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Associations of Multiple Violence Victimization Experiences with Risky Drinking Among Adolescents Living on or Near American Indian Reservations

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Abstract

Violence victimization can increase risk for adolescent alcohol misuse. However, prior research has typically examined either specific victimization experiences in isolation or has summed multiple such experiences into a simple count score, often within general population samples. Existing studies are limited because victimized youth tend to experience multiple types of violence that vary considerably in severity, particularly among those from minoritized and underprivileged groups. This study examines which of several violence victimization experiences are related to risky drinking while testing for sex differences in a large sample of American Indian (AI) youth who live on or near AI reservations. Secondary analyses of cross-sectional cohort data collected from AI adolescents (*n* = 3,498; 50.5% male) living on or near AI reservations from 2009 to 2013 were conducted. Violence victimization experiences (beaten up, threatened with a weapon, hurt with a weapon, sexually assaulted, and robbed) were examined as predictors of latent risky drinking (LRD), indicated by drinking frequency, heavy episodic drinking (HED), and drunkenness. Multiple group structural equation modeling by sex was conducted, adjusting for demographic factors and frequency of alcohol use. Being beaten up, hurt with a weapon, and sexually assaulted had significant positive adjusted associations with LRD. No sex differences were found for any type of violence victimization in relation to LRD. Culturally sensitive screening and referral initiatives may help support vulnerable youth, including AI youth, to prevent alcohol misuse following severe victimization experiences.

1. Introduction

Adolescent alcohol use is prevalent and not equally distributed across racial/ethnic groups (Miech et al., 2023; Stanley & Swaim, 2015). To illustrate, 39.7% and 22.9% of AI eighth graders in the United States reported ever using alcohol and ever being drunk, respectively; corresponding percentages over the same time frame among eighth graders in the nationally representative Monitoring the Future study were 22.8% and 8.6% (Swaim & Stanley, 2018). By the 12th grade, these differences had disappeared. Of course, the presence of any group differences in alcohol involvement must be understood in light of broader contexts that for minoritized youth are characterized by economic deprivation, structural racism, and historical trauma (Skewes & Blume, 2019). Still, alcohol use is concerning for all adolescents because it compromises psychosocial functioning, disrupts ongoing brain maturation, and increases the likelihood of developing alcohol use disorders and related psychiatric conditions (Bonomo et al., 2001; Couture et al., 2022; Squeglia et al., 2009; Volkow et al., 2014; Yang & Golshirazi, 2024).

Contexts of marginalization and structural disadvantage place minoritized youth at risk for many health-related concerns, including violence victimization. For instance, AI youth are significantly more likely to be the victims of several types of violence compared to other youth (Centers for Disease Control and Prevention, 2025). In all youth, violence exposure causes personal suffering and is a risk factor for numerous adverse outcomes (Turanovic, 2022), including underage drinking (Kaukinen, 2002; King et al., 2014; Niño et al., 2016).

Studies have established positive links between specific types of violence examined in isolation, such as bullying, and adolescent alcohol-related outcomes (Gaete et al., 2017; Topper et al., 2011; Williams et al.,

2020). This narrow focus is limiting because victimized youth often are exposed to multiple types of violence. Among the fewer studies to simultaneously consider different types of violence exposures, it has been common to use a single summary score (Andreescu & Overstreet, 2022; Thompson et al., 2008). For example, in a study using Add Health data (Turanovic & Pratt, 2015), adolescent violence victimization was operationalized as a dichotomous variable indexing the presence or absence of at least one of three violent experiences (e.g., getting "jumped"). Also using Add Health data, another study created a variety index by summing dichotomous violence victimization items into a count of the number of violent exposures (Turanovic & Pratt, 2017). In both studies, violence victimization was positively associated with various outcomes, including alcohol problems. Likewise, adverse childhood experiences (ACEs), operationalized as a variety index that assesses household adversities (e.g., poverty, parental incarceration) and includes selected violence exposure items (e.g., sexual abuse), is a risk factor for adolescent alcohol outcomes (Dube et al., 2006; Kelly et al., 2023), such as sipping behavior in early adolescents (Nagata et al., 2023).

