91, 1.28]), though boys were more likely than girls to engage in high-intensity binge drinking (OR = 1.31, 95% CI [1.01, 1.71]). Roughly 15.10% of girls reported binge drinking at the standard 4+ threshold and 4.64% reported drinking 8+ drinks at some point in the previous 30 days. Among boys, 16.35% reported drinking 5+ drinks and 6.03% reported consuming 10+ drinks in the previous 30 days. Boys reported greater levels of victimization relative to girls, $t = 6.17$, $p < .001$ (effect size, Cohen's $d = .17$).

Binge Drinking and School-Based Victimization by Sexual Minority Status

Weighted prevalences of standard and high-intensity binge drinking by sexual minority status are displayed in Table 2. In the full sample, the prevalence of standard binge and high-intensity binge drinking were highest among lesbian/gay youth as well as youth who reported male and female sex partners. Sex-stratified models indicated that lesbian and bisexual girls reported higher rates of standard and high-intensity binge drinking compared with heterosexual girls, as did girls who indicated same-sex sexual partners as well as male and female sexual partners. Behaviorally bisexual boys had elevated rates of binge drinking at the standard rate compared with boys with only female partners. Boys unsure of their sexual identity and boys who reported male and female sexual partners displayed the highest prevalence of 10+ drinking. Youth reporting no sexual partners had the lowest rates of standard and high-intensity binge drinking.

Bisexual and unsure youth in the full sample experienced significantly higher rates of school-based victimization than heterosexual youth, as did youth who reported male and female partners. This pattern was similar among girls, though girls who reported exclusive same-sex behavior also reported more school-based victimization than heterosexual girls. Boys who were unsure of their sexual identity and who had male and female sex partners reported higher levels of victimization than heterosexual identified and behavioral youth. Youth with no sexual partners reported the lowest rates of victimization.

Sexual Orientation Differences in Standard and High-Intensity Binge Drinking

Adjusted logistic regression models of the full sample showed significant disparities for SMY across standard and high-intensity binge drinking outcomes (Table 3).⁴ Lesbian/gay youth and bisexual youth were more likely than heterosexual youth to participate in standard, but not high-intensity binge drinking. Youth who reported both male and female sexual partners had greater odds of standard and high-intensity binge drinking relative to those with (only) other-sex sexual partners, though youth reporting no sexual partners had significantly lower odds. The examination of sex-stratified models were supported by significant interactions between sexual minority status and sex: adjusted Wald χ^2 parametric test (W) = 2.92, p = .019 and W = 3.33, p = .010 for sexual identity by sex interaction for standard and high-intensity binge drinking, respectively, and W = 69.18, p < .001 and W = 20.57, p < .001 for sexual behavior by sex interaction for standard and high-intensity binge drinking, respectively.

Lesbian and bisexual identified and behavioral girls had elevated rates of standard binge drinking relative to heterosexual girls and girls with exclusively male sexual partners. Lesbian girls were nearly 3.4 times, and girls with male and female sexual partners were over 1.5 times, as likely as heterosexual identified and behavioral girls to report high-intensity binge drinking in the past 30 days. Girls reporting no sexual partners were less likely than girls with exclusively male partners to report standard or high-intensity binge drinking.

Gay boys were significantly less likely than heterosexual boys to participate in high-intensity binge drinking. Boys with male and female sexual partners were over two times as likely as heterosexual boys to report standard binge drinking, whereas boys who reported no sexual partners were significantly less likely to report standard or high-intensity binge drinking than heterosexual boys.

Mediating Effect of School-Based Victimization

School-based victimization was significantly associated with both standard and high-intensity binge drinking across all models (see Table 3). In the full sample, results indicated that victimization mediated the associations between sexual identity, behavior, and standard as well as high-intensity binge drinking, with the exception of lesbian/gay youth and for youth with exclusively same-sex partners (see Table 4). When adjusted for victimization, models testing differences by sexual identity showed a 14% and 13% reduction in odds of standard binge drinking for bisexual youth and youth with male and female sexual partners, respectively, and a 21% reduction in the odds of high intensity binge drinking among youth with male and female sexual partners.

