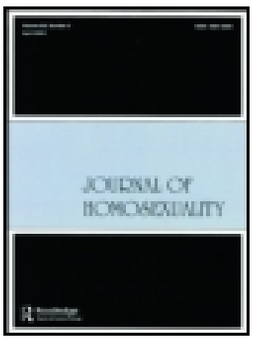

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Adverse Childhood Experiences, Suicidal/Self-Harming Thoughts, and Suicide Attempts Among LGB and Heterosexual Utahns

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ABSTRACT

Current research suggests that sexual minorities living in Utah may be at higher risk for experiencing suicidal/self-harming thoughts and suicide attempts than heterosexuals in Utah. However, to date no research has been conducted examining potential reasons sexual minorities living in Utah may be at higher risk. Using two representative samples of Utahns, we examine (a) disparities in adverse childhood experiences (ACEs) between sexual minorities and heterosexual Utahn, (b) how ACEs and sexual orientation may predict recent suicidal/self-harming thoughts and lifetime prevalence of suicide attempts, and (c) how sexual orientation and ACEs might interact to predict suicidal outcomes. Results with each sample showed that sexual minority Utahns reported higher levels of ACEs and suicidal/self-harming thoughts than heterosexual Utahns. Both sexual orientation and ACEs uniquely predicted suicidality when both were entered into regression models, but no interaction effects were found between these predictors.

KEYWORDS

LGB; Utah; suicide; adverse childhood experiences; sexual minority

Currently the tenth leading cause of death in the United States (Centers for Disease Control and Prevention [CDC], 2018), suicide has increased approximately 30% in the past decade (Stone et al., 2018). Furthermore, those who identify as lesbian, gay, or bisexual (LGB) report a higher prevalence of suicidal attempts than heterosexuals. For example, a recent meta-analysis of population-based surveys of adults found that 11% of adults who identify as LGB reported having attempted suicide at some time in their lives compared to 4% of heterosexuals (Hottes, Bogaert, Rhodes, Brennan, & Gesink, 2016). This study aims to better understand suicidal ideation and attempts by LGB individuals by focusing on representative surveys of adults from Utah, a state that ranks fifth the U.S. for deaths by suicide and has experienced a 47% increase in suicide deaths over the last decade (Stone et al., 2018). LGB adults living in Utah especially need empirical attention given these individuals are much more likely than other adults living in Utah to report suicidal/self-harming ideation and suicide attempts (McGraw, Peer, McManimen, Chinn, & Mahoney,

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2020). Furthermore, LGB Utahns report a history of suicide attempts three times higher than the typical rate of LGB adults in population-based samples (Hottes et al., 2016). In this study, we focus on the role that adverse childhood experiences and sexual orientation play in predicting suicidal/self-harming thoughts and suicide attempts by Utahns based on two representative surveys conducted in 2016 and 2018. The former survey assesses self-harm/suicidal thoughts and the latter survey assessed suicidal behavior. Specifically, we tested whether the association between higher total ACE score and suicidal thoughts or behaviors would be stronger for those who identify as LGB.

Suicide and sexual orientation in Utah

Utah ranks 5th in the nation for deaths by suicide and is part of the "suicide belt" with other western states with high rates of suicide (e.g., Montana, Idaho, Wyoming, and Arizona; Smith & Kawachi, 2014). Previous research suggests that Utah's relatively high rates of suicide may be related to greater access to firearms, the presence of rural communities, population density, and higher altitude (Betz et al., 2011; Brenner, Cheng, Clark, & Camargo, 2011; Haws et al., 2009; Hirsch & Cukrowicz, 2014; Irwin, Coleman, Fisher, & Marasco, 2014; Kim et al., 2011; Kious, Kondo, & Renshaw, 2018; Poon & Saewyc, 2009). An emerging new focus of research on adults and youth living in Utah has identified sexual orientation as another salient possible risk factor for suicide (Bridges, Tyler Lefevor, Schow, & Rosik, 2020; McGraw et al., 2020). For example, McGraw et al. (2020) found that adult Utahns who identify as LGB were substantially more likely than heterosexual Utahns to report suicidal/self-harming thoughts (14.3% vs. 4.3%; OR = 3.71) based on a 2016 representative survey of the state (i.e., Utah's Behavioral Risk Factor Surveillance System, BRFSS; Utah Department of Health). Also, in 2017, the BRFSS assessed suicide attempts, but not suicidal ideation, and LGB Utahns reported much higher odds of having ever attempted suicide (36.6% vs. 7.0%; OR = 7.66) and having made multiple suicide attempts (26.5% vs. 2.8%; OR = 12.49). Based on these two surveys, bisexual Utahns also reported higher prevalence of suicidal/self-harming thoughts and attempts than lesbian and gay Utahns (McGraw et al., 2020). Overall, adult LGB Utahns may be nearly three times more likely to attempt suicide compared to typical rates found for LGB adults in population-based samples (e.g., Hottes et al., 2016).