Although informative, prior studies examining multiple types of violence victimization and adolescent alcohol misuse have weaknesses. For example, by counting the number of different types of violent experiences, the use of a variety index provides no information about specific exposures. To illustrate, all combinations of two violent acts, whatever they might be (e.g., robbed/sexually assaulted, bullied/threatened), receive the same score (i.e., a 2) and are weighted equally in a variety index, thereby masking differences in the severity of experiences.

AI youth bear a disproportionate burden of the costs resulting from violence victimization and risky drinking and have been underrepresented in research. To help fill this research gap, Turanovic and Pratt (2017) analyzed data from the subset of AI youth (n = 558) from the Add Health study, finding that an adolescent violence victimization variety index, ranging from 0–4, was correlated positively with alcohol problems (r = .24, p < .05); however, the relationship was statistically non-significant in an adjusted analysis. This study was informative but limited by examining only a count of the number of violence exposures. Additionally, by targeting AI adolescents drawn from a general population sample, the study was further limited by overlooking youth who live on or near AI reservations. This is a significant weakness because reservations and surrounding areas are important contexts characterized by unique risks (e.g., isolation, poverty) and strengths (e.g., cultural and social traditions) that have implications for understanding violence victimization and preventing its adverse consequences.

Drawing from the same dataset as we do in the current study, Phelan (2023) found that sexual assault had a statistically significant positive relationship with past 30-day alcohol use, even after adjustment for covariates, in a sample of adolescents living on or near AI reservations. However, additional violence victimization experiences were not considered, and the outcome did not measure more problematic alcohol involvement that places youth at increased risk for adverse outcomes. Moreover, although sex (assigned at birth) was included in the Phelan (2023) analyses as a covariate, a potential sex difference in the strength of the relationship between sexual assault and alcohol use was not tested. The consequences of violence victimization experiences for drinking might differ for females and males (Leban, 2021). For example, Pinchevsky et al. (2013) found that frequent binge drinking was more likely among females who reported at least one of six types of violence victimization compared to their male counterparts. In

summary, previous studies on adolescent violence victimization have typically examined single types in isolation or used broad variety indices that count the number of exposures, thereby failing to elucidate the unique, adjusted associations of multiple violence victimization experiences with alcohol use. Also, given the potential for sex differences in these associations, understanding the role of biological sex is crucial for determining how to optimally tailor alcohol misuse preventive interventions for females and males (Lowik et al., 2024).

Consistent with many prior studies in this area of research, our analyses are theoretically guided by stress-coping and self-medication frameworks (Cooper et al., 1995; Khantzian, 1997). Coping and self-medication theories hypothesize specific mechanisms by which trauma-exposed individuals may use alcohol to escape negative affect (negative reinforcement) and to alleviate hyperarousal or intrusive symptoms (Cooper et al., 1995; Khantzian, 1997). Over time, repeated distress-driven drinking can dysregulate key stress-response systems, such as the hypothalamic–pituitary–adrenal (HPA) axis, increasing risk for hazardous use (Blaine & Sinha, 2017; Sinha, 2008). According to these frameworks, individuals can turn to risky drinking as an attempt to cope with the feelings of depression, anxiety, and stress that often result from experiencing violence (Jenkins et al., 2026), leading to significant positive associations between victimization experiences and risky drinking measures. These processes may be particularly acute in the AI population, as suggested by Indigenist Stress Coping theory. The Indigenist Stress-Coping theory identifies traumatic life stressors, including historical trauma, contemporary oppression, racism and discrimination, child maltreatment, violent crime, and unresolved historical loss and grief, as being associated with adverse health outcomes, including substance use. This framework supports the expectation that exposure to violence and other traumatic stressors increases the risk of negative health outcomes, including risky drinking behaviors (Walters et al., 2002).