Among girls, victimization also mediated the association between sexual minority status and both standard and high-intensity binge drinking outcomes for all sexual minority subgroups, with the exception of lesbian girls (see Table 5). When adjusting for experiences of school-based victimization, there was a 28% reduction in the odds of standard binge

⁴See online supplement for unadjusted odds ratios and tables that include covariate estimates.

drinking for bisexual girls; there was a 17% reduction in odds of standard binge drinking and a 29% reduction in odds for high-intensity binge drinking for girls reporting both male and female sexual partners.

School-based victimization also mediated associations between sexual identity and standard and high-intensity binge drinking outcomes for boys, though less consistently than for girls. Associations between sexual behavior and standard and high-intensity binge drinking outcomes were mediated for youth who reported no sexual partners and both male and female sexual partners. Adjusting for experiences of school-based victimization reduced the odds of standard binge drinking by 41% for boys with male and female sexual partners.

Discussion

Among a US national sample, subgroups of SMY, especially lesbian and behaviorally bisexual girls, displayed substantial risk for high-intensity binge drinking compared with heterosexual peers. Findings indicate notable sexual orientation differences in risk for excessive alcohol use at higher rates of consumption not captured by measures based on the standard cutoff values for binge drinking. The use of a large, recent U.S. national sample also allowed us to investigate sexual orientation differences in high-intensity binge drinking for males and females separately, and across two measures of sexual minority status. Results suggest unique differences in the risk for high-intensity binge drinking for lesbian relative to bisexual youth and for behaviorally bisexual youth relative to those with only other- or same-sex partners.

Sexual minority girls, on the basis of identity, were between 1.5 and 3.4 times as likely as heterosexual girls to engage in standard and high-intensity binge drinking, with lesbian girls indicating the highest rates of risk. Girls who reported both male and female sexual partners were also 40% and 62% more likely than girls with only other-sex partners to engage in standard and high-intensity binge drinking, respectively. Gay boys, on the basis of identity and behavior, were similar to, or in some cases, less likely than heterosexual boys to participate in heavy alcohol use. Behaviorally bisexual boys, however, were 2.2 times as likely as boys with only other-sex partners to engage in standard binge drinking. Though sex-stratified results are underpowered, findings are consistent with and provide further support for the “gender paradox” in sexual-orientation-related alcohol use disparities, whereby sexual minority women indicate more robust disparities in alcohol-related outcomes than do sexual minority men [12,16,17]. Sex-stratified findings are also consistent with adult studies of sexual orientation differences in high-intensity binge drinking [28].

As hypothesized, our results indicate that experiences with physical victimization at school help to explain why some SMY are more likely to engage in excessive alcohol use [19]. The extent to which victimization mediated the effect between sexual minority status and standard and high-intensity binge drinking is consistent with previous theoretical and empirical literature highlighting the health-compromising effects of victimization, which are often attributed to anti-LGB stigma [19,29]. In our study, however, there are notable differences in the mediating effect of school-based victimization by sexual identity, sexual behavior, and sex. Experiences with physical victimization at school, for example, appear to

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be a particularly salient mediator for sexual minority girls on the basis of identity and behavior, with the exception of lesbian-identified girls. School-based victimization was also a less consistent mediator for boys. Findings from prior studies demonstrate that sexual minority boys are more likely to experience school-based victimization than sexual minority girls [21,22]. Our findings are, however, consistent with another recent study in which researchers found that experiences with bullying explained sexual orientation difference in alcohol use for girls, but not boys [30]. Future research with more robust samples of sexual minorities could reveal the degree to which physical victimization is a distinctive mechanism for alcohol use for sexual minority boys relative to sexual minority girls.