Adverse childhood experiences (ACEs), sexual orientation, and suicide

ACEs and suicide

One especially robust factor tied to suicidal ideation and attempts are more frequent adverse childhood experiences, otherwise known as ACEs. ACEs typically include experiences of childhood abuse (physical and sexual) and

household challenges (parent treated violently; substance abuse; parental incarceration, parental mental illness, or parental separation/divorce) (Felitti et al., 1998), which when endorsed and then aggregated together on ACE inventories, comprise one's "ACE score." In the largest examination of ACEs among adults in the United States, Giano, Wheeler, and Hubach (2020) found that nearly 60% of the individuals in the United States have experienced at least one ACE by age 18 (see also CDC, 2016; Merrick, Ford, Ports, & Guinn, 2018). Furthermore, meta-analyses and replication studies show that any given ACE increases the risk of suicide and suicidal ideation later in life (e.g., Devries et al., 2014; Dube et al., 2001; Merrick et al., 2017; Ng, Yong, Ho, Lim, & Yeo, 2018). Unfortunately, prevalence estimates also indicate that greater than 60% of the individuals with a history of ACEs report more than one ACE experience (Merrick et al., 2018, 2017). Furthermore, the more ACEs that individuals have experienced, the more likely they are to report suicidal ideation and attempts. For instance, in a nationally representative sample of U.S. adults (N = 9,421), Thompson, Kingree, and Lamis (2019) reported that compared to participants reporting zero ACEs, the odds of suicidal ideation increased 1.69 times for those endorsing one ACE, 2.31 times for those endorsing two ACEs, and 3.13 times for those with three or more ACE experiences. A similar pattern emerged for suicide attempts, with increasing odds as ACE score increased, compared to those with an ACE score of zero (Thompson et al., 2019).

Sexual orientation and ACEs

In general, sexual minorities are more likely to experience ACEs. For example, in an examination of BRFSS data from North Carolina, Washington, and Wisconsin, Austin, Herrick, and Proescholdbell (2016) found that sexual minorities were significantly more likely than their heterosexual counterparts to report each ACE category (e.g., physical, sexual, and emotional abuse, parental separation/divorce, adult mental illness in the home, adult substance use in the home, incarcerated household member, and violence between adults in the home). Unadjusted odds ratios for these discrepancies ranged from 1.69 (Adult substance abuse in the home) to 3.11 (sexual abuse). Similarly, Andersen and Blosnich (2013) found that LGB participants had nearly 1.7 and 1.6 times the rate of ACEs compared to heterosexuals. Furthermore, in their recent article, Giano et al. (2020) found that mean scores of ACEs were different for sexual orientation, with bisexual participants reporting the highest (3.01), followed by lesbian and gay participants (2.30), compared to heterosexual participants (1.53). Furthermore, a greater percentage of LGB participants endorsed each ACE category (e.g., emotional abuse) than heterosexual participants. For example, 58% of the bisexual participants reported having experienced emotional abuse, compared to 48% of the lesbian and gay participants and 33.7% of the heterosexual participants.

Sexual orientation as a moderator of ACEs and suicidal ideation & attempts

Theoretically, LGB individuals who experience maltreatment may interpret and internalize these experiences as a negative reflection of their being LGB (i.e., "I must have been abused because I am gay."). For example, Gold, Feinstein, Skidmore, and Marx (2011) found that for gay men, childhood physical abuse predicted higher levels of negative feelings toward their sexual orientation. Similarly, Gold, Marx, and Lexington (2007) found that gay male sexual assault survivors reported higher levels of negative feelings about their sexual orientation than community samples of gay men. Thus, it is possible that LGB individuals may interpret the maltreatment they experience (such as abuse) as being related to their sexual orientation, which may result in negative feeling about their LGB status.

Given that LGB adults may interpret and internalize negative events and maltreatment, it is possible that sexual orientation may moderate the relationship between ACEs and negative outcomes, like suicidal thoughts and attempts. This potential moderation effect may be particularly salient in Utah, where the Church of Jesus Christ of Latter-day Saints, a large conservative Christian denomination, has a significant presence and influence. By exploring potential moderation effects, we can test if ACEs are experienced differently for sexual minorities in Utah, which can help inform culturally competent care. If there are no moderation effects, we can determine that the connection between ACEs and suicide risk may act similarly, regardless of sexual orientation.