To date, theory has not progressed so far as to explain which of several violence victimization experiences may be stronger risks for adolescent risky drinking. However, because severe stressors elicit stronger stress responses, it can be anticipated that certain victimization experiences may have stronger links to alcohol involvement. In particular, sexual assault is a uniquely psychologically and emotionally traumatic form of interpersonal violence. Among common forms of interpersonal violence, sexual assault is most likely to produce chronic, severe posttraumatic stress disorder (PTSD) due to the profound violation of bodily integrity and autonomy (Dworkin et al., 2021; Thomas et al., 2024). Thus, sexual assault is associated with high rates of PTSD and strongly linked to maladaptive coping behaviors, including alcohol use (Dworkin et al., 2021; Stappenbeck et al., 2023; World Health Organization, 2024). Alcohol use may begin as a voluntary, avoidant coping strategy to escape negative affect. In this way, alcohol temporarily normalizes these systems, but as tolerance develops, the person experiences withdrawal-induced hyperarousal and cravings that are driven by brain stress circuits (e.g., extended amygdala; Centanni et al., 2019). At this stage, drinking is no longer just “coping” but rather a physiologically driven compulsion or craving that feels automatic and involuntary. Risky drinking after sexual assault can involve both psychological coping and neurobiological craving, which many researchers conceptualize as “self-medication” that transitions into addiction (Guggisberg, 2012; Miranda et al., 2002).

These general mechanisms may be magnified in populations with elevated trauma burden, including AI adolescents who also experienced historical trauma and ongoing colonization (Walters et al., 2002). Research consistently shows that AI adolescents experience higher rates of sexual violence compared to their peers from other racial and ethnic groups (Kirk-Provencher et al., 2020). This group also reports significantly higher rates of alcohol use and substance-related problems (Edwards et al., 2021; Kirk-Provencher et al., 2020). When considered through the lens of historical and intergenerational trauma, the burden of sexual assault trauma among AI adolescents can be directly compounded by this collective historical pain (Brave Heart et al., 2011; O'Neill et al., 2018).

Guided by this background and these theoretical frameworks, the current study examines multiple violence victimization experiences in relation to risky drinking in a sample of AI adolescents living on or near AI reservations. Tests of potential sex differences in the presence and strength of the relationships between violence victimization experiences and the outcome also are conducted. Analyses rigorously adjust for all violence victimization experiences as well as demographic characteristics and frequency of alcohol use. The analyses are largely exploratory; however, based on prior research (e.g., Phelan, 2023; Pinchevsky et al., 2013), we expected that sexual assault, in particular, would have a statistically significant positive association with risky drinking that might be stronger for females than males.

2. Method

2.1 Participants and Procedures

We conducted secondary analyses of publicly available cross-sectional cohort data from the Drug Use Among Young American Indians Study (Swaim & Stanley, 2018), an annual surveillance study of AI and other youth living on or near AI reservations in the United States. The data were obtained from the Inter-university Consortium for Political and Social Research (ICPSR) repository (Swaim & Stanley, 2018), specifically through its National Archive of Computerized Data on Aging (NAHDAP) and specialized studies, which serves as a primary repository for AI substance use data. We used the data collected from annual in-school, self-report surveys between the years 2009–2013 on 5,744 students in Grades 7–12 in five regions (Northwest, Northern Plains, Upper Great Lakes, Southeast & Texas, Southwest). These regions were defined in the original study design and represent the full geographic scope of the dataset. No regions were excluded from the present analyses. Adolescents were included in the analysis sample if they identified as AI (*n* = 3,498). The lead university's institutional review board determined that this study did not constitute human subjects research due to the analysis of publicly available, deidentified data.

2.2 Measures

In the original study, data were collected using the American Drug and Alcohol Survey (Dieterich et al., 2013; Stanley et al., 2014) and the Prevention Planning Survey (PPS), refined and validated for use with diverse youth living on or near AI reservations.