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With regards to the lack of mediation for lesbian girls and sexual minority boys, previous research on the differential effect of bias-based victimization relative to general harassment suggests that homophobic victimization may have a unique effect distinct from the effects of general victimization on the health of SMY [31]. Similarly, reports of other forms of peer harassment, such as bullying – which is defined by a power differential and repetition of peer harassment [32] – may play a differential or additive role in SMY substance use. Future studies could also consider minority-specific experiences, such as internalized stigma, or stressors associated with coming out (i.e., fear of rejection from parents or peers) that appear to be distinctive for sexual minority girls [33]. General psychosocial factors associated with alcohol use, such as perceived drinking norms, positive expectancies, and drinking to conform, have preliminarily been shown to mediate sexual orientation differences in alcohol consumption, particularly for sexual minority women [34–36]. Another theory is that lesbian girls eschew traditional gender norms and thus engage in alcohol use – a traditionally masculine behavior – more readily than their heterosexual peers [17]. Ultimately, more empirical work is needed to explore the multiple mechanisms that contribute to elevated rates of alcohol use among sexual minorities.

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Not unlike previous studies [11,16], we note more robust disparities for youth who report bisexual identity and behavior. Though not well understood, many scholars suggest that there are more robust sexual orientation disparities in alcohol use for bisexual youth due to the unique effects of biphobia [37], including stigma-related experiences from both heterosexual and gay/lesbian peers. Given stereotypes about bisexual identity, bisexual youth may experience an invalidation of their sexual identity from peers, or related forms of sexual harassment [38]. Interestingly, youth who reported bisexual identity and behavior did not consistently report the highest rates of school-based victimization (see Table 1), though these experiences mediated the association between sexual minority status and standard as well as high-intensity binge drinking for these youth (with the exception of bisexual-identified boys). As such, the link between school-based experiences of physical victimization and alcohol use may be particularly strong for bisexual youth, and bisexual girls in particular.

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As with all studies, there are limitations to note. The data are cross-sectional; we cannot make claims about the temporal order of these associations, including the mediating effect of physical victimization. However, the recall period of our items helps to limit temporal confounding given that victimization was largely measured for the past 12-months and drinking in the previous 30 days. In the current study, we estimated sexual orientation

differences in the likelihood of standard and high-intensity binge, we were not able to ascertain how frequently youth engage in the behavior. Given the acute consequences of binge drinking (e.g., alcohol poisoning, alcohol-related injury or death) [3–5], even a single episode of high-intensity binge drinking, particularly among youth, is of great concern. Furthermore, we were not able to test other within-group differences that influence underage alcohol use such as race/ethnicity or age – we do, however, account for these effects. Although we assessed victimization as a mediator of sexual identity differences in high-intensity binge drinking, future work would benefit from assessing less physical forms of aggression, such as verbal bullying and online harassment. Given that high-intensity binge drinking is a relatively low prevalence behavior and the number of SMY is relatively small, studies with larger numbers of sexual minorities, or that purposively oversample SMY, are needed to help disentangle within-group differences in rates of high-intensity binge drinking. Similarly, results from sex-stratified models were underpowered to detect differences, particularly for boys. Finally, the YRBS is a school-based survey, and thus does not include students who are not currently enrolled, pushed-out, or less likely to attend for fear of bullying – youth who are dis-proportionately more likely to be sexual minorities and to engage in substance use [39,40]. Thus, these limitations in power and selection imply that the effects we find are likely to be under-estimates of disparities in the full population of youth.

Despite these limitations, there are several strengths of the current study. First, we used a large population-based survey to estimate rates of high-intensity binge drinking among heterosexual and SMY. Findings are the first to indicate disparities in high-intensity binge drinking for SMY and point to particularly concerning rates of excessive alcohol use for sexual minority girls. The identification of these disparities highlights the practical importance of brief alcohol screenings for SMY in school, primary care, and mental health settings. Further, school-based victimization largely explained sexual minority differences in standard and high-intensity binge drinking, especially for girls. Given that rates of school-based victimization and bullying are lower in schools with anti-discrimination and enumerated anti-bullying policies, this may prove to be a simple but effective strategy to decrease rates of high-intensity binge drinking for SMY [24].

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

This study was funded in part by the National Institute on Alcohol Abuse and Alcoholism (awarded to Fish) grant number F32AA023138. This research was also supported by grant P2CHD042849, awarded to the Population Research Center at The University of Texas at Austin by the Eunice Kennedy Shriver National Institute of Child Health and Human Development. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. Preliminary analyses were supported by the National Institute on Alcohol Abuse and Alcoholism (awarded to Russell) grant number R01AA020270, and from the Priscilla Pond Flawn Endowment at the University of Texas at Austin. Schulenberg acknowledges support from National Institute on Drug Abuse grants R01DA001411 and R01DA016575.

