



ELSEVIER

 JOURNAL OF
 ADOLESCENT
 HEALTH

www.jahonline.org

Original article

Sexual Identity, Adverse Childhood Experiences, and Suicidal Behaviors

 Kristen Clements-Nolle, Ph.D., M.P.H.^{a,*}, Taylor Lensch, M.P.H.^a, Amberlee Baxa, M.P.H.^b, Christopher Gay, M.P.H.^a, Sandra Larson, M.P.H.^b, and Wei Yang, Ph.D.^a
^a School of Community Health Sciences, University of Nevada, Reno, Reno, Nevada^b Office of Public Health Informatics and Epidemiology, Nevada Division of Public and Behavioral Health, Las Vegas, Nevada

Article history: Received May 17, 2017; Accepted September 2, 2017

Keywords: Adverse childhood experiences; High school students; Sexual identity; Suicidal behaviors

 A B S T R A C T

Purpose: The objective of this study was to examine the influence of sexual identity and adverse childhood experiences (ACEs) on suicidal behaviors in a population-based sample of high school students.

Methods: A two-stage cluster random sampling design was used to recruit 5,108 students from 97 high schools. A total of 4,955 students (97%) provided information that allowed for classification of sexual identity into three groups: (1) lesbian, gay, or bisexual (LGB) (10%); (2) not sure (4.6%); and (3) heterosexual (85.4%). Five measures of childhood abuse and household dysfunction were summed, and the ACE score was categorized as 0, 1, 2, and 3–5 ACEs. Weighted logistic regression was used to assess the influence of sexual identity, ACEs, and their interaction on suicide ideation and attempts in the past 12 months.

Results: Compared with heterosexual students, those who were LGB and were not sure had higher odds of suicide ideation and attempts. There was also a graded relationship between cumulative ACE exposure and suicidal behaviors. Although sexual identity/ACE interaction was not observed, LGB/not sure students who experienced a high number of ACEs were disproportionately affected. Compared with heterosexual students with 0 ACE, LGB/not sure students with 0 ACE (adjusted odds ratio [AOR] = 3.32, 95% confidence interval [CI] = 1.96–5.61), 1 ACE (AOR = 6.58, 95% CI = 4.05–10.71), 2 ACEs (AOR 13.50, 95% CI = 8.45–21.58), and 3–5 ACEs (AOR = 14.04, 95% CI = 8.72, 22.62) had higher odds of suicide ideation. A similar pattern was observed for suicide attempts.

Conclusions: LGB and students not sure of their sexual identity with greater exposure to ACEs have disproportionately high levels of suicide ideation and attempts. Trauma-informed interventions for these populations are warranted.

© 2017 Society for Adolescent Health and Medicine. All rights reserved.

 IMPLICATIONS AND CONTRIBUTIONS

Adolescent research exploring the independent and interacting influence of sexual identity and adverse childhood experiences on suicidal behaviors is limited. This study found that lesbian, gay, or bisexual students and students who are not sure of their sexual identity with greater adverse childhood experience exposure have disproportionately high odds of suicide ideation and attempts.

Conflicts of Interest: The authors have no conflicts of interest to disclose.

The results presented in this paper were the basis of an oral presentation at the 144th Annual Conference of the American Public Health Association, Denver, CO, in October 2016.

* Address correspondence to: Kristen Clements-Nolle, Ph.D., M.P.H., School of Community Health Sciences, University of Nevada, Reno, Mailstop 274, Reno, NV 89557-0274.

E-mail address: clements@unr.edu (K. Clements-Nolle).

Suicide is the second leading cause of death among adolescents and young adults (10–24 years) in the U.S. [1], and there is evidence that suicide rates are increasing in this age group [2]. Population-based studies demonstrate that adolescents who self-identify as lesbian, gay, or bisexual (LGB) report significantly higher rates of suicidal behaviors than their heterosexual peers [3,4]. In 2015, sexual identity was added as a core variable to the national Youth Risk Behavior Survey (YRBS), resulting in the largest number of states and school districts that have assessed sexual

identity among high school students to date (25 states and 19 large urban school districts). The 2015 YRBS found that the prevalence of suicide ideation was nearly three times higher and the prevalence of suicide attempts was more than four times higher among LGB students than among heterosexual students. Suicidal behaviors were also consistently higher among students who were not sure of their sexual orientation than among those who self-identified as heterosexual [3].

Sexual identity remains significantly associated with suicidal behaviors after controlling for known risk factors such as depression and substance use [4–6], suggesting that other risk factors may explain the disproportionate rates of suicidal behaviors among sexual minority youth. The minority stress model hypothesizes that the stigma, prejudice, and discrimination experienced by LGB individuals contribute to chronic stress and poor mental health outcomes, including suicidal behaviors [7]. Most studies with LGB youth have focused on exposure to sexual minority-related victimization [8–10] and being bullied or victimized at school [11–13] and have generally found support for the minority stress model. However, exposure to victimization and other stressors within the family is common for LGB youth [14] and may also contribute to suicidal risk behaviors [15–18].