Dependent Variable: LRD. A latent variable for risky drinking was estimated based on three indicators capturing multiple alcohol use behaviors (α = .76). First, frequency of drinking is measured by a question of

having used alcohol in the last 12 months. The categories for alcohol frequency were 0 = none, 1 = 1–2 times, 2 = 3–9 times, 3 = 10–19 times, 4 = 20–49 times, 5 = 50 times or more. Second, HED is defined as consuming 5 or more standard drinks for men and 4 or more for women within a short period (Wechsler et al., 2003). The categories for HED in the last two weeks were 0 = none, 1 = once, 2 = twice, 3 = three times, 4 = four times, 5 = five times, 6 = six times, 7 = seven times, 8 = eight times, 9 = 9 times, 10 = ten or more times. Third, past month drunkenness referred to the number of times getting drunk in the past month. The categories for past month drunkenness were 0 = none, 1 = one or two times, 2 = three to nine times, 3 = ten to twenty times, 4 = twenty or more times.

Independent Variables: Violence Victimization. Five items from the PPS measured ever being beaten by a peer/someone else, scared with a weapon, hurt with a weapon, robbed, or sexually assaulted on a 4-point response scale: 1 = Never, 2 = 1–2 times, 3 = 3–5 times, and 4 = 6+ times. Repeated victimization was rare in the sample, resulting in low frequency counts; therefore, all items were dichotomized to represent the presence (1) or absence (0) of each victimization experience.

Covariates. Adolescents provided demographic information about themselves, including their age and biological sex assigned at birth (1 = male, 0 = female), which was included as a covariate and was also used to define groups for multiple group analyses. It is also noteworthy that by design, socio-economic indicators were not collected as a part of the study.

2.3 Data Analyses

Analyses were conducted in three stages. First, a full sample structural equation model (SEM) was estimated in Mplus 9.0 to examine the independent contributions from the five violence victimization experiences to LRD in the full AI sample, adjusting for each experience and for the covariates. Second, cross-group invariance of the LRD factor was evaluated via multiple group confirmatory factor analysis (CFA) simultaneously in both male and female groups without inclusion of the covariates or outcomes, testing for configural and metric invariance of the measurement model (Dimitrov, 2010). After establishing measurement invariance in LRD for females and males, a multiple group SEM was estimated in Mplus to compare associations between five violence victimization experiences and risky drinking by sex of the youth participant. Group differences in the path coefficients were tested with the Satorra-Bentler Scaled Chi-Square (Satorra & Bentler, 2010) via a series of parameter constraints, where the usual chi-square statistic (which assumes a normal distribution) is divided by a scaling correction to better approximate chi-square with a non-normal distribution. Specifically, equality constraints were used to constrain each path, in turn, to be equal for females and males. The fit of a model without constraints on the path estimates was then compared with the fit of each nested model (i.e., more restrictive model with an equality constraint) via the Satorra-Bentler scaled chi-square difference test.

Analyses used the maximum likelihood-robust (MLR) estimator with standard errors and a chi-square test that are robust to non-normality of observations in the outcome variable. All exogenous variables in the model were also correlated to improve missing data estimation and reduce bias. There was a small amount of missing data on violence victimization predictors and covariates ranging between 10% and 11% (see Table 1). The full information maximum likelihood (FIML) approach to missing data used by the MLR

estimator in Mplus preserved the full analysis sample without loss of cases (Enders, 2022). All models accounted for nesting of students within schools via Mplus' cluster option and Type = Complex using the dataset's ulocation variable.

Table 1

Descriptive Statistics of the Analytic Variables

Variable						Females		Males	
	N	Min	Max	Mean/%	SD	Mean/%	SD	Mean/%	SD
Violence Victimization Experiences									
Beaten by peer/other	3100	0	1	30.8		27.5		34.6	
Scared with a weapon	3065	0	1	12.9		9.6		16	
Hurt with a weapon	3070	0	1	9.9		6.5		13.3	
Sexually assaulted	3070	0	0	10.6		17		4.4	
Robbed	3068	0	0	14		12.4		15.7	
Risky Drinking Indicators									
Heavy Episodic Drinking	3358	0	10						
none				83.0		80.8		85.2	
once				6.0		6.5		5.6	
2 times				3.2		3.6		2.7	
3 times				2.7		3.6		1.8	
4 times				1.8		2.2		1.4	
5 times				1.0		1.3		0.8	
6 times				0.5		0.5		0.5	
7 times				0.5		0.2		0.7	
8 times				0.1		0.2		0.4	
9 times				0.3		0.2		1.0	
10 or more times				0.9		0.8		1.4	
Past Month Drunkenness	3214	0	4						
none				81.8		80.1		83.2	
1–2 times				12.1		13.6		10.8	