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IMPLICATIONS AND CONTRIBUTION

Sexual minority youth are more likely to report heavy alcohol use than their heterosexual peers, yet studies have not assessed more dangerous, but prevalent, levels of excessive alcohol use. Sexual minority girls are at elevated risk for high-intensity binge drinking. Youths' experience with school-based victimization helped to explain these disparities.

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Table 1
Participant demographics by gender: youth risk behavior surveillance survey, United States, 2015

	Full sample			Females (49.16%)			Males (50.84%)		
	n^a/M	% _w ^b	(95%CI)	n^a/M	% _w ^b	(95% CI)	n/M	% _w	(95%CI)
Age	16,07		(5.01, 5.14)	16,02		(4.97, 4.08)	16,12		(5.04, 5.21)
Sexual identity									
Heterosexual	9,662	89.93	(88.39, 91.29)	4,646	85.78	(83.11, 88.08)	5,016	93.95	(92.78, 94.94)
Gay/lesbian	195	1.58	(1.24, 2.00)	113	1.76	(1.34, 2.30)	82	1.40	(1.03, 1.90)
Bisexual	650	5.59	(4.74, 6.57)	524	8.95	(7.41, 10.77)	126	2.33	(1.75, 3.10)
Not sure	332	2.91	(2.43, 3.48)	204	3.52	(2.75, 4.48)	128	2.32	(1.86, 2.88)
Sexual behavior									
Never had sex	5,055	47.53	(44.43, 50.64)	2,710	49.52	(45.28, 53.77)	2,345	45.60	(42.99, 48.22)
Other sex	5,121	46.99	(44.38, 49.63)	2,281	42.09	(38.90, 45.34)	2,840	51.74	(49.17, 54.30)
Same sex	179	1.41	(1.11, 1.80)	107	1.74	(1.27, 2.39)	72	1.10	(0.78, 1.53)
Male and female	484	4.07	(3.36, 4.92)	389	6.65	(5.35, 8.24)	95	1.57	(1.14, 2.16)
Race/Ethnicity									
White	4,671	56.52	(50.18, 62.65)	2,384	57.04	(49.50, 64.27)	2,287	56.01	(50.00, 61.86)
Black	1,102	12.02	(10.10, 14.26)	576	12.34	(10.17, 14.90)	526	11.72	(9.90, 13.82)
Latino	3,938	22.17	(17.57, 27.58)	1,979	22.03	(16.90, 28.20)	1,959	22.31	(17.52, 27.97)
Asian/Pacific Islander	504	4.17	(2.56, 6.75)	235	3.71	(2.03, 6.67)	269	4.63	(3.07, 6.91)
Other	624	5.11	(4.22, 6.17)	313	4.88	(3.69, 6.42)	311	5.33	(4.33, 6.55)
Victimization	5,68		(5.55, 5.81)	5,48		(5.35, 5.61)	5,89		(5.73, 6.05)
Binge drinking									
4+/5+ drinks	1,707	15.61	(13.54, 17.92)	857	15.09	(12.44, 18.20)	850	16.11	(14.29, 18.10)
8+/10+ drinks	608	5.30	(4.45, 6.31)	266	4.62	(3.62, 5.88)	342	5.96	(4.91, 7.22)

^aUnweighted frequencies.

^bWeighted estimates.

Prevalence of standard and high-intensity binge drinking and school-based victimization by sexual orientation: youth risk behavior surveillance survey, United States, 2015