Adverse childhood experiences (ACEs) can be defined as childhood abuse, neglect, and a range of household dysfunctions [19]. Population-based research has documented a higher prevalence of ACEs among sexual minority adults [20,21], and there is a demonstrated dose-response relationship between ACEs and attempted suicide throughout the life span [22,23]. Studies with adult populations have also explored the role of a limited number of ACEs in the relationship between sexual identity and suicidal risk behaviors. One study used cross-sectional data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) and found that the association between LGB identity and attempted suicide among adults was significantly mediated by childhood sexual abuse and physical abuse for women and sexual abuse for men [17]. Another longitudinal study with a nationally representative sample of young adults (18–27 years) showed that exposure to childhood adversity (defined as any exposure to childhood physical abuse, childhood sexual abuse, housing instability, or intimate partner violence) partially explained the relationship between LGB identity and suicidality [18].

Although mediation analyses are important for understanding the possible mechanism by which LGB identity influences suicide risk, an equally important and unexplored question is whether ACEs interact with sexual identity to influence suicidal behaviors. Understanding whether sexual minority adolescents who have an elevated exposure to ACEs are disproportionately at risk of suicidal behaviors is essential for developing effective suicide prevention strategies for sexual minority populations. Furthermore, previous research exploring the role of ACEs in the relationship between sexual identity and suicidal behaviors has relied on samples of adult and young adult populations and has focused only on childhood abuse [17] or broad measures of any childhood adversity [18]. Children are often exposed to multiple forms of abuse and household dysfunction, and there is evidence that cumulative exposure to adversities may have a greater impact on health outcomes than individual stressors [24]. In the present study, we examined the independent and interacting influence of sexual identity and cumulative exposure to ACEs on recent suicide ideation and attempts in a population-based sample of 4,955 high school students.

Methods

Participants and procedures

The YRBS is a national survey designed by the Centers for Disease Control and Prevention (CDC) to monitor priority health-related behaviors among high school students. Data for our analyses were obtained from the 2015 Nevada YRBS. A two-stage cluster random sampling design was used to ensure a representative sample of students in grades 9–12 from regular, charter, and alternative public schools throughout the state. The first sampling stage grouped 16 school districts into 7 regions, which align with the statewide prevention coalition structure. In the second sampling stage, second periods or required English classes were randomly selected from all schools for survey administration. Half of the school districts required active parental permission and half required passive parental permission. After parental permission was obtained, the questionnaire was administered to students in all selected classes. Students could choose not to participate and could skip any questions they did not feel comfortable answering. Overall, 5,108 youths from 97 schools completed the questionnaire. The overall response rate (a combination of school and student participation) was 65%. The study was approved by the university's institutional review board, and the local school district institutional review board approval was obtained when required.

Measures

Sexual identity. In 2015, the CDC added sexual identity as a core YRBS variable [3]. Students were asked, "Which of the following best describes you?" Responses included heterosexual (straight), gay or lesbian, bisexual, and not sure. Three comparison groups were used for the analyses: (1) LGB, (2) not sure, and (3) heterosexual.

Adverse childhood experiences. The CDC YRBS survey includes a core measure of lifetime sexual abuse: "Have you ever been physically forced to have sexual intercourse when you did not want to?" Additionally, four state-added variables were adapted from the Behavioral Risk Factor Surveillance System (BRFSS) ACE module [20,21] to assess the lifetime prevalence of (1) physical abuse by an adult—"Have you ever been hit, beaten, kicked, or physically hurt in any way by an adult? (Do not include being spanked for bad behavior)"; (2) household domestic violence—"Have you ever seen or heard adults in your home slap, hit, kick, punch, or beat each other up?"; (3) household mental illness—"Have you ever lived with someone who was depressed, mentally ill, or suicidal?"; and (4) household substance abuse—"Have you ever lived with someone who was a problem drinker or alcoholic or abused street or prescription drugs?" Responses to all ACE questions were dichotomized as yes versus no. Two household dysfunction questions (household mental illness and household substance use) included a response of "don't know." Consistent with previous research with adults using the BRFSS ACE module [19,20], don't know responses were coded as missing for these questions. The five ACE questions were summed to create a total ACE score (range 0–5). The ACE score was further categorized as 0, 1, 2, and 3–5 ACEs.