Variable						Females		Males	
	N	Min	Max	Mean/%	SD	Mean/%	SD	Mean/%	SD
3–9 times				4.4		4.8		4.2	
10–19 times				1.0		1.2		0.7	
20 times or more				0.7		0.4		1.1	
Alcohol frequency (12 months)	3438	0	5						
none				51.6		45.9		57.4	
1–2 times				20.7		22.3		19.0	
3–9 times				15.5		19.1		12.0	
10–19 times				6.3		7.3		5.4	
20–49 times				3.3		3.5		3.2	
50 times or more				2.5		1.9		3.0	
Covariates									
Adolescent Age	3490	10	21	14.76	1.7	14.8	1.7	14.7	1.69
Sex (male)	3380	0	1	50.5					

Following recommendations by Flora, Crone, and Bell (2025), we interpret completely standardized regression coefficients as effect-size measures. A standardized coefficient reflects the expected change in the outcome (in standard deviation units) for a one-standard-deviation change in the predictor, providing information about the substantive magnitude of associations. Statistical inference (i.e., *p*-values and confidence intervals) is based on the corresponding unstandardized parameter estimates, as is customary in structural equation modeling (Flora et al., 2025). Standardized estimates are presented solely to aid interpretation of effect sizes and to enable comparability of coefficients across groups in our multigroup STEM model.

3. Results

3.1 Descriptive Statistics

Descriptive statistics for the study variables are reported in Table 1. The analytic sample (*n* = 3,498) consisted of adolescents who were on average 14.76 years old (SD = 1.70) In terms of victimization experiences, 38.4% of the total sample reported experiencing at least one. Males had higher prevalence of being beaten by peer/other (34.6% vs 27.5%, $t(2966) = -5.78$, $p < .001$), robbed (15.7% vs 12.4%, $t(2964) =$

-3.56, $p < .001$), scared with a weapon (16% vs 9.6%, $t(2961) = -6.42$, $p < .001$), and hurt with a weapon (13.3% vs 6.5%, $t(2965) = -7.42$, $p < .001$) compared to females, whereas females had higher prevalence of being sexually assaulted (17% vs 4.4%, $t(2967) = 11.52$, $p < .001$) compared to males. Approximately 17% of adolescents reported one or more HED experiences in the last two weeks, and about 18.20% reported being drunk one or more times in the last month, 48.4% reported using alcohol frequency of more than one time in the last month. Correlations among all measured variables are presented in Table 2. The three risky drinking indicators, HED and being drunk, were positively associated with every victimization experience. Male sex was significantly associated with both HED and being drunk.

Table 2
Correlations Among Analytic Variables

1		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Heavy Episodic Drinking	**1**	**.639****	**.523****	**.148****	**.086****	**.188****	**.137****	**.078****	**.070****
2	Being drunk last month	.680**	1	.637**	.165**	.068*	.141**	.113**	0.010	.101**
3	Alcohol Frequency	.511**	.658**	1	.170**	.087**	.146**	.145**	.078**	.200**
4	Beaten by peer/other	.111**	.134**	.201**	1	.241**	.237**	.177**	.187**	-0.042
5	Scared with a weapon	.095**	.092**	.178**	.315**	1	.487**	.246**	.218**	-0.024
6	Hurt with a weapon	.143**	.140**	.231**	.354**	.486**	1	.208**	.227**	-0.002
7	Sexually assaulted	.066*	.064*	0.018	.093**	.132**	.160**	1	.226**	0.032
8	Robbed	0.040	0.048	.131**	.256**	.306**	.315**	.136**	1	0.010
9	Adolescent Age	.140**	.185**	.324**	0.026	0.040	.070**	0.023	0.037	1

Note. $^{**}p < .01$; Correlations for males are below diagonal, and for females are above diagonal.