Table 2

	Standard binge drinking (4+ / 5+ drinks)			High-intensity binge drinking (8+ / 10+ drinks)			School-based victimization		
	% _w	(95% CI)	χ^2, p^a	% _w	(95% CI)	χ^2, p^a	M	(95% CI)	F, p ^b
<u>FULL SAMPLE</u>									
Sexual identity			3.83, .014			0.61, .601			5.70, .003
Heterosexual	15.24	(13.15, 17.60)		5.28	(4.40, 6.32)		5.63 _{ab}	(5.50, 5.75)	
Lesbian/gay	22.87	(15.74, 32.01)		6.98	(3.23, 14.42)		5.79	(5.34, 6.24)	
Bisexual	18.92	(16.33, 21.82)		4.57	(3.17, 6.57)		6.11 _a	(5.80, 6.42)	
Not sure	16.59	(12.10, 22.31)		6.54	(3.72, 11.25)		6.61 _b	(5.85, 7.37)	
Sexual behavior			203.37, < .001			87.87, < .001			48.31, < .001
Never had sex	4.60	(3.67, 5.76)		1.14	(0.83, 1.56)		5.32 _{ab}	(5.19, 5.44)	
Other sex	24.99	(22.30, 27.89)		8.85	(7.58, 10.31)		5.93 _{abd}	(5.79, 6.07)	
Same sex	25.16	(16.73, 36.01)		8.78	(4.65, 15.97)		7.46 _b	(5.87, 9.05)	
Male and female	32.44	(27.25, 38.11)		11.81	(8.56, 16.08)		6.57 _{cd}	(6.22, 6.91)	
<u>GIRLS</u>									
Sexual identity			3.35, .026			2.24, .094			10.03, < .001
Heterosexual	14.48	(11.80, 17.64)		4.38	(3.36, 5.69)		5.39 _{ab}	(5.26, 5.51)	
Lesbian	23.71	(14.03, 37.17)		11.49	(4.90, 24.65)		5.71	(5.21, 6.22)	
Bisexual	18.98	(15.85, 22.57)		5.36	(3.58, 7.95)		6.15 _a	(5.78, 6.52)	
Not sure	15.91	(10.92, 22.61)		5.25	(2.11, 12.51)		5.83 _b	(5.58, 6.08)	
Sexual behavior			81.99, < .001			34.47, < .001			27.01, < .001
Never had sex	4.49	(3.27, 6.12)		1.14	(0.76, 1.70)		5.22 _{abc}	(5.10, 5.34)	
Other sex	24.64	(20.93, 28.78)		7.43	(5.81, 9.46)		5.54 _{abd}	(5.42, 5.66)	
Same sex	27.99	(16.57, 43.22)		11.37	(5.12, 23.38)		8.24 _{bd}	(5.84, 10.64)	
Male and female	30.22	(24.38, 36.79)		11.01	(7.26, 16.37)		6.28 _{ce}	(5.94, 6.63)	
<u>BOYS</u>									
Sexual identity			0.73, .524			3.57, .022			1.84, .156
Heterosexual	15.92	(14.03, 18.01)		6.07	(4.99, 7.38)		5.84 _a	(5.68, 6.00)	

	Standard binge drinking (4+ / 5+ drinks)		High-intensity binge drinking (8+ / 10+ drinks)		School-based victimization		
	% _w	(95% CI)	χ^2, p^a	% _w	(95% CI)	M	(95% CI) F, p^b
Gay	21.86	(13.04, 34.29)		1.52	(0.45, 4.97)	5.88	(5.12, 6.65)
Bisexual	18.72	(11.51, 28.97)		1.65	(0.45, 5.86)	5.95	(5.49, 6.40)
Not sure	17.58	(11.16, 26.60)		8.43	(4.35, 15.72)	7.75 _a	(6.06, 9.44)
Sexual behavior			94.00, < .001				26.21, < .001
Never had sex	4.72	(3.42, 6.49)		1.14	(0.68, 1.92)	5.42 _{ab}	(5.27, 5.56)
Other sex	25.27	(22.65, 28.07)		9.96	(8.35, 11.83)	6.24 _{ac}	(6.03, 6.44)
Same sex	20.82	(11.35, 35.06)		4.80	(1.24, 16.84)	6.27	(4.43, 8.12)
Male and female	41.56	(28.82, 55.55)		15.07	(8.22, 26.02)	7.73 _{bc}	(6.57, 8.89)

Similar subscripts denote mean differences at $p < .05$.

