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A Comparison of Risk Factors Associated with Suicide Ideation/Attempts in American Indian and White Youth in Montana

Karen Manzo, Hope Tiesman, Jera Stewart, Gerald R. Hobbs, and Sarah S. Knox

We examined racial/ethnic and gender-specific associations between suicide ideation/attempts and risky behaviors, sadness/hopelessness, and victimization in Montana American Indian and White youth using 1999–2011 Youth Risk Behavior Survey data. Logistic regression was used to calculate odds ratios and 95% confidence intervals in stratified racial/ethnic-gender groups. The primary results of this study show that although the American Indian youth had more statistically significant suicidal thoughts and attempts than the White youth, they had fewer statistically significant predictors compared to the White youth. Sadness/hopelessness was the strongest, and the only statistically significant, predictor of suicide ideation/attempts common across all four groups. The unhealthy weight control cluster was a significant predictor for the White youth and the American Indian/Alaska Native girls; the alcohol/tobacco/marijuana cluster was a significant predictor for the American Indian boys only. Results show important differences across the groups and indicate directions for future research targeting prevention and intervention.

Keywords adolescence, American Indian youth, mental health, minority health, suicide prevention

INTRODUCTION

Suicide deaths, non-fatal suicide attempts, and suicide ideation (e.g., thinking about, considering, planning for suicide) are a worldwide public health problem for Indigenous (e.g., American Indian, Alaska Native, Canadian First Nation, New Zealand Maori, Australian Aborigines) people, especially those under age 25 (Hunter & Harvey, 2002; Mullany, Barlow, Goklish et al., 2009; Olson & Wahab, 2006; Wexler, Silveira, & Bertone-Johnson, 2012). In the United States, American Indian/Alaska Native (AI/AN) youth report significantly more suicide-related thoughts and behaviors than youth from other racial/ethnic groups, including attempting suicide up to 2.5 times more often than these other youth (Pavkov, Travis, Fox et al., 2010). As with other racial/ethnic groups, AI/AN girls report attempting suicide almost twice as often as AI/AN boys (Borowsky, Resnick, Ireland et al., 1999).

Poor mental health, especially depression, is consistently associated with the greatest risk for suicide ideation/attempts (Foley, Goldston, Costello et al., 2006; LaFromboise, Medoff, Lee et al., 2007; LeMaster, Beals, Novins et al., 2004); however, there are other potentially modifiable factors. Research also shows a direct relationship between suicide ideation/attempts and psychosocial risk factors such as exposure to suicide by family or friend (Borowsky, Resnick, Ireland et al., 1999; Freedenthal & Stiffman, 2004), substance use (Eaton, Foti, Brener et al., 2011; Freedenthal & Stiffman, 2004; LaFromboise, Medoff, Lee et al., 2007; Reyes, Robles, Colon et al., 2011; Yoder, Whitbeck, Hoyt, & LaFromboise, 2006), and victimization, such as physical and sexual abuse (Borowsky, Resnick, Ireland et al., 1999; Johnson, Cohen, Gould et al., 2002; Wexler, Silveira, & Bertone-Johnson, 2012), dating violence (Olshen, McVeigh, Wunsch-Hitzig et al., 2007; Swahn, Simon, Hertz et al., 2008), and sexual assault (For the Cedar Project Partnership, Moniruzzaman, Pearce et al., 2009; Olshen, McVeigh, Wunsch-Hitzig et al., 2007) across racial/ethnic groups. All in all, the prevalence of most of the risk factors is highest in AI/AN youth (Pavkov, Travis, Fox et al., 2010).