3.2 Full Sample SEM

The model fit for the full sample SEM was acceptable ($\chi^2 = 164.67$, $df = 14$, $p < .001$, CFI = .95; TLI = .91; RMSEA = .06; SRMR = .02). Standardized factor loadings for LRD were .88 (drunkenness) and .74 (HED), and .74 (alcohol frequency). After controlling for adolescent age and sex, three violence victimization experiences were significantly associated with the LRD: beaten by a peer ($b = .18$, s.e. = .03, $p < .001$; $\beta = .15$), hurt with a weapon ($b = .26$, s.e. = .04, $p < .001$; $\beta = .15$) and sexually assaulted ($b = .14$, s.e. = .05, $p = .003$; $\beta = .08$). In terms of covariates, adolescent age was positively associated ($b = .06$, s.e. = .01, $p < .001$; $\beta = .18$) and being male was negatively associated with LRD ($b = -.07$, s.e. = .03, $p = .024$; $\beta = -.06$). Model

results are presented in Table 3. To aid interpretation of effect magnitude, standardized regression coefficients are reported and treated as effect size measures, indicating the expected change (in standard deviation units) in the outcome for a one standard deviation change in the predictor. The model accounted for an estimated 10.1% of the variance in the outcome.

Table 3
Structural Equation Model Results Predicting Adolescent Risky Drinking (AI Sample)

Path	***b***	**95% CI for Beta**		***p*-value**	***B***
		Lower	**Upper**		
Beaten by a peer/someone else	0.18	0.13	0.23	0.003	0.15
Hurt with a weapon	0.26	0.18	0.35	< .001	0.15
Sexually assaulted	0.14	0.05	0.23	0.003	0.08
Scared with a weapon	0.01	-0.07	0.09	0.740	0.01
Robbed	-0.03	-0.10	0.05	0.476	-0.02
Adolescent age	0.06	0.04	0.09	< .001	0.18
Adolescent sex (male)	-0.07	-0.13	-0.01	0.024	-0.06

3.3 Multiple Group Tests of Sex Differences

Tests of metric invariance indicated that constraining factor loadings to equality across males and females did not significantly worsen model fit ($\Delta\chi^2$ (3) = 1.93, p = .59), supporting equivalence of the measurement structure of LRD across groups. Tests of group differences in the path coefficients revealed no significant sex differences in the associations of victimization experiences with the risky drinking outcome. The only significant difference emerged for the association of age, such that being older was associated with higher risk of LRD for males ($\chi^2(1)$ = 9.63, p = .002). Overall, the results from the multiple group SEM were similar to the results for the full sample. Three types of victimization significantly predicted LRD for both males and females: being beaten by a peer, hurt with a weapon, and sexually assaulted. Two types of victimization did not show a clear link with LRD: being scared with a weapon and being robbed.

4. Discussion

Our study sheds new light on the associations of multiple forms of violence victimization with risky drinking in a sample of AI adolescents living on or near AI reservations in the United States. In rigorously adjusted latent variable models using the AI analysis sample, three of the five victimization experiences examined, beaten up by a peer, being hurt with a weapon and being sexually assaulted, had statistically significant positive associations with the outcome. Drawing from the same dataset, Phelan (2023) reported a statistically significant positive association between sexual assault and a single indicator of past month alcohol use, speculating that alcohol consumption might serve as a coping mechanism for dealing with the negative affect that results from sexual assault. However, that study did not examine other forms of

victimization or consider more problematic alcohol involvement. Addressing these gaps, we found that beaten up by a peer, being sexually assaulted, and being hurt with a weapon predicted LRD, adjusting for age.