Previous studies have suggested the potential for sexual orientation to moderate the relationship between some adverse experiences and psychopathology. For example, while not examining ACEs specifically, Cramer, McNiel, Holley, Shumway, and Boccellari (2012), found that participant sexual orientation moderated the relationship between being the victim of various crimes and panic symptoms, as well as trauma history and anxiety symptoms. Sexual and gender minority victims reported stronger relationships between being victims of crimes and trauma histories with internalizing symptoms (e.g., panic and anxiety; Cramer et al., 2012). Cramer et al. (2012) suggested that it was possible that factors, such as internalized negative feelings toward one's sexual orientation (i.e., internalized homophobia) and heterosexist cultural influences, may both play important roles as to the moderation effect of sexual orientation on adverse experiences and psychopathology. Thus, when a person experiences self-loathing and stigma from others due to their sexual orientation, it may yield negative mental health symptoms (Herek et al., 2009).

To our knowledge, only one published study has examined the potential moderating effect of sexual orientation on ACEs and suicide (Clements-Nolle et al., 2018). Specifically, Clements-Nolle et al. (2018) found no significant interaction between sexual orientation and ACE scores with suicidal thoughts

and attempts, but LGB high school students did report higher levels of ACEs than their heterosexual peers. However, Clements-Nolle et al.'s study (Clements-Nolle et al., 2018) has important limitations that suggest more attention is needed to address whether ACE scores are more strongly linked to suicidal ideation or attempts for sexual minorities relative to heterosexuals given the moderator effects cited above in predicting other manifestations of psychopathology. First, their study did not include several events that are typically included when assessing ACEs in adult populations (e.g., incarceration of a family member or parental separation/divorce). This may have limited variability in the measures of ACE and the researchers' ability to detect a potential moderation effect. In addition, their sample was comprised of adolescents, some of whom may have been more likely to have withheld information about their sexual orientation to their peers and families. By contrast, adults who are older presumably have had more time and opportunities to internalize homophobic feelings, and a greater likelihood of having disclosed to their families, peers or religious community that they identified as a sexual minority in a cultural context with more widespread heteronormativity. Therefore, this potential moderation effect needs to be examined in an adult sample. Given these limitations, it is prudent that more research is done to examine any potential moderation effect of sexual orientation on ACEs and suicidal thoughts/attempts.

The current study

We sought to replicate and extend prior research on suicidal thoughts and attempts with a particular focus on the role of independent and interactive roles of sexual orientation and ACEs with participants in the fifth highest state for suicide in the United States (US)—Utah. Specifically, we first examined whether any differences between LGB and heterosexual Utahns emerged in total ACEs and each ACE category to establish if any disparities by sexual orientation exist in Utah. In addition, given that previous research using Utah's BRFSS demonstrated differences in suicide outcomes when comparing LGB Utahns (with bisexuals reporting higher numbers, see McGraw et al., 2020), we also sought to explore if there were any significant differences in ACEs and suicide attempt prevalence within sexual minority groups. Furthermore, we examined if sexual orientation and total ACE score would each uniquely predict suicidal/self-harming thoughts and suicide attempts above controls (e.g., demographics, previous diagnosis of depression) among all study participants. Finally, given the potential for sexual minorities to experience stronger effects of negative events, such as abuse, on psychopathology, we tested if sexual orientation moderated the relationship between ACEs and suicidal/self-harming thoughts and suicide attempts.

Methods

We used the 2016 and 2018 datasets from Utah's Behavioral Risk Factor Surveillance System (BRFSS; Utah Department of Health, 2016, 2018). The BRFSS is an annual nationwide survey collected by the US Centers for Disease Control and Prevention (CDC) in partnership with state health departments. BRFSS data are collected through a disproportionate stratified sampling of landline telephones and random sampling of cellular telephones. All participants are 18 years or older. Sampling and weighting procedures ensure that each state's data is a representative sample of non-institutionalized adults in the state.

Core items on the BRFSS include demographics, perceived overall physical and mental health, health behaviors, and chronic health issues. States are able to administer optional modules that explore special topics to their entire sample or subsets of their survey samples, such as ACEs, depression, and suicide attempts. The Utah's 2016 BRFSS dataset contained optional modules on ACEs and depression, including a question on recent suicidal or self-harming thoughts, to a subset of their survey sample. In addition, Utah's 2018 BRFSS dataset contained optional modules on ACEs and the lifetime prevalence of suicide attempts to a subset of their survey sample. We report the actual sample size, while sharing the weighted demographic characteristics.

Participant characteristics

2016 dataset

The total number of adult participants for the 2016 dataset was N = 10,988, with ages ranging from 18 to 99 (m = 44.47). The sample was also nearly evenly split in regard to sex at birth with 50.1% reported female participants (49.8% male). Eighty-six percent of participants identified as white and 87.6% identified as heterosexual. The majority of participants had some college or technical school training (39.2%), had a college or graduate degree (26.8%) or had a high school diploma (24.3%). Other demographic characteristics can be found in Table 1.