Studies have also shown associations between suicide ideation/attempts and several other psychosocial risk factors, such as early risk-taking behaviors (Swahn, Bossarte, & Sullivent, 2008), issues around weight control and body image (Eaton, Foti, Brener et al., 2011; Eaton, Lowry, Brener et al., 2005), risky sexual behaviors (Eaton, Foti, Brener et al., 2011), and bullying (Klomek, Marrocco, M, Schonfield et al., 2007); however, these studies did not include AI/AN youth. Besides the potential risk factors listed above, other unique areas of concern for AI/AN youth include earlier initiation and more frequent use of alcohol, tobacco, and other illicit drugs (Pavkov, Travis, Fox et al., 2010), higher exposure to suicidal thoughts and behaviors (Goldston, Molock, Whitbeck et al., 2008), discrimination (Whitbeck, Chen, Hoyt et al., 2004; Yoder, Whitbeck, Hoyt et al., 2006), out-of-home placement (Cross, Simmons, Alberty et al., 2007), and family history of boarding school attendance (RHS National Team, 2007).

Although suicide ideation/attempts is a growing health concern among AI/AN youth, a limited number of studies have included AI/AN youth in the examination of racial/ethnic differences. Rutman, Park, Castor et al. (2008) examined differences between AI/AN and White youth in urban schools and Pavkov, Travis, Fox, et al. (2010), examined national level racial/ethnic differences; however, these analyses were largely descriptions of prevalence and did not examine risk factor associations. Another study surprisingly found American Indian race/ethnicity to be a protective factor for 3 month suicide ideation/attempts (Foley, Goldston, Costello et al., 2006); however, this study was set in North Carolina which has only one reservation, therefore differing demographically from western states that have multiple reservations and different tribes (United States Census Bureau, 2014; 2010 data). In addition, the researchers did not stratify by racial/ethnic group or gender (Foley, Goldston, Costello et al., 2006). A recent study found both differences and similarities in predictors for suicide attempts between Native and non-Native youth; however, they controlled for, rather than stratified by, gender (Mackin, Perkins, & Furrer, 2012). In addition, this study was set in Oregon which has a smaller proportion of American Indians than the setting for the current study (United States Census Bureau, 2014; 2010 data).

The present study focuses on the state of Montana, which has the highest suicide rate in the 48 contiguous states. Montana has multiple tribal areas, including seven reservations and five urban areas. American Indians are the most visible minority group

in Montana, comprising about 6.5% (66,000) (United States Census Bureau, 2014; 2010 data) of the total population. The purpose of the present analyses is to examine racial/ethnic and gender-specific associations between high risk behaviors, sadness/hopelessness, victimization, and risk for suicide ideation/attempts in American Indian and White youth in Montana using Youth Risk Behavior Survey (YRBS) data. To our knowledge, an analysis of YRBS suicide data for a Northern Plains state such as Montana has not been published. Understanding unique and shared gender- and racial/ethnic-specific risk factors associated with suicide ideation/attempts is important to help inform suicide prevention intervention to decrease the prevalence of suicide ideation/attempts in this vulnerable group.

METHODS

Sample and Participants

The Youth Risk Behavior Survey (YRBS) is a self-report epidemiological survey conducted in odd years in randomly selected high schools across the nation. The survey monitors health behaviors in six categories: unintentional injury and violence; tobacco use; alcohol and other drugs; sexual behaviors; physical activity; and dietary behaviors (Eaton, Kann, Kinchen et al., 2006). The school response rate for the annual sample of Montana schools (N = 50) ranged from 94% to 98% over the study time period. There are two tribally run schools in the state and they participate. The vast majority of schools are rural. For the present analyses, data for Montana American Indian (self-identified) girls (n = 628) and boys (n = 695) and White girls (n = 8,814) and boys (n = 8715) in grades 9–12 were extracted from the YRBS for the 7 combined odd years from 1999–2011 (N = 21,610).