Adjusted odds ratios of binge drinking thresholds among female and male and mediation of victimization: youth risk behavior survey, United States, 2015

Table 3

	Standard binge drinking (4+/5+ drinks)				High-intensity binge drinking (8+/10+ drinks)							
	Main effects model		Conditional model		Main effects model		Conditional model					
	aOR	P	aOR	P	aOR	P	aOR	P				
FULL SAMPLE												
Sexual Identity												
Heterosexual _(ref)	1.00		1.00		1.00		1.00					
Lesbian/gay	1.70	(1.03, 2.78)	.037	1.64	(0.96, 2.81)	.070	1.36	(0.61, 3.07)	.444			
Bisexual	1.38	(1.11, 1.71)	.005	1.24	(0.99, 1.56)	.063	0.91	(0.58, 1.40)	.647			
Not sure	1.17	(0.80, 1.71)	.417	0.88	(0.53, 1.46)	.617	1.32	(0.74, 2.34)	.337			
Victimization			1.24	(1.19, 1.30)	<.001				1.26	(1.21, 1.31)	<.001	
Sexual Behavior												
Other sex _(ref)	1.00		1.00		1.00		1.00		1.00		1.00	
Never had sex	0.16	(0.13, 0.19)	<.001	0.18	(0.15, 0.22)	<.001	0.14	(0.10, 0.19)	<.001	0.16	(0.11, 0.22)	<.001
Same sex	1.19	(0.72, 1.99)	.485	0.95	(0.55, 1.63)	.835	1.15	(0.58, 2.28)	.680	0.54	(0.25, 1.13)	.100
Male and female	1.52	(1.16, 1.99)	.003	1.39	(1.04, 1.84)	.025	1.45	(1.01, 2.07)	.042	1.24	(0.84, 1.83)	.272
Victimization			1.18	(1.14, 1.23)	<.001				1.21	(1.17, 1.26)	<.001	
GIRLS												
Sexual Identity												
Heterosexual _(ref)	1.00		1.00		1.00		1.00		1.00		1.00	
Lesbian	2.10	(1.10, 4.01)	.026	1.94	(0.99, 3.80)	.052	3.39	(1.34, 8.59)	.011	3.17	(1.24, 8.08)	.017
Bisexual	1.48	(1.09, 2.01)	.014	1.20	(0.90, 1.62)	.209	1.30	(0.76, 2.24)	.326	0.99	(0.55, 1.78)	.976
Not sure	1.21	(0.78, 1.87)	.378	1.09	(0.70, 1.68)	.697	1.31	(0.56, 3.10)	.522	1.21	(0.53, 2.76)	.650
Victimization			1.27	(1.19, 1.36)	<.001				1.28	(1.19, 1.39)	<.001	
Sexual Behavior												
Other sex _(ref)	1.00		1.00		1.00		1.00		1.00		1.00	
Never had sex	0.16	(0.11, 0.23)	<.001	0.17	(0.12, 0.25)	<.001	0.17	(0.11, 0.25)	<.001	0.18	(0.12, 0.28)	<.001
Same sex	1.38	(0.69, 2.77)	.354	0.90	(0.40, 2.01)	.790	1.89	(0.76, 4.67)	.163	0.64	(0.20, 2.08)	.447
Male and female	1.40	(1.03, 1.90)	.034	1.23	(0.91, 1.68)	.173	1.62	(1.05, 2.52)	.032	1.33	(0.85, 2.10)	.207
Victimization			1.20	(1.14, 1.26)	<.001				1.23	(1.14, 1.33)	<.001	