Most studies of multiple violence victimization experiences in relation to alcohol use have used a “variety” or count index that simply sums the number of such experiences (Andreescu & Overstreet, 2022; Smith et al., 2018; Thompson et al., 2008), but this practice ignores variation in the severity of violence exposures. Consistent with our findings, being the victim of either serious physical assault (e.g., being beaten up, hurt with a weapon) or sexual violence is generally regarded as more traumatic than having comparatively minor experiences such as fistfights (Allwood et al., 2023; Centers for Disease Control and Prevention, 2024; Dworkin, 2020; Edwards et al., 2021). In contrast, being robbed or threatened with a weapon were not significantly linked with risky drinking. This pattern indicates that the severity and type of violence matter: more severe forms of violence (hurt with a weapon and beaten up by a peer) and specific forms of victimization (sexual assault) are associated with a more severe profile of risky alcohol use, characterized by higher frequency, HED, and drunkenness. Therefore, experiencing particularly severe forms of violence might be more likely to elicit a coping motive for drinking in response to the trauma resulting from serious violence exposure (Dixon et al., 2009; Stappenbeck et al., 2023).

We discovered no significant difference for females and males in the association between any type of violence victimization and risky drinking. However, this pattern of group differences is noteworthy in light of the prevalence statistics (Tolou-Shams et al., 2021). Being beaten by a peer/someone else and being hurt with a weapon were more prevalent in males (34.6% and 13.3%, respectively) than females (27.5% and 6.5%, respectively), consistent with prior research indicating that males are more likely to be both the perpetrators and victims of violent crimes (Zandt, 2024). By contrast, according to the CDC’s 2023 Youth Risk Behavior Survey, adolescent females (18%) were three times more likely than males (6%) to report experiencing past-year sexual violence (Centers for Disease Control and Prevention, 2024), and the prevalence of sexual assault in the current sample was almost four times higher in females (17%) than males (4.4%).

While prevalence estimates of different types of violence victimization often differ by sex, the association between victimization and risky drinking may not vary significantly between male and female adolescents. A systematic review of school-based studies found that adolescent dating and sexual violence victimization is consistently associated with increased substance use, including alcohol misuse (Woolweaver et al., 2024). In addition, a large meta-analysis of 53 studies found that bullying victimization (including physical acts such as pushing and hitting) was significantly associated with alcohol use, and sex-specific subgroup analyses did not reveal a consistent pattern of one sex being at greater risk (Moore et al., 2017). However, other findings on sex differences were mixed, with some studies reporting stronger associations for females, some for males, and others finding no significant differences (Astle et al., 2023; Lehmann et al., 2025; Woolweaver et al., 2024).

The lack of sex differences in the current study may indicate a culturally specific pattern among AI adolescents. The shared burden of historical and intergenerational trauma has been described as creating

a context of elevated collective vulnerability (Brave Heart, 2003; Brave Heart et al., 2011), which may reduce the relative influence of individual-level factors, such as sex-based differences, in shaping responses to trauma. For AI adolescents, whose communities already bear a high burden of historical trauma, the addition of severe violence victimization may amplify the association with risky drinking, and this pattern held for both males and females. The profound and collective stress of colonization, discrimination, and community trauma may overshadow any differences in how individuals of different sexes process trauma. In this context, the unifying experience of being an AI adolescent may be more powerful in shaping the link between more severe forms of violence exposure and risky drinking than the specific sex assigned at birth.

Findings should be interpreted with certain study limitations in mind. First, the data are cross-sectional, precluding the ability to determine the direction of effects. It is known, for example, that alcohol consumption can lead to aggression (Crane et al., 2016). We attempted to mitigate this concern by selecting alcohol indicators with a relatively short recall period (i.e., past two weeks, past month), whereas the violence victimization measures captured lifetime experiences. Second, available data provided no information about the nature of the experiences reported, and research shows that the consequences of victimization vary based on factors such as the type of relationship between the perpetrator and victim (Hullenaar et al., 2022). Third, the data are somewhat dated but it was no possible to use more recent data from the larger ongoing study since recent cohorts were no longer asked about violence victimization. Fourth, because gender identity was not included in the dataset, our analyses were limited to a binary sex-as-assigned-at-birth variable in the data so our study could not fully capture these dynamics. Fifth, to protect participant confidentiality, the dataset does not include additional demographic or socioeconomic variables beyond sex assigned at birth, age, and ethnicity. As a result, we were unable to include additional relevant covariates in the analysis. Additionally, the dataset does not provide a variable on specific tribal affiliations per agreements with participating tribes. Consequently, our findings cannot speak to potential variation across tribes, and interpretations should be limited to the broader AI adolescent population included in this study. Lastly, the data were collected from adolescents living in unique contexts on or near AI reservations but did not distinguish between youth who live on the reservation and those who live in nearby border communities. The social, economic and racial dynamics in some border towns are likely to differ between these settings and could influence both victimization risk and its consequences. Overall, results might not generalize to AI adolescents in other contexts and more contemporary periods of time.