Suicide risk behaviors. A standardized YRBS question was used to assess suicide ideation, "During the past 12 months, did you ever

seriously consider attempting suicide?" Responses were dichotomized as yes versus no. Suicide attempts were assessed by asking students, "During the past 12 months, how many times did you actually attempt suicide?" Responses were dichotomized as zero times versus one or more times.

Covariates. Demographic characteristics included sex, age, and race/ethnicity. County of residence was coded as urban (50,000 or more people) or rural (<50,000 people) using the Census Bureau's classification of urban and rural counties [25]. Additionally, a state-added question assessed whether students were qualified for free or reduced lunch (yes vs. no) as a proxy for income level. School district parental permission (active vs. passive) and use of alcohol and marijuana in the past 30 days (yes vs. no) were also included as covariates.

Analyses

The weighted chi-square test was used to compare the prevalence of sociodemographic characteristics, substance use, ACEs, and suicide risk behaviors between LGB, not sure, and heterosexual students. Because three sexual identity groups were compared for each variable, the Bonferroni method was used to adjust for multiple comparisons.

To account for the complex survey design, weighted logistic regression was used to assess whether sexual orientation (LGB, not sure, and heterosexual) and ACE scores (0, 1, 2, and 3–5 ACEs) were independently associated with suicide ideation and suicide attempts after controlling for sex, age, race/ethnicity, county of residence, qualification for free or reduced lunch, parental

permission type, recent alcohol use, and recent marijuana use. The adjusted odds ratio (AOR) and 95% confidence interval (CI) were calculated.

We repeated the weighted logistic regression models for each outcome including sexual identity \times ACE score interaction terms. Because the models without interaction terms showed similar effects for students who self-identified as LGB and those who were not sure of their sexual orientation, these two groups were combined for interaction analyses. Overall, eight groups were compared: (1) heterosexual/0 ACE (referent), (2) heterosexual/1 ACE, (3) heterosexual/2 ACEs, (4) heterosexual/3–5 ACEs, (5) LGB and not sure/0 ACE, (6) LGB and not sure/1 ACE, (7) LGB and not sure/2 ACEs, and (8) LGB and not sure/3–5 ACEs. All percentages shown are weighted percentages and all *p* values are two-tailed. SAS version 9.4 (SAS Institute, Cary, NC) was used for all analyses.

Results

Of the 5,108 participants who completed the surveys, 4,955 (97.0%) answered the sexual identity question. Of this group, 498 (10.0%) self-identified as LGB, 227 (4.6%) were not sure of their sexual identity, and 4,230 (85.4%) self-identified as heterosexual. The descriptive characteristics of LGB, not sure, and heterosexual students are presented in Table 1. Almost three quarters of the participants were 16 years of age or younger and most were Hispanic (39.4%) and non-Hispanic white (36.3%). One in five students lived in a rural county and 40.5% qualified for free or reduced lunch. Almost one third of the sampled students (30.5%) drank alcohol and 19.6% used marijuana in the past 30

Table 1
Characteristics of 4,955 high school students, by sexual identity—2015

	Total N (%)	LGB, n (%)	Not sure, n (%)	Heterosexual, n (%)	<i>p</i> Value
Sex					
Female	2,538 (48.7)	360 (71.7)	146 (65.2)	2,032 (45.1)	a,b
Male	2,398 (51.3)	134 (28.3)	80 (34.8)	2,184 (54.9)	
Age					
≤ 14 y	590 (10.5)	65 (10.7)	27 (10.0)	498 (10.5)	
15 y	1,359 (25.5)	142 (28.9)	70 (27.8)	1,147 (24.9)	
16 y	1,311 (25.8)	127 (21.4)	57 (23.3)	1,127 (26.5)	
17 y	1,140 (25.0)	113 (26.7)	47 (25.0)	980 (24.8)	
≥ 18 y	543 (13.2)	50 (12.2)	25 (13.9)	468 (13.3)	
Race/ethnicity					
Hispanic	1,951 (39.4)	177 (37.4)	90 (39.8)	1,684 (39.6)	
Non-Hispanic white	1,919 (36.3)	199 (35.3)	83 (38.5)	1,637 (36.3)	
Non-Hispanic black	263 (9.9)	35 (12.1)	11 (8.3)	217 (9.7)	
Non-Hispanic other	721 (14.5)	72 (15.2)	30 (13.3)	619 (14.4)	
County of residence					
Urban	3,612 (90.4)	378 (90.8)	173 (93.5)	3,061 (90.2)	
Rural	1,343 (9.6)	120 (9.2)	54 (6.5)	1,169 (9.8)	
Parent permission					
Active	2,918 (79.3)	299 (78.9)	127 (76.6)	2,492 (79.5)	
Passive	2,037 (20.7)	199 (21.1)	100 (23.4)	1,738 (20.5)	
Qualify for free or reduced lunch					
Yes	1,920 (40.5)	235 (49.1)	90 (39.8)	1,595 (39.6)	a
No	3,013 (59.5)	260 (50.9)	134 (60.2)	2,619 (60.4)	
Alcohol use (past 30 d)					
Yes	1,391 (30.5)	205 (46.8)	78 (42.7)	1,108 (28.1)	a,b
No	3,071 (69.5)	232 (53.2)	117 (57.3)	2,722 (71.9)	
Marijuana use (past 30 d)					
Yes	958 (19.6)	170 (34.7)	55 (26.8)	733 (17.5)	a
No	3,928 (80.4)	310 (65.3)	166 (73.2)	3,452 (82.5)	