Variables

The dependent variable was a positive response to at least one of the following: "During the past 12 months, how many times did you actually attempt suicide?" (yes = 1 or more times; no = 0 times), "During the past 12 months, did you ever seriously consider attempting suicide?" (yes; no), or "During the past 12 months, did you ever make a plan about how you would attempt suicide?" (yes; no). We determined seriousness of intent by the question "If you attempted suicide during the past 12 months, did any of your attempts result in an injury, poisoning, or overdose that had to be treated by a doctor or nurse?" (yes; no). Preliminary analyses showed little to no difference in the statistical significance of individual predictors for suicide ideation and suicide attempts. Therefore, to increase power, we used cluster analysis to combine the variables into more meaningful clusters and to help to reduce multicollinearity in variables that were similar. The variables were coded in the direction of high risk. In addition to sadness/hopelessness (feeling sad or hopeless every day for 2 weeks or more during the past 12 months), we selected 29 independent variables and grouped them into 9 clusters:

1. Alcohol, tobacco, and marijuana use (current and binge drinking, riding with someone who had been drinking and driving while drinking during past 30 days, current tobacco use, current marijuana use);
2. Unhealthy weight control (fasting, taking diet pills, purging to lose weight during the past 30 days)
3. Early risk-taking behavior (smoking cigarettes, drinking alcohol, using marijuana, or having sex before age 13).
4. Partner victimization (past 12 months dating violence, ever sexually assaulted);
5. Lack of personal safety at school (feeling unsafe [past 30 days], being threatened [past 12 months]);

6. Risky sexual behaviors (more than 4 sex partners in lifetime, more than 1 sex partner in the past 3 months, alcohol/drug use before last sexual intercourse, no condom use with last sexual intercourse);
7. Weapon carrying (carried a weapon and/or a gun during the past 30 days);
8. Injection (ever use heroin, steroids, and needle drugs); and
9. Inhalant (cocaine [ever, current] and ever use methamphetamines).

Since the clusters contain different numbers of risk behaviors, we used the mean for each cluster in the analyses.

Procedures

Variable clustering is a widely accepted statistical method used to reduce the dimensionality of prediction models. There are not enough data in the literature to form a well grounded hypothesis of what variables to cluster and we did not want to bias the analyses by improperly clustering variables, so we allowed the data to show us where the clusters were. Similarity in some items would also have created problems with multicollinearity. We used the non-hierarchical version of Proc Varclus in SAS Version 9.2 to create the clusters. It uses an iterative process to create groups of variables that are as correlated as possible within a cluster and as uncorrelated as possible with variables in other clusters (SAS Institute Inc., 2008). We used partitive clustering with the default 0.7 eigenvalue threshold to split the clusters. We selected 9 clusters at the point where the clusters were formed of variables that were not substantially different from other iterations. Since changes had been made to the YRBS over the study time-period, we only included variables that were used in all 7 years of data in the cluster analysis.

Statistical Analyses

Analyses were stratified by racial/ethnic group and gender and were carried out with SAS Version 9.2. First, simple frequencies were established to determine gender and racial/ethnic-specific prevalence estimates. Chi-square tests of association were used to determine significant racial/ethnic and gender between-group differences. A Bonferroni correction was used to account for multiple testing, so differences in prevalence estimates were considered statistically significant at the $p < .0005$ level. We then conducted logistic regression analyses (forward selection) using a*ge* as a control variable. We hypothesized that depression might be the key underlying risk factor, since it consistently shows the greatest independent risk for suicide ideation/attempts (Foley, Goldston, Costello et al., 2006; LeMaster, Beals, Novins et al., 2004). It is also associated with several of the risk factors discussed here (e.g., bullying, smoking and alcohol, marijuana, and other substance use) (Saluja, Iachan, Scheidt et al., 2004). Since sadness/hopelessness was the only reasonable surrogate we had for depression in the YRBS, it served as a proxy in the logistic regression models. Proc Survey Logistic was used to account for complex sampling and to facilitate generalizability across all Montana high school students. All analyses were weighted to account for the complex sampling design and to reduce non-response bias (Centers for Disease Control and Prevention, 2004).

Following their code of regulations, all aspects of the project, including this article, received approval from the Rocky Mountain Tribal Institutional Review Board (RMTIRB) located in Billings, Montana.