	Standard binge drinking (4+/5+ drinks)						High-intensity binge drinking (8+/10+ drinks)					
	Main effects model			Conditional model			Main effects model			Conditional model		
	<i>aOR</i>	(95% CI)	<i>P</i>	<i>aOR</i>	(95% CI)	<i>P</i>	<i>aOR</i>	(95% CI)	<i>P</i>	<i>aOR</i>	(95% CI)	<i>P</i>
BOYS												
Sexual Identity												
Heterosexual _(ref)	1.00			1.00			1.00			1.00		
Gay	1.31	(0.56, 3.07)	.529	1.26	(0.49, 3.23)	.618	0.20	(0.06, 0.73)	.015	0.17	(0.05, 0.60)	.007
Bisexual	1.24	(0.74, 2.08)	.398	1.22	(0.68, 2.17)	.495	0.27	(0.07, 1.04)	.056	0.24	(0.06, 1.04)	.057
Not sure	1.16	(0.65, 2.06)	.614	0.62	(0.22, 1.70)	.342	1.44	(0.71, 2.94)	.303	0.52	(0.16, 1.72)	.276
Victimization				1.24	(1.19, 1.30)	< .001				1.25	(1.19, 1.31)	< .001
Sexual Behavior												
Other sex _(ref)	1.00			1.00			1.00			1.00		
Never had sex	0.16	(0.12, 0.21)	< .001	0.18	(0.14, 0.24)	< .001	0.12	(0.07, 0.20)	< .001	0.14	(0.08, 0.24)	< .001
Same sex	0.92	(0.42, 2.02)	.835	0.91	(0.43, 1.93)	.793	0.52	(0.13, 2.19)	.366	0.38	(0.14, 1.04)	.060
Male and female	2.19	(1.12, 4.28)	.023	1.78	(0.81, 3.93)	.149	1.64	(0.79, 3.40)	.179	1.09	(0.44, 2.70)	.851
Victimization				1.18	(1.13, 1.23)	< .001				1.21	(1.16, 1.26)	< .001

Note. CI = confidence interval; *aOR* = adjusted odds ratio. Models adjusted for race/ethnicity and age. Bolded estimates reflect $p < .05$. See online supplement to view tables with covariates included.

Table 4

Direct, indirect, and total mediating effects of victimization in the full sample

	Full sample								
	4+/5+ drinks			8+/10+ drinks					
	<i>b</i>	SE	(95%CI)	<i>P</i>	<i>b</i>	SE	(95%CI)	<i>P</i>	
Sexual Identity									
Lesbian/gay									
Total effect	.31	.14	(.05, .58)	.020	.15	.21	(-.26, .56)	.477	
Indirect effect	.01	.03	(-.04, .07)	.576	.02	.03	(-.04, .07)	.566	
Direct effect	.30	.14	(.03, .57)	.029	.13	.21	(-.28, .55)	.523	
Bisexual									
Total effect	.18	.06	(.07, .29)	.002	-.04	.10	(-.24, .15)	.660	
Indirect effect	.05	.02	(.02, .08)	.001	.05	.02	(.02, .08)	<.001	
Direct effect	.12	.06	(.01, .23)	.027	-.10	.10	(-.28, .10)	.327	
Unsure									
Total effect	.10	.09	(-.08, .28)	.276	.14	.14	(-.14, .42)	.317	
Indirect effect	.11	.04	(.04, .19)	.004	.11	.04	(.04, .18)	.004	
Direct effect	-.01	.09	(-.19, .17)	.904	.03	.13	(-.23, .30)	.809	
Sexual Behavior									
Never had sex									
Total effect	-.83	.03	(-.89, -.76)	<.001	-.77	.05	(-.87, -.67)	<.001	
Indirect effect	-.06	.01	(-.07, -.04)	<.001	-.06	.01	(-.08, -.05)	<.001	
Direct effect	-.77	.04	(-.84, -.70)	<.001	-.70	.05	(-.80, -.61)	<.001	
Same sex									
Total effect	.11	.13	(-.16, .37)	.424	.05	.16	(-.26, .36)	.745	
Indirect effect	.12	.07	(-.01, .25)	.067	.13	.08	(-.02, .29)	.091	
Direct effect	-.02	.12	(-.25, .22)	.902	.08	.12	(-.31, .14)	.481	
Male and female									
Total effect	.22	.07	(.09, .36)	.001	.18	.08	(.02, .33)	.029	
Indirect effect	.05	.01	(.02, .08)	<.001	.06	.01	(.03, .08)	<.001	
Direct effect	.17	.07	(.04, .30)	.012	.12	.08	(.04, .28)	.129	

Note. Standard errors and 95% CI estimated with 5,000 bootstrap draws.