LGB = lesbian, gay, or bisexual.

^a LGB versus heterosexual ($p < .001$).

^b Not sure versus heterosexual ($p < .001$).

Table 2

ACEs, suicide ideation, and suicide attempts by sexual identity of 4,955 high school students—2015

	LGB, n (%)	Not sure, n (%)	Heterosexual, n (%)	p Value
ACEs				
Sexual abuse				
Yes	122 (24.4)	42 (13.9)	329 (6.8)	a,b
No	369 (75.6)	181 (86.1)	3,882 (93.2)	
Physical abuse				
Yes	171 (34.1)	52 (21.2)	598 (13.1)	a,b
No	315 (65.9)	171 (78.8)	3,617 (86.9)	
Household domestic violence				
Yes	133 (26.7)	63 (25.0)	617 (14.7)	a,b
No	346 (73.3)	160 (75.0)	3,581 (85.3)	
Household mental illness				
Yes	255 (50.3)	102 (44.6)	1,159 (27.4)	a,b
No	222 (49.7)	112 (55.4)	2,955 (72.6)	
Household substance use/abuse				
Yes	234 (47.1)	86 (37.7)	1,229 (28.2)	a,b
No	235 (52.9)	125 (62.3)	2,882 (71.8)	
ACE score				
0	95 (21.9)	65 (37.8)	1,967 (50.0)	a,b
1	97 (21.9)	50 (21.9)	999 (24.8)	
2	109 (23.4)	43 (21.7)	638 (15.2)	
3–5	151 (32.8)	47 (18.6)	450 (10.1)	
Suicide ideation (past 12 mo)				
Yes	214 (41.5)	87 (36.8)	617 (13.9)	a,b
No	270 (58.5)	133 (63.2)	3,602 (86.1)	
Suicide attempts (past 12 mo)				
Yes	135 (28.5)	44 (21.1)	288 (6.8)	a,b
No	306 (71.5)	149 (78.9)	3,396 (93.2)	

ACE = adverse childhood experience; LGB = lesbian, gay, or bisexual.

^a LGB versus heterosexual ($p < .001$).

^b Not sure versus heterosexual ($p < .001$).

days. A higher proportion of LGB and not sure students were female, and a higher proportion of LGB students qualified for free or reduced lunch compared with heterosexual students. Recent use of alcohol was also higher among LGB and not sure students, and recent use of marijuana was higher among LGB students than among heterosexual students.

Table 2 shows the unadjusted associations between sexual identity and ACEs and sexual identity and suicidal behaviors. Individual ACEs were consistently higher among LGB and not sure students than among heterosexual students ($p < .001$): sexual abuse (LGB, 24.4%; not sure, 13.9%; and heterosexual, 6.8%), physical abuse (LGB, 34.1%; not sure, 21.2%; and heterosexual, 13.1%), witnessing domestic violence at home (LGB, 26.7%; not sure, 25.0%; and heterosexual, 14.7%), household mental illness (LGB, 50.3%; not sure, 44.6%; and heterosexual, 27.4%), and household substance abuse (LGB, 47.1%; not sure, 37.7%; and heterosexual, 28.2%). Additionally, LGB and not sure students had higher cumulative ACE scores than heterosexual students ($p < .001$). For example, 56.2% of LGB and 40.3% of not sure students had 2–5 ACEs compared with 25.3% of heterosexual students. LGB and not sure students also had a higher prevalence of suicide ideation (LGB, 41.5%; not sure, 36.8%; heterosexual, 13.9%; $p < .001$) and suicide attempts in the past 12 months (LGB 28.5%; not sure, 21.1%; heterosexual, 6.8%; $p < .001$).

After controlling for all covariates, higher odds of suicide ideation and attempts were observed among students who

self-identified as LGB (ideation: AOR = 2.48, 95% CI = 1.83–3.35; attempts: AOR = 3.03, 95% CI = 2.17–4.23) or were not sure of their sexual identity (ideation: AOR = 2.87, 95% CI = 1.88–4.37; attempts: AOR = 3.20, 95% CI = 1.84–5.57) compared with students who self-identified as heterosexual (Table 3).