RESULTS

Descriptive Statistics

Descriptive statistics can be seen in Table 1. During the study time-period,

TABLE 1. **Prevalence of Suicidality and Select Risk Factors by Gender and Race/Ethnicity for American Indian and White Montana Youth: YRBS, 1999–2011**

	Girls			Boys			Racial/Ethnic differences		
	American Indian N = 628 (n) %	White N = 8814 (n) %	p value *<.0005	American Indian N = 695 (n) %	White N = 8715 (n) %	p value *<.0005	American Indian N = 1323 (n) %	White N = 17529 (n) %	p value *<.0005
Suicidal thoughts/behaviors									
Consider	(165) 26.8%*	(1813) 20.7%	0.0003	(117) 17.1%*	(1019) 11.9%	<.0001	(282) 21.7%*	(2832) 16.4%	<.0001
Plan	(131) 21.0%	(1412) 16.1%	0.0014	(90) 13.1%	(931) 10.8%	0.0656	(221) 16.9%	(2343) 13.5%	0.0006
Attempt	(106) 19.6%*	(731) 9.1%	<.0001	(63) 11.5%*	(380) 5.0%	<.0001	(169) 15.5%*	(1111) 7.1%	<.0001
Injury with attempt	(35) 6.5%*	(215) 2.7%	<.0001	(19) 3.4%	(146) 1.9%	0.0148	(54) 4.9%*	(361) 2.3%	<.0001
Sadness/hopelessness	(267) 43.2%*	(2748) 31.4%	<.0001	(169) 24.7%*	(1559) 18.1%	<.0001	(436) 33.5%*	(4307) 24.8%	<.0001
Alcohol, tobacco, marijuana									
Current drinking	(305) 53.8%*	(3779) 45.1%	<.0001	(310) 50.8%	(3929) 48.0%	0.1773	(615) 52.3%*	(7708) 46.6%	0.0002
Binge drinking	(245) 41.0%*	(2651) 30.6%	<.0001	(255) 38.8%	(3010) 35.4%	0.0810	(500) 39.9%*	(5661) 33.0%	<.0001
Riding w/someone drinking	(272) 43.8%*	(2879) 32.9%	<.0001	(291) 42.4%*	(2786) 32.3%	<.0001	(563) 43.0%*	(5665) 32.6%	<.0001
Driving while drinking	(117) 19.2%	(1228) 14.1%	0.0006	(120) 18.2%	(1600) 18.8%	0.7088	(237) 18.7%	(2828) 16.4%	0.0372
Current smoking	(300) 52.3%*	(1703) 20.1%	<.0001	(240) 39.4%*	(1634) 19.7%	<.0001	(540) 45.7%*	(3337) 19.9%	<.0001
Current marijuana use	(265) 43.9%*	(1576) 18.1%	<.0001	(275) 42.1%*	(1859) 21.9%	<.0001	(540) 43.0%*	(3435) 20.0%	<.0001
Inhalant drugs									
Cocaine	(103) 17.0%*	(517) 6.0%	<.0001	(102) 15.2%*	(650) 7.6%	<.0001	(205) 16.1%*	(1167) 6.8%	<.0001
Current cocaine	(43) 7.0%*	(171) 2.0%	<.0001	(43) 6.4%*	(263) 3.1%	<.0001	(86) 6.7%*	(434) 2.5%	<.0001
Meth	(116) 18.8%*	(502) 5.7%	<.0001	(92) 13.7%*	(561) 6.5%	<.0001	(208) 16.1%*	(1063) 6.1%	<.0001
Injection drugs									
Heroin	(28) 4.5%*	(136) 1.6%	<.0001	(44) 6.5%*	(252) 2.9%	<.0001	(72) 5.5%*	(388) 2.2%	<.0001
Steroids	(43) 6.9%*	(203) 2.3%	<.0001	(43) 6.3%	(339) 3.9%	0.0023	(86) 6.6%*	(542) 3.1%	<.0001
Injection drugs	(31) 5.0%*	(111) 1.3%	<.0001	(31) 4.6%	(230) 2.7%	0.0037	(62) 4.8%*	(341) 2.0%	<.0001