2018 dataset

The total number of participants for the 2018 dataset was N = 10,563, with ages ranging from 18 to 99 (m = 44.07). The sample was also nearly evenly split in regard to sex at birth with 49.9% reported female participants (49.7% male). Most participants identified as white (85.7%) and heterosexual (87.7%). The majority had some college or technical school training (38.7%), had a college or graduate degree (27.8%) or had high school diplomas (24.1%). Other demographic characteristics can be found in Table 1.

Table 1. Demographic characteristics 2016 & 2018 datasets.

	2016 dataset		2018 dataset	
Sample Characteristic	n^a	%[b]	n^a	%[b]
Gender				
Female	5879	50.1	5301	49.9
Male	5093	49. 8	5217	49.7
Marital status				
Never married	1381	20.5	1567	20.9
Married	7265	59.6	6781	59.3
Divorced	998	9.2	971	8.9
Widowed	914	4.6	718	4.7
Member of an unmarried couple	216	3.6	275	3.7
Highest educational level				
Elementary	121	2.5	148	2.5
Some high school	382	6.9	384	6.3
High school graduate	2780	24.3	2661	24.1
Some college or technical school	3667	39.2	3279	38.7
College graduate	3993	26.8	4039	27.8
Sexual Orientation				
Heterosexual	9877	87.6	9417	87.7
Lesbian/Gay	91	1.1	110	1.2
Bisexual	136	1.8	165	2.3
Race/Ethnicity				
White	10048	86.1	9464	85.7
African American	71	.9	84	1.0
American Indian/Alaskan Native	164	1.5	188	1.6
Asian	109	2.3	124	2.5
Pacific Islander	54	1.1	50	.7
Other	171	2.6	166	2.2
Multiracial	110	1.5	116	1.5

Total 2016 n = 10,988; Total 2018 n = 10,563. Participants mean age by dataset (2016 = 44.5; 2018 = 44.1).
[a]Taken from observed data. [b]Percentages are from weighted estimates.

Variables/measures

Independent variables

Sexual orientation. Both the 2016 and 2018 datasets contained a single demographic item asking about participant sexual orientation. We coded this variable dichotomously as either heterosexual or LGB. To test differences of ACEs and suicide attempts within sexual minorities, we also coded another variable as LG vs. B.

Adverse childhood experiences (ACEs). ACEs were measured through the ACEs questionnaire (Felitti et al., 1998). The ACEs questionnaire is an 11-item survey that examines the presence of four general types of ACEs during the time period before the participant was 18. These general types of ACEs include the presence of sexual abuse (e.g., "How often did anyone at least 5 years older than you or an adult, ever touch you sexually?"), physical abuse (e.g., "how often did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?"), witnessing domestic violence (e.g., How often did you parents or adults in your home ever slap, hit, kick, punch or beat each other up?"), and various aspects of household challenges (e.g., "were your parents separated or divorced?" or "did you live with anyone who was

a problem drinker or alcoholic?"). Items related to household challenges are dichotomized into either "yes" or "no," while witnessing domestic violence, sexual and physical abuse items have options such as "never," "once," or "more than once." ACE scores were calculated by summing each individual ACE category together and ranged from 0 to 11. Cronbach's Alpha for the 11-item ACEs questionnaire was acceptable for both the 2016 (a = .76) and 2018 (a = .77) samples.

Dependent variables

Suicidal/self-harming thoughts. From the 2016 dataset, we used a single item from the PHQ-9 (Kroenke, Spitzer, & Williams, 2001), which asks about the frequency of suicidal/self-harming thoughts in the last 2 weeks (e.g., "Over the last 2 weeks, how often have you had thoughts that you would be better off dead or of hurting yourself in some way?"). This variable was coded as a continuous variable from 0 to 14.

Lifetime prevalence of suicide attempts. From the 2018 dataset, we used a single item that asked about how many times participants had attempted suicide in their lifetime (e.g., "During your lifetime, how many times have you attempted suicide?"). Participant answers were coded dichotomously as either "never attempted vs. ever attempted" and as "single attempt vs. multiple attempts."

Control variables

Previous diagnosis of depression. To control for depressive symptoms we used a single item present in each dataset, which inquired if a participant had ever been diagnosed with a depressive disorder (e.g., "Has a doctor, nurse, or other health professional ever told you, you have a depressive disorder including depression, major depression, dysthymia, or minor depression?"). Previous depression diagnosis was coded as either "yes," "no," or "don't know or refused."

Additionally, age, race/ethnicity, and sex at birth were all used as control variables.