As ACE scores increased, there was an increase in the odds of (1) suicide ideation—1 ACE (AOR = 2.31, 95% CI = 1.74–3.07), 2 ACEs (AOR = 3.82, 95% CI = 2.77–5.27), and 3–5 ACEs (AOR = 5.73, 95% CI = 4.11–8.00); and (2) attempts—1 ACE (AOR = 1.21, 95% CI = .76–1.93), 2 ACEs (AOR = 3.09, 95% CI = 1.91–5.02), and 3–5 ACEs (AOR = 5.43, 95% CI = 3.41–8.65) (Table 3).

In the models that included interaction terms (sexual identity × ACE scores), no statistically significant interactions were observed. A similar pattern of increasing odds of suicide ideation and attempts corresponding to increases in ACE scores was observed regardless of sexual identity (Figures 1 and 2). However, students who reported that they were LGB or not sure of their sexual identity and had higher ACE scores were disproportionately affected. Compared with heterosexual students with 0 ACE, LGB/not sure students with 0 ACE (AOR = 3.32, 95% CI = 1.96–5.61), 1 ACE (AOR = 6.58, 95% CI = 4.05–10.71), 2 ACEs (AOR = 13.50, 95% CI = 8.45–21.58), and 3–5 ACEs (AOR = 14.04, 95% CI = 8.72–22.62) had higher odds of suicide ideation (Figure 1). Elevated odds of suicide attempts were also found among LGB/not sure students with 0 ACE (AOR = 3.76, 95% CI = 1.81–7.79), 1 ACE (AOR = 4.23, 95% CI = 2.26–7.93), 2 ACEs (AOR = 12.81, 95% CI = 6.28–26.14), and 3–5 ACEs (AOR = 13.15, 95% CI = 7.27–23.79) compared with heterosexual students with no ACE (Figure 2).

Discussion

The present study examined the independent and interacting influence of sexual identity and cumulative exposure to ACEs on suicidal behaviors in a population-based sample of high school students. Consistent with previous research, students who self-identified as LGB [2,3] or were not sure of their sexual orientation [3] were at greater risk of suicide ideation and attempts. Furthermore, there was a strong and graded relationship between ACEs and suicidal behaviors, which is consistent with adult literature [22,23]. Although we did not observe a significant interaction between sexual identity and ACEs, students who self-identified as LGB or were not sure of their sexual identity and

Table 3

Influence of sexual identity and ACEs on suicide ideation and suicide attempts—2015

Variable	Suicide ideation ^a		Suicide attempts ^a	
	AOR	(95% CI)	AOR	(95% CI)
Sexual identity				
Heterosexual (ref)	1.00		1.00	
LGB	2.48	(1.83–3.35)	3.03	(2.17–4.23)
Not sure	2.87	(1.88–4.37)	3.20	(1.84–5.57)
ACE score				
0 (ref)	1.00		1.00	
1	2.31	(1.74–3.07)	1.21	(.76–1.93)
2	3.82	(2.77–5.27)	3.09	(1.91–5.02)
3–5	5.73	(4.11–8.00)	5.43	(3.41–8.65)

ACE = adverse childhood experience; AOR = adjusted odds ratio; CI = confidence interval; LGB = lesbian, gay, or bisexual; ref = reference.

^a Adjusted for sex, age, race/ethnicity, county of residence, free or reduced lunch qualification, parent permission status, recent alcohol use, and recent marijuana use.