(*Continued*)

TABLE 1. **Continued**

	Girls			Boys			Racial/Ethnic differences		
	American Indian N = 628 (n) %	White N = 8814 (n) %	p value *< .0005	American Indian N = 695 (n) %	White N = 8715 (n) %	p value *< .0005	American Indian N = 1323 (n) %	White N = 17529 (n) %	p value *< .0005
Early risk-taking behavior									
Smoking under age 13	(224) 37.8%*	(1127) 13.4%	<.0001	(244) 38.1%*	(1433) 17.4%	<.0001	(468) 38.0%*	(2560) 15.4%	<.0001
Drinking under age 13	(178) 29.6%*	(1835) 22.0%	<.0001	(239) 36.7%	(2649) 32.2%	0.0191	(417) 33.3%*	(4484) 27.0%	<.0001
Marijuana use under age 13	(177) 29.2%*	(474) 5.4%	<.0001	(246) 37.5%*	(826) 9.7%	<.0001	(423) 33.5%*	(1300) 7.5%	<.0001
Sex under age 13	(36) 6.4%*	(215) 2.6%	<.0001	(105) 18.1%*	(463) 5.8%	<.0001	(141) 12.3%*	(678) 4.1%	<.0001
Lack of school safety									
Feeling unsafe at school	(64) 10.3%*	(292) 3.3%	<.0001	(52) 7.6%*	(269) 3.1%	<.0001	(116) 8.8%*	(561) 3.2%	<.0001
Being threatened at school	(41) 6.6%	(410) 4.7%	0.0322	(72) 10.4%	(748) 8.6%	0.1079	(113) 8.6%	(1158) 6.6%	0.0065
Partner victimization									
Dating violence	(97) 15.8%*	(815) 9.3%	<.0001	(90) 13.3%	(839) 9.8%	0.0034	(187) 14.5%*	(1654) 9.5%	<.0001
Sexual assault	(95) 15.4%	(1046) 12.0%	0.0125	(67) 9.8%*	(419) 4.9%	<.0001	(162) 12.4%*	(1465) 8.4%	<.0001
Risky sexual behaviors									
Sex with 4 or more in life	(115) 20.3%*	(963) 11.5%	<.0001	(180) 31.6%*	(977) 12.2%	<.0001	(295) 26.0%*	(1940) 11.8%	<.0001
Sex with 1 or more past 3 months	(239) 42.2%*	(2552) 30.5%	<.0001	(256) 44.5%*	(2182) 27.4%	<.0001	(495) 43.4%*	(4734) 29.0%	<.0001
Sex with alcohol	(104) 18.5%*	(889) 10.6%	<.0001	(125) 21.7%*	(1035) 13.0%	<.0001	(229) 20.1%*	(1924) 11.8%	<.0001
Used condom (no)	(149) 26.6%*	(1465) 17.6%	<.0001	(140) 24.8%*	(1246) 15.7%	<.0001	(289) 25.7%*	(2711) 16.7%	<.0001
Unhealthy weight control									
Diet pills	(68) 11.0%	(646) 7.4%	0.0012	(58) 8.6%*	(328) 3.8%	<.0001	(126) 9.8%*	(974) 5.6%	<.0001
Fast	(151) 24.5%*	(1363) 15.6%	<.0001	(102) 15.2%*	(569) 6.6%	<.0001	(253) 19.6%*	(1932) 11.2%	<.0001
Purge	(53) 8.7%	(634) 7.3%	0.1922	(38) 5.7%*	(226) 2.7%	<.0001	(91) 7.1%	(860) 5.0%	0.0010
Weapon carrying									
Carried a weapon	(55) 9.0%	(647) 7.4%	0.1672	(222) 34.2%	(2935) 34.9%	0.6836	(277) 21.9%	(3582) 21.0%	0.4148
Carried a gun	(12) 1.9%	(166) 1.9%	0.9427	(97) 14.7%	(1248) 14.7%	0.9992	(109) 8.5%	(1414) 8.2%	0.6880