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Table 5

Direct, indirect, and total mediating effects of victimization among girls and boys

	Girls						Boys									
	4+ drinks			8+ drinks			5+ drinks			10+ drinks						
	<i>b</i>	SE	(95% CI)	<i>P</i>	<i>b</i>	SE	(95% CI)	<i>P</i>	<i>b</i>	SE	(95% CI)	<i>P</i>				
Sexual Identity																
Lesbian/Gay																
Total effect	.42	.17	(.08, .76)	.015	.57	.26	(.06, 1.08)	.028	.18	.23	(-.26, .62)	.431	-.64	.53	(-1.68, .41)	.231
Indirect effect	.04	.03	(-.03, .10)	.236	.04	.03	(-.02, .10)	.220	.00	.04	(-.09, .09)	.958	.00	.04	(-.08, .08)	.991
Direct effect	.38	.17	(.05, .72)	.026	.54	.25	(.04, 1.03)	.034	.18	.23	(-.28, .63)	.449	-.64	.53	(-.68, .40)	.229
Bisexual																
Total effect	.21	.08	(.05, .37)	.009	.12	.12	(-.11, .35)	.306	.11	.15	(-.18, .41)	.442	-.57	.96	(-1.54, .40)	.254
Indirect effect	.10	.02	(.05, .14)	<.001	.09	.02	(.05, .13)	<.001	.01	.03	(-.05, .07)	.713	.01	.03	(-.04, .06)	.692
Direct effect	.12	.08	(.03, .26)	.121	.03	.11	(-.20, .25)	.801	.10	.16	(-.20, .41)	.506	-.58	.50	(-1.55, .40)	.249
Unsure																
Total effect	.11	.11	(-.09, .32)	.288	.13	.23	(-.32, .57)	.577	.10	.15	(-.20, .40)	.510	.20	.19	(-.17, .58)	.293
Indirect effect	.06	.02	(.02, .09)	.002	.05	.02	(.02, .09)	.002	.22	.09	(.05, .38)	.012	.21	.08	(.05, .37)	.009
Direct effect	.06	.10	(-.14, .25)	.565	.07	.22	(-.35, .50)	.735	-.11	.17	(-.44, .21)	.495	-.01	.18	(-.35, .34)	.968
Sexual Behavior																
Never had sex																
Total effect	-.83	.06	(-.94, -.72)	<.001	-.68	.07	(-.82, -.54)	<.001	-.84	.05	(-.93, -.75)	<.001	-.82	.08	(-.98, -.67)	<.001
Indirect effect	-.04	.01	(-.05, -.02)	<.001	-.04	.01	(-.06, -.02)	<.001	-.08	.01	(-.10, -.05)	<.001	-.08	.01	(-.10, -.06)	<.001
Direct effect	-.79	.06	(-.91, -.68)	<.001	-.64	.07	(-.78, -.51)	<.001	-.76	.05	(-.86, -.67)	<.001	-.75	.08	(-.90, -.59)	<.001
Same sex																
Total effect	.17	.19	(-.20, .54)	.371	.26	.21	(-.16, .68)	.218	-.02	.21	(-.44, .39)	.912	-.23	.51	(-.23, .76)	.646
Indirect effect	.24	.11	(.03, .45)	.026	.26	.13	(.01, .50)	.041	.00	.07	(-.15, .14)	.952	-.01	.08	(-.15, .14)	.945
Direct effect	-.07	.18	(-.43, .29)	.712	.01	.15	(-.29, .31)	.958	-.02	.18	(-.38, .34)	.917	-.23	.46	(-1.13, .67)	.619
Male and female																
Total effect	.17	.08	(.02, .33)	.029	.22	.10	(.03, .42)	.023	.41	.18	(.06, .76)	.022	.23	.18	(-.12, .58)	.189
Indirect effect	.06	.02	(.03, .10)	<.001	.07	.02	(.04, .10)	<.001	.12	.05	(.03, .22)	.013	.13	.05	(.03, .23)	.010
Direct effect	.11	.08	(-.04, .26)	.145	.16	.10	(-.03, .34)	.101	.29	.19	(-.09, .66)	.135	.11	1.85	(-.26, .47)	.570

Note. Standard errors and 95% CI estimated with 5,000 bootstraps.

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