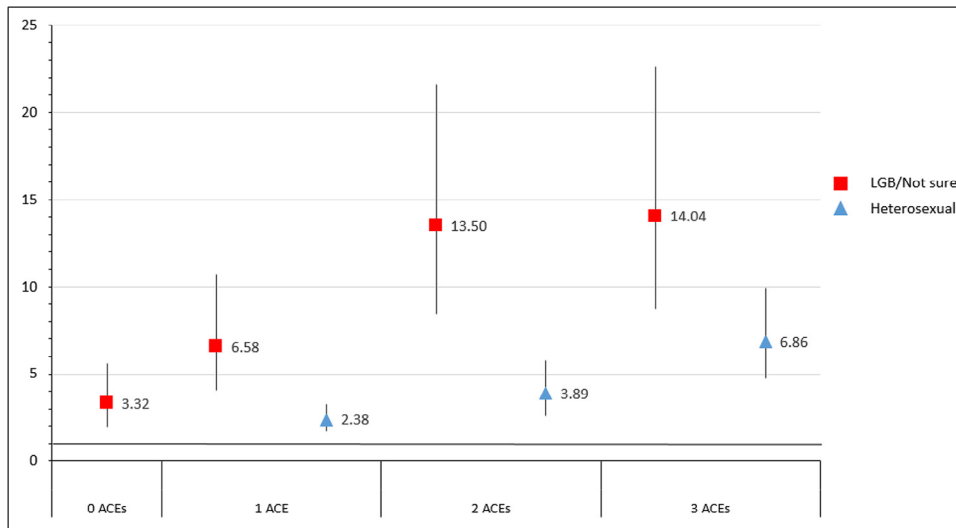


Figure 1. Interacting influence of sexual identity and ACEs on suicide ideation—2015. Heterosexual/0 ACE is the referent group. AORs and 95% CIs plotted. The model was adjusted for sex, age, race/ethnicity, county of residence, free or reduced lunch qualification, parent permission type, recent alcohol use, and recent marijuana use. No significant interaction effects between sexual identity and ACEs were observed.

experienced a high number of ACEs were disproportionately affected. For example, compared with heterosexual students with no ACE, LGB/not sure students with 2 or more ACEs had approximately 13 times higher odds of suicide ideation and attempts.

We were not able to identify mechanisms underlying the influence of LGB identity and ACEs on suicidal behaviors, but past research has shown that sexual minority victimization and peer/school victimization [8–13] increases suicide risk behaviors among LGB adolescents. It may be that exposure to ACEs adds to other stressors that are common among sexual minority populations, such as social discrimination, stigma, and victimization [21]. Future research using representative longitudinal designs should explore whether exposure to societal minority stressors, as well

as ongoing family adversities, have a cumulative and interacting impact on suicide ideation and attempts across the life span. There is also a need for studies that explore protective factors or youth assets that may moderate the impact of childhood trauma on suicidal behaviors.

Our study supports a growing body of evidence showing higher levels of childhood abuse among LGB youth compared with heterosexual youth [14] and adds to this literature by demonstrating that adolescents who are not sure about their sexual identity are also at an increased risk of abuse. Even within the same family, research has shown that LGB individuals are at a greater risk of psychological abuse and physical abuse than their heterosexual siblings [26]. There is a paucity of data exploring household

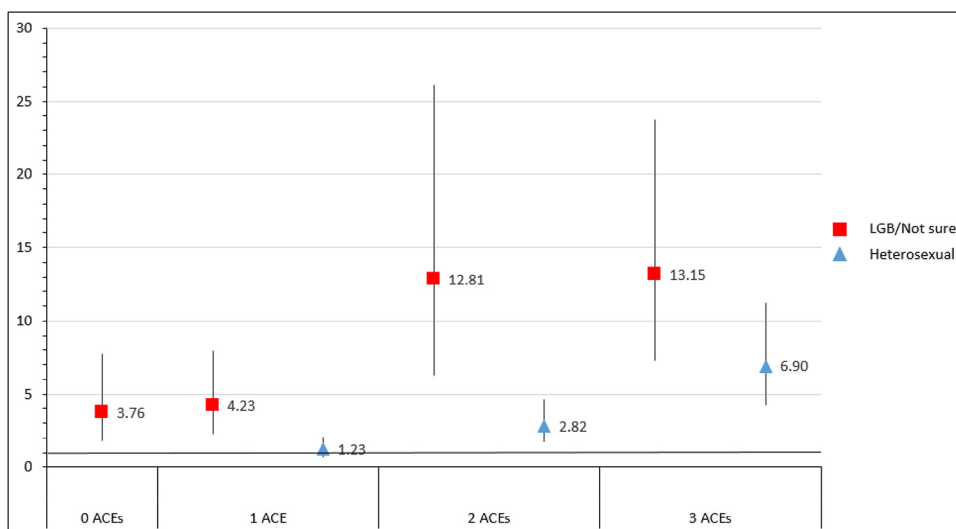


Figure 2. Interacting influence of sexual identity and ACEs on suicide attempts—2015. Heterosexual/0 ACE is the referent group. AORs and 95% CIs were plotted. The model was adjusted for sex, age, race/ethnicity, county of residence, free or reduced lunch qualification, parent permission type, recent alcohol use, and recent marijuana use. No significant interaction effects between sexual identity and ACEs were observed.

dysfunction in sexual minority populations [16], but our results suggest that LGB and not sure adolescents are more likely to witness household domestic violence and to live with an adult with a substance abuse or mental health problem, which is consistent with recent population-based adult research [20,21].

The reasons for the higher prevalence of ACEs among sexual minority youth are not evident in our study or in other studies. However, research has demonstrated an association between childhood gender nonconformity (which is more common among LGB adolescents) and childhood abuse and neglect by family members [27,28]. Furthermore, verbal abuse and other forms of victimization are potential consequences when sexual minority youth disclose their sexual orientation to parents [29], and research with lesbian and bisexual women has shown that awareness and disclosure of sexual identity at an earlier age are associated with an increased risk of harassment and abuse by family members [30].