Analytical plan

Data analysis was conducted in Stata 16 statistical software. First, we examined data missingness and identified the appropriate method for addressing missing data. Second, negative binomial, logistic, and multinomial logistic regressions were performed to examine potential differences between LGB and heterosexual participants, and between LG and B participants, on ACEs and suicidal variables. Negative binomial and logistic regressions were performed to examine the relationship between total ACEs and sexual orientation on suicidal thoughts and attempts, with control variables. Moderation analyses were performed to examine if sexual orientation interacted with total ACEs on

suicidal thoughts and attempts. Simple slope analysis was also conducted on any statistically significant interactions. The appropriate weighting variable was applied to all inferential statistical tests. To reduce Type I error, we used .01 as the cutoff for statistical significance. Confidence intervals are also provided where possible.

Results

Preliminary statistics

Missing data

First, we examined missingness in the 2016 and 2018 dataset. In the 2016 dataset, 60.4% of individuals had missing data on at least one study variable; 56.0% were missing data on suicidal thoughts, 56.6% were missing data across all ACE questions, and 8.0% were missing data on sexual orientation. The participants with missing data were not significantly different on gender (p = .785), sexual orientation (p = .251), number of ACEs (p = .217), age (p = .690), or depression (p = .134). There was a significant difference by race/ethnicity (p = .008), such that Asian participants had the highest rate of missing data (70.6%) and multiracial participants had the lowest rate of missing data (58.2%).

In the 2018 dataset, 60.7% of individuals had missing data on at least one study variable; 8.6% were missing data on suicide attempts, 55.8% were missing data across all ACE questions, and 8.3% were missing data on sexual orientation. The participants with missing data were not significantly different on gender (p = .522), sexual orientation (p = .636), number of ACEs (p = .562), or age (p = .181).There was a significant difference by depression (p = .032), such that individuals with depression had a higher rate of missing data (61.0%) than individuals without depression (58.6%), and there was a significant difference by race/ethnicity (p = .007), such that ("Other") had the highest rate of missing data (70.5%) and ("Pacific Islander") had the lowest rate of missing data (56.0%). Thus, the data are likely missing at random (MAR), such that missingness is not associated with unobserved values after controlling for the observed variables (Lang & Little, 2018). When data are MAR, multiple imputation is recommended to predict missing values based on the available data (Lang & Little, 2018). We used multiple imputation with chained equations to impute 50 datasets each for the 2016 and 2018 data, and included all interaction terms in the imputation model (number of ACEs squared, sexual orientation by number of ACEs, and sexual orientation by number of ACEs squared) using the transform and then impute or just another variable, approach (Von Hippel, 2009). Afterward, we used Rubin's rules for combining imputed datasets to conduct analyses across all imputations to arrive at a single set of point estimates and inferential statistics for each analysis (Rubin, 1987).

Descriptive statistics

The average number of total ACEs per all study participants was 2.0 (2016) and 1.9 (2018). In addition, the presence of sexual and physical abuse, and witnessing domestic violence ACEs were relatively low (2016: M = .32, .22, .17; 2018: M = .30, .20, .17). Experiencing a troubled home was more common (2016: M = 1.1; 2018: M = .98). In addition, the vast majority of participants in the 2016 dataset had no suicidal/self-harming thoughts in the last 2 weeks (96%, M = .20).[1] Similarly, the large majority of participants in the 2018 dataset (92%) reported no suicide attempts in their lifetime, with 8% indicating any suicide attempt. Among those who had attempted suicide in their lives, half reported multiple attempts.

Inferential statistics

Differences in ACEs and suicide attempts by sexual orientation

Negative binomial, logistic, and multinomial logistic regressions were performed to examine potential differences between LGB and heterosexual participants, and between LG and B participants, on ACEs and suicidal variables. As hypothesized, LGB Utahns reported significantly higher levels of total ACEs, sexual abuse, physical abuse, witnessing domestic violence, experiencing troubled homes, and both suicidal/self-harming thoughts and suicide attempts, than their heterosexual counterparts (see Table 2). This remained true for both 2016 and 2018 samples. There was no statistically significant difference between lesbian/gay and bisexual participants on any of the ACEs, including total ACEs, for either sample.

LGB Utahns also reported higher lifetime prevalence of any suicide attempts compared to heterosexual Utahns (34% vs. 7%; OR = 6.73, SE = 1.26, $p < .001$, 95% CI [4.67, 9.71] see Table 2). There was no significant difference between LG and B participants, regarding any lifetime suicide attempts (p = .198).