5. Conclusions and Implications

Despite these limitations, the rigorously adjusted analyses enhance our confidence in the findings surrounding the unique associations of multiple forms of violence victimization with risky drinking in a sample of AI adolescents living on or near AI reservations throughout the United States. Findings have unique contributions and practical implications for practice. This study contributes to literature in several ways. First, rather than relying only on cumulative counts of victimization, we examined specific types of violence separately. While cumulative approaches capture overall exposure, they can mask important differences in how distinct types of violence relate to risky drinking. By looking at these experiences individually, we found that three types of victimization were more directly associated with risky drinking, and these patterns were similar across sex. This approach helps highlight relationships that may be

overlooked when victimization is combined into a single measure. Second, we explicitly tested whether associations between victimization and risky drinking differ by sex. Although prior research has documented overall associations, fewer studies have examined whether these pathways operate differently for males and females, particularly among American Indian adolescents. In our analyses, the associations between victimization and risky drinking did not differ by sex assigned at birth. However, emerging evidence suggests that gender identity, which is distinct from biological sex, can relate differently to substance use outcomes. For example, studies that examine both sex-assigned-at-birth and gender identity find that gender identity is independently associated with substance use patterns, and that interactions between sex assigned at birth and gender identity can influence alcohol use behaviors among adolescents. This suggests that future research including comprehensive measures of gender identity and expression could provide different insight into these dynamics. Third, AI communities face disproportionately high rates of violence exposure and alcohol-related harms, shaped in part by historical trauma, structural inequities, and ongoing social stressors. By identifying which types of victimization are most strongly linked to risky drinking in this population, our findings offer more targeted insight for prevention and early intervention efforts that are culturally responsive. Overall, these findings move beyond cumulative risk approaches and provide a more detailed understanding of how different types of violence are related to risky drinking among American Indian adolescents.

The present findings have implications for policy and practice. The differential associations observed across specific types of violence suggest that prevention and intervention efforts should move beyond treating victimization as a uniform construct. Screening protocols in schools and community settings serving American Indian youth may benefit from assessing distinct types of violence exposure rather than relying solely on cumulative adversity measures. This approach can help identify youth at elevated risk for risky drinking who might otherwise be overlooked in broad risk assessments. Additionally, given the disproportionate burden of violence exposure and alcohol-related harms among AI adolescents, culturally grounded prevention strategies are critical. Specifically, culturally sensitive, tailored screening and referral efforts hold promise for preventing risky drinking among AI adolescents with elevated risk. Particular attention might be given to those who have been beaten by a peer/someone else or hurt with a weapon and been sexually assaulted. Referring vulnerable youth to alcohol misuse preventive interventions that provide support and adaptive coping skills may help promote their positive functioning in the face of adversity. Policies that support community-driven, trauma-informed approaches and increase access to culturally relevant mental health and substance use services may be particularly important. By identifying which forms of victimization are most strongly associated with risky drinking, the present findings provide more targeted guidance for resource allocation and program development within diverse tribal and community settings.

Declarations

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Declaration of conflicting interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical considerations

The study used publicly available, de-identified surveillance data. The requirement for Institutional Review Board approval was waived.

Consent to participate

Not applicable, as the study used publicly available, de-identified data.

Consent for publication

Not applicable, as the study used publicly available, de-identified data.

Data availability

This study is based on publicly available data from: *Substance Use Among American Indian Youth: Epidemiology and Etiology, [United States], 2015–2020 (ICPSR 37997)*. Data are available through the Inter-university Consortium for Political and Social Research (ICPSR) at https://doi.org/10.3886/ICPSR37997.v1.

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