The strengths of our study include the use of a large representative sample of LGB, not sure, and heterosexual high school students, and a focus on cumulative exposure to childhood abuse and household dysfunction. There are also some limitations that should be noted.

First, information bias may partially account for the higher prevalence of childhood abuse and household dysfunction we have observed among LGB and not sure participants. It is possible that students who are willing to self-identify as LGB are also more likely to report potentially stigmatizing information such as childhood abuse and household dysfunction [31], and if LGB youth and those who are not sure of their sexual identity have more exposure to therapy and counseling services, this may increase their recognition of different types of family dysfunction [20]. However, researchers generally conclude that elevated rates of suicidal behaviors among LGB individuals are not caused by self-report [32], and over-reporting of ACEs among students who are LGB or are not sure of their sexual identity would not influence the main associations we observed.

Second, we combined lesbian, gay, and bisexual students into one group to ensure enough power to assess interaction. Such grouping of sexual identity prohibited our ability to investigate differences in ACEs and suicide risk behaviors, as well as potential interacting effects between different sexual minority populations.

Third, although a strength of our study was the inclusion of several measures of childhood abuse and household dysfunction, we did not have some ACE measures that are typically included in adult surveillance studies, such as emotional abuse, the incarceration of a family member, and parental separation/divorce [20,21].

Fourth, the YRBS is a cross-sectional surveillance study and, as such, we cannot determine the temporal relationship between the development of sexual identity, the timing of ACEs, and the potential influence on suicidal behaviors. Finally, although our survey results are generalizable to high school students in one state, we are cautious about generalizing to other areas.

Our research demonstrates that high school students who self-identify as LGB or are not sure of their sexual identity and have a higher cumulative exposure to ACEs are important subpopulations for suicide prevention efforts. Screening for ACEs in schools, pediatric primary care settings, and other child-serving agencies has been recommended as an efficient strategy for identifying youth who may be at risk of a range of poor physical and mental health outcomes [33]. Our research provides evidence for assessing

sexual identity during such screenings and demonstrates the importance of ensuring that providers who work with sexual minority adolescents are aware of their elevated risk of experiencing ACEs [26] and the potential influence this can have on suicidal behaviors. Finally, the higher prevalence of ACEs among adolescents who are LGB or are not sure of their sexual identity and the demonstrated influence on suicide risk behaviors highlight the need to ensure that suicide prevention efforts for sexual minority youth are trauma informed.

Funding Sources

This research was partially supported by a grant from the Centers for Disease Control and Prevention [CDC-PS13-1308] and received supplemental funding from the Nevada State Division of Public and Behavioral Health (work order 4332). The lead author also received support from a grant from the National Institute of General Medical Sciences (P20GM103440).

References

- [1] Centers for disease control and prevention (CDC). Web-Based Injury Statistics Query and Reporting System (WISQARS). 2017. Available at: <http://www.cdc.gov/injury/wisqars/index.html>. Accessed September 1, 2017.
- [2] Curtin SC, Warner M, Hedegaard H. Increase in suicide in the United States, 1999–2014. NCHS Data Brief 2016;241:1–8. Available at: <https://www.cdc.gov/nchs/data/databriefs/db241.pdf>. Accessed September 1, 2017.
- [3] Kann L, et al. Sexual identity, sex of sexual contacts, and health-related behaviors among students in grades 9–12—United States and selected sites, 2015. MMWR Surveill Summ 2016;65:1–202.
- [4] Russell ST, Joyner K. Adolescent sexual orientation and suicide risk: Evidence from a national study. Am J Public Health 2001;91:1276–81.
- [5] Fergusson DM, Horwood LJ, Ridder EM, Beautrais AL. Sexual orientation and mental health in a birth cohort of young adults. Psychol Med 2005;35:971–81.
- [6] Wichstrom L, Hegna K. Sexual orientation and suicide attempt: A longitudinal study of the general Norwegian adolescent population. J Abnorm Psychol 2003;112:144–51.
- [7] Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. Psychol Bull 2003;129:674–97.
- [8] Baams L, Grossman AH, Russell ST. Minority stress and mechanisms of risk for depression and suicidal ideation among lesbian, gay, and bisexual youth. Dev Psychol 2015;51:688–96.
- [9] Burton CM, Marshal MP, Chisolm DJ, et al. Sexual minority-related victimization as a mediator of mental health disparities in sexual minority youth: A longitudinal analysis. J Youth Adolesc 2013;42:394–402.
- [10] Mustanski B, Liu RT. A longitudinal study of predictors of suicide attempts among lesbian, gay, bisexual, and transgender youth. Arch Sex Behav 2013;42:437–48.
- [11] Ybarra ML, Mitchell KJ, Kosciw JG, Korchmaros JD. Understanding linkages between bullying and suicidal ideation in a national sample of LGB and heterosexual youth in the United States. Prev Sci 2015;16:451–62.
- [12] Duong J, Bradshaw C. Associations between bullying and engaging in aggressive and suicidal behaviors among sexual minority youth: The moderating role of connectedness. J Sch Health 2014;84:636–45.
- [13] Bontempo DE, D'Augelli AR. Effects of at-school victimization and sexual orientation on lesbian, gay, or bisexual youths' health risk behavior. J Adolesc Health 2002;30:364–74.
- [14] Friedman MS, Marshal MP, Guadamuz TE, et al. A meta-analysis of disparities in childhood sexual abuse, parental physical abuse, and peer victimization among sexual minority and sexual nonminority individuals. Am J Public Health 2011;101:1481–94.
- [15] D'Augelli AR, Grossman AH, Salter NP, et al. Predicting the suicide attempts of lesbian, gay, and bisexual youth. Suicide Life Threat Behav 2005;35:646–60.
- [16] Schneeberger AR, Dietl MF, Muenzenmaier KH, et al. Stressful childhood experiences and health outcomes in sexual minority populations: A systematic review. Soc Psychiatry Psychiatr Epidemiol 2014;49:1427–45.
- [17] Flynn AB, Johnson RM, Bolton SL, Mojtabai R. Victimization of lesbian, gay, and bisexual people in childhood: Associations with attempted suicide. Suicide Life Threat Behav 2016;46:457–70.