ACEs predicting recent suicidal/self-harming thoughts

Negative binomial regressions were performed to examine the relationship between total ACEs on suicidal/self-harming thoughts, with control variables. There was a significant main effect of sexual orientation (IRR = 3.32, SE = 1.72, $p < .023$; 95% CI [1.19, 9.26]) and total ACEs on recent suicidal/self-harming thoughts (IRR = 1.25, SE = 0.07, $p < .001$; 95% CI [1.12, 1.38]). In addition, previous diagnosis of depression was the only significant control variable in the model (IRR = 4.97, SE = 1.20, $p < .001$; 95% CI [3.09, 7.99]). Race and sex at birth were not significant (see Table 3).

Table 2. Comparison of ACEs and suicidal variables by sexual orientation.

	Heterosexual		Sexual Minority (LGB)		
Measure	*M*	*SE*	*M*	*SE*	*t*
		2016			
Total ACEs	1.9	.05	4.8	.43	9.49***
Sexual Abuse	.29	.02	1.0	.15	7.83***
Physical Abuse	.21	.02	.41	.06	4.85***
Witnessing Domestic Violence	.16	.01	.48	.06	5.20***
Troubled Home	1.0	.03	2.6	.25	9.00***
Suicidal/Self-harming Thoughts	.16	.02	1.5	.52	6.26***
		2018			
Total ACEs	1.8	.04	4.1	.32	10.05***
Sexual Abuse	.28	.01	.80	.11	7.27***
Physical Abuse	.19	.01	.40	.05	5.17***
Witnessing Domestic Violence	.16	.01	.36	.05	5.14***
Troubled Home	.93	.03	2.2	.19	9.58***
Lifetime Suicide Attempts	.07	.003	.35	.04	10.77***

***$p < .000$.

ACEs predicting lifetime suicide attempts

There was a significant main effect of sexual orientation ($OR = 2.58$, SE = 0.59, $p < .001$; 95% CI [1.65, 4.03]) and total ACEs on the lifetime prevalence of any suicide attempt ($OR = 1.36$, SE = 0.03, $p < .001$; 95% CI [1.30, 1.43]), even after controlling for age, sex, race, and previous diagnosis of depression. Both previous diagnosis of depression and age were significant controls (see Table 3). Previous diagnosis of depression also had a larger effect than total ACEs ($p < .001$). In addition, total ACEs predicted the lifetime prevalence of multiple suicide attempts, even with controls ($RRR = 1.10$, SE = 0.04, $p = .005$; 95% CI [1.03, 1.18]; See Table 3). Sexual orientation was not a significant predictor of

Table 3. Negative binomial, logistic regression & multinomial logistic analysis on suicidal/self-harming thoughts & suicide attempts.

				$CI_{95\%}$ for *b*	
Predictor	*IRR/OR/RRR*	SE	*p*	Lower	Upper
2016 data					
	Suicidal/Self-Harming Thoughts				
Age	1.00	0.01	.761	0.99	1.02
Sex (reference = male)	0.75	0.22	.337	0.42	1.35
Diagnosed w/Depression	4.97	1.20	<.001	3.09	7.99
Sexual Orientation (reference = heterosexual)	3.32	1.72	.023	1.19	9.26
Total ACEs	1.25	0.07	<.001	1.12	1.38
2018 data					
	Any Suicide Attempt				
Age	.99	.003	.000	.97	.99
Sex	.87	.11	.237	.68	1.10
Diagnosed w/Depression	4.3	.54	.000	3.37	5.50
Sexual Orientation	2.58	.59	<.001	1.65	4.03
Total ACEs	1.36	.03	< .001	1.30	1.42
	Multiple Suicide Attempts				
Age	.99	.01	.199	.98	1.00
Sex	.94	.19	.744	.63	1.38
Diagnosed w/Depression	2.01	.45	.002	1.29	3.12
Sexual Orientation	.98	.31	.941	.53	1.81
Total ACEs	1.10	.04	.006	1.03	1.19

multiple attempts (p = .941), but previous diagnosis of depression was (*RRR* = 2.01, SE = 0.45, p = .002; 95% CI [1.29, 3.12]).

Sexual orientation as a moderator

We ran a negative binomial regression to test the potential moderating effect of sexual orientation on total ACEs and recent suicidal/self-harming thoughts. Sexual orientation did not moderate the relationship between total ACEs and recent suicidal/self-harming thoughts (*IRR* = 1.03, SE = 0.16, p = .869; CI 95% [0.75, 1.40]), while total ACEs (*IRR* = 1.22, SE = 0.07, p = .001; 95% CI [1.09, 1.36]) and a history of depression diagnosis (*IRR* = 0.21, SE = 0.05, p < .001; 95% CI [0.13, 0.34]) remained significant predictors (see Table 4).

Likewise, when examining the potential moderation effect of sexual orientation with total ACEs and any suicide attempts, we did not find a significant interaction (*OR* = 1.09, SE = 0.11, p = .399; 95% CI [0.89, 1.34]). Additionally, there was no significant moderating effect of sexual orientation on total ACEs and multiple suicide attempts (*RRR* = 1.11, SE = 0.14, p = .391; 95% CI [0.87, 1.42]; See Table 4).