- [18] McLaughlin KA, Hatzenbuehler ML, Xuan Z, Conron KJ. Disproportionate exposure to early-life adversity and sexual orientation disparities in psychiatric morbidity. *Child Abuse Negl* 2012;36:645–55.
- [19] Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) study. *Am J Prev Med* 1998;14:245–58.
- [20] Andersen JP, Blosnich J. Disparities in adverse childhood experiences among sexual minority and heterosexual adults: results from a multi-state probability-based sample. *PLoS ONE* 2013;8:e54691.
- [21] Austin A, Herrick H, Proescholdbell S. Adverse Childhood experiences related to poor adult health among lesbian, gay, and bisexual individuals. *Am J Public Health* 2016;106:314–20.
- [22] Dube SR, Anda RF, Felitti VJ, et al. Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span: Findings from the Adverse Childhood Experiences study. *JAMA* 2001;286:3089–96.
- [23] Bellis MA, Hughes K, Leckenby N, et al. Adverse childhood experiences and associations with health-harming behaviours in young adults: surveys in eight eastern European countries. *Bull World Health Organ* 2014;92:641–55.
- [24] Evans GW, Li D, Whipple SS. Cumulative risk and child development. *Psychol Bull* 2013;139:1342–96.
- [25] U.S. Census Bureau. Geography—Urban and Rural Classification. 2016. Available at: <https://www.census.gov/geo/reference/urban-rural.html>. Accessed September 1, 2017.
- [26] Balsam KF, Rothblum ED, Beauchaine TP. Victimization over the life span: a comparison of lesbian, gay, bisexual, and heterosexual siblings. *J Consult Clin Psychol* 2005;73:477–87.
- [27] Bos H, de Haas S, Kuyper L. Lesbian, gay, and bisexual adults: Childhood gender nonconformity, childhood trauma, and sexual victimization. *J Interpers Violence* 2016;1–20:Epub ahead of print.
- [28] D'Augelli AR, Grossman AH, Starks MT. Childhood gender atypicality, victimization, and PTSD among lesbian, gay, and bisexual youth. *J Interpers Violence* 2006;21:1462–82.
- [29] Saewyc EM, Skay CL, Pettingell SL, et al. Hazards of stigma: The sexual and physical abuse of gay, lesbian, and bisexual adolescents in the United States and Canada. *Child Welfare* 2006;85:195–213.
- [30] Corliss HL, Cochran SD, Mays VM, et al. Age of minority sexual orientation development and risk of childhood maltreatment and suicide attempts in women. *Am J Orthopsychiatry* 2009;79:511–21.
- [31] Corliss HL, Cochran SD, Mays VM. Reports of parental maltreatment during childhood in a United States population-based survey of homosexual, bisexual, and heterosexual adults. *Child Abuse Negl* 2002;26:1165–78.
- [32] Russell ST. Sexual minority youth and suicide risk. *Am Behav Sci* 2003;46:1241–57.
- [33] Ko SJ, Ford JD, Kassam-Adams N, et al. Creating trauma-informed systems: Child welfare, education, first responders, health care, juvenile justice. *Prof Psychol Res Pr* 2008;39:396–404.