Table 4. Negative binomial, logistic and multinomial logistic regression analyses of moderation effect of sexual orientation on suicidal/self-harming thoughts & suicide attempts.

				$CI_{95\%}$ for *OR/RRR*	
Predictor	*IRR/OR/RRR*	SE	p	Lower	Upper
2016 data					
	Suicidal/Self-Harming Thoughts				
Age	1.00	0.01	.599	0.99	1.02
Sex (reference = male)	0.75	0.22	.330	0.42	1.34
Diagnosed w/Depression	4.69	1.14	<.001	2.00	7.60
Sexual Orientation	2.88	2.56	.238	0.49	16.84
Total ACEs	1.22	0.07	<.001	1.09	1.36
Sexual Orientation*Total ACEs	1.03	0.16	.869	.75	1.40
2018 data					
	Any Suicide Attempt				
Age	0.99	0.004	<.001	0.98	0.99
Sex (reference = male)	0.86	0.11	.229	0.68	1.10
Diagnosed w/Depression	0.23	0.03	<.001	0.18	0.30
Sexual Orientation	1.91	0.93	.185	0.73	5.00
Total ACEs	1.35	0.03	<.001	1.29	1.42
Sexual Orientation*Total ACEs	1.09	0.11	.399	0.89	1.34
	Multiple Suicide Attempts				
Age	0.99	0.01	.212	0.98	1.00
Sex (reference = male)	0.93	0.19	.727	0.63	1.38
Diagnosed w/Depression	0.50	0.11	.002	0.32	0.78
Sexual Orientation	0.60	0.40	.439	0.16	2.19
Total ACEs	1.09	0.04	.014	1.02	1.17
Sexual Orientation*Total ACEs	1.11	0.14	.391	0.87	1.42

Discussion

The current study examined the effects of adverse childhood experiences (ACEs) and sexual orientation on suicidal/self-harming thoughts and behaviors in adulthood within Utah using data from the BRFSS. Utahns identifying as LGB reported more ACEs than heterosexual Utahns, but there was no difference within sexual minorities. Similar results were found with regard to lifetime suicide attempts. As expected, sexual orientation and total number of ACEs predicted suicidal/self-harming thoughts and suicide attempts. However, we did not observe a moderating effect of sexual orientation on the relationship between ACEs and suicidal/self-harming thoughts and attempts. These findings are consistent with prior literature documenting the impact of ACEs on future risk for suicide in the general population and specific to the LGB population (Felitti et al., 1998; Mustanski, Andrews, & Puckett, 2016). Previous research has found that LGB adults in Utah were more likely to report suicidal/self-injurious thoughts and previous suicide attempts than other population samples across the United States and Canada (see Hottes et al., 2016; McGraw et al., 2020). The current findings also suggest that LGB Utahns report experiencing more ACEs than LGB adults around the nation (see Giano et al., 2020).

Given the high levels of ACEs and suicidal thoughts and behaviors by LGB Utahns, it is important that suicide prevention efforts be specific to the unique challenges this population may face within Utah families. For example, while this study was unable to examine any potential associations with religious affiliation, specifically those associated with the Church of Jesus Christ of Latter-day Saints, sexual minorities connected with this faith tradition have previously reported low levels of parental support and high levels of rejection from their families (see Mattingly, Galliher, Dehlin, Crowell, & Bradshaw, 2016) and family uses of religion against their sexual minority children has been found to be associated with suicidal thoughts and behaviors (Gibbs & Goldbach, 2015; McGraw, 2020). As family support has been previously shown to be a protective factor and sexual orientation did not moderate the effects on suicidal thoughts and behaviors in the current study, interventions should begin during childhood with a focus on building a safe, welcoming family and social environment for Utah youth, regardless of sexual orientation (Eisenberg & Resnick, 2006). In addition, while the current study is only able to discuss these dynamics in the context of Utah, other adjacent western states (e.g., Idaho and Arizona) each have sizable LDS populations, which suggests that some of these dynamics may be present. Future studies should examine how these dynamics may or may not generalize to other similar western states.

As the current research was cross-sectional, we were unable to make any causal inferences for why individuals identifying as a sexual minority were more likely to report ACEs. However, it is possible that childhood actions such

as gender stereotype nonconformity or expression of sexuality was associated with increased abuse or neglect as indicated by prior literature (Bos, de Haas, & Kuyper, 2019; Saewyc et al., 2006). Therefore, it is also important that any early intervention programs emphasize acceptance within the family and the broader society. These types of interventions should also utilize a cultural humility approach as it will help to create a strong, trusting alliance with the provider, which may help to increase help-seeking behaviors and reduce discrimination within the healthcare setting (Goldbach, Rhoades, Green, Fulginiti, & Marshel, 2019; Mosher et al., 2017; Pachankis, 2014). This approach would include normalizing and validating the ACEs, empowering communication, and facilitation of building supportive relationships.

This study has several limitations. Firstly, the wording of the suicide ideation question of the BRFSS conflates suicide ideation and non-suicidal self-injury (NSSI) ideation. In addition to being at an elevated risk for suicidal ideation, identifying as a sexual minority is also associated with an increased risk for engaging in NSSI (Batejan, Jarvi, & Swenson, 2015). Furthermore, research has indicated that at least 40% of respondents in the National Comorbidity Study who reported attempting suicide had no intent to die (Nock & Kessler, 2006). Thus, conflation of suicide ideation and behaviors with non-suicidal ideation and behaviors likely occurred and the results of the study should be interpreted in light of this. However, some research has indicated NSSI may be a stronger predictor of future suicide attempts than prior attempt history (Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer, 2011). Given this finding, the current study's results still serve as an important finding for suicide prevention with sexual minorities as NSSI ideation may serve as a proxy for suicidal ideation when conflated and both contribute to suicide risk.

Another limitation is the nature of the ACEs questionnaire in that it assesses for the presence of a type of adverse childhood experience rather than the frequency or severity of those experiences. Hodgdon et al. (2018) explored characteristics of psychological maltreatment, physical and sexual abuse including the different types of events, the age of onset, and the proportion of life during which the events were experienced. They found that experiencing more types of maltreatment was related to worse mental health outcomes, but they also noted that other characteristics such as the individual's age, the number of perpetrators, and duration of exposure also significantly influenced mental health. Additionally, the ACE questionnaire does not assess for other avenues of discrimination and adverse experiences reported by LGB individuals including peer victimization or religious discrimination (Gibbs & Goldbach, 2015; Hatzenbuehler, 2011).

In addition, while we did use survey weights and missing data techniques, the sample of sexual minorities in our study was relatively small (2016: $n = 227$; 2018: $n = 275$). The failure to detect any interaction effects may be the product of these small samples. Finally, the current study was unable to assess for discriminatory experiences during adulthood due to the nature of the BFRSS data collection.

Research has demonstrated an association between worst point suicide ideation and discrimination for sexual and gender minority adults (Salentine, Hilt, Muehlenkamp, & Ehlinger, 2020). Future research should further explore the ways in which ACEs, both within the family and within the broader society, may predispose someone to be vulnerable to suicide risk. Additionally, efforts should involve a multivariable approach that combines these childhood adversities with the adversities experienced during adulthood to gain a thorough understanding of how these factors interact to increase suicide risk.

In light of these limitations, the current study adds to our understanding of the relationships between ACEs, sexual orientation, and suicidal/self-harming thoughts and behaviors. The absence of a moderating effect suggests that sexual orientation and ACEs have unique contributions to suicide risk, but more research is needed in this area. Furthermore, as suicide prediction efforts often focus on singular risk factors but fail to increase predictive capabilities (Franklin et al., 2017; U.S. Department of Health and Human Services [HHS] Office of the Surgeon General and National Action Alliance for Suicide Prevention, 2012), it is important to continue investigating the complex relationships between known risk factors on an individual's risk for suicide. This network approach will allow researchers and clinicians to more accurately identify individuals at risk for developing suicidal thoughts and allow for the development of appropriate, targeted interventions, which may help to reverse the observed trend of increasing suicide rates across the country.

Conclusion

The present study demonstrated in a representative sample of adult Utahns that participants identifying as a sexual minority endorsed more ACEs suicidal/self-harming thoughts and lifetime suicide attempts. Additionally, the total number of ACEs and sexual orientation predicted suicidal/self-harming thoughts and suicide attempts. However, there was no moderation effect between total ACEs and sexual orientation in predicting suicidal/self-harming thoughts and suicide attempts. This study is consistent with the existing body of research and suggests that childhood adversity, is a risk factor associated with suicidal behavior and that this effect is especially potent for individuals identifying as a sexual minority. These results also replicate previous research suggesting the absence of a moderation effect of ACEs and suicidal thoughts/attempts. These results have important implications for the assessment and prevention of suicidal risk for both future research and clinical practice. Future research should continue investigating the unique effects of ACEs predicting suicidal behaviors within sexual minority populations. Clinicians and professionals working with sexual minority individuals should be aware of these potential effects, specifically when assessing for suicidal risk, and integrate treatment plans to address ACE individuals may have experienced.

Note

1. Percentage based off of unweighted estimates, with data imputation.

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