Note. *p value <.0005.

more than twice as many American Indian youth (n = 169; 15.5%) in Montana reported attempting suicide one or more times during the past 12 months than White youth (n = 1,111; 7.1%). In addition, twice as many American Indian youth (n = 54; 4.9%) reported an injury associated with attempted suicide, in comparison to White youth (n = 361; 2.3%). Both attempt (n = 106; 19.6%) and attempt with injury (n = 35; 6.5%) were highest in the American Indian girls and a higher proportion of these girls reported considering (n = 165; 26.8%) and planning for (n = 131; 21.0%) an attempt during the past year.

Almost twice as many girls reported sadness/hopelessness as boys in their respective racial/ethnic-groups, with American Indian girls (n = 267; 43.2%) reporting the highest. Compared to the White girls, the American Indian girls reported significantly more suicidal thoughts ($p = 0.0003$), suicide attempts ($p < 0.0001$), injury with attempt ($p < 0.0001$), sadness/hopelessness ($p < 0.0001$), early risk-taking behaviors ($p < 0.0001$), feeling unsafe at school ($p < 0.0001$), dating violence ($p < 0.0001$), and fasting to lose weight ($p < 0.0001$). Compared to the White boys, a significantly higher percentage of American Indian boys reported suicidal thoughts ($p < 0.0001$), suicide attempts ($p < 0.0001$), sadness/hopelessness ($p < 0.0001$), smoking cigarettes or marijuana or having sex before age 13 ($p < 0.0001$), sexual assault ($p < 0.0001$), and using diet pills, fasting, or purging to lose weight ($p < 0.0001$).

Logistic Regression Analyses

Results from the regression analyses (see Table 2) show differences and similarities across the racial/ethnic-gender groups. As hypothesized, sadness/hopelessness was one of the strongest predictors of suicide ideation/attempts and was the only statistically significant predictor common across all four groups: American Indian girls (OR = 4.13 [2.51, 6.81]); American Indian boys (OR = 6.23 [3.59, 10.80]); White girls (OR = 6.57 [5.76, 7.49]); White boys (OR = 8.80 [7.53, 10.28]). The unhealthy weight control cluster was a statistically significant predictor of suicide ideation/attempts for the White boys and girls and the American Indian girls, but not the American Indian boys. In addition to sadness/hopelessness, unhealthy weight control was the only significant predictor for the American Indian girls. There was an inverse association between age and suicide ideation/attempt in all groups except the American Indian boys. For the American Indian boys, in addition to sadness/hopelessness, the alcohol/tobacco/marijuana cluster and the weapon carrying cluster were statistically significant predictors of suicide ideation/attempts.

The White girls had more significant behavioral predictors of suicide ideation/attempts than any other group. In addition to sadness/hopelessness and the unhealthy weight control cluster, other statistically significant predictors of suicide ideation/attempts in these girls included alcohol/tobacco/marijuana, early risk-taking behaviors, lack of personal safety at school, partner victimization, and weapon carrying. Like White girls, White boys also showed significance for lack of personal safety at school, early risk taking behaviors, and partner victimization. White boys were the only group where risky sexual behaviors were also a significant predictor.

DISCUSSION

The primary results of this study show that although the American Indian youth had more statistically significant suicidal thoughts and attempts than the White youth, they had fewer statistically significant predictors compared to the White youth. Specifically, while the American Indian

TABLE 2. **Multiple Predictor Models for Suicide Ideation/Attempt (in Prior 12 Months) in Montana Youth: YRBS, 1999–2011**

	American Indian girls OR[a] (95% CI)	American Indian boys OR[a] (95% CI)	White girls OR[a] (95% CI)	White boys OR[a] (95% CI)
Sadness/hopelessness	**4.13 (2.51, 6.81)******	**6.23 (3.59, 10.80)******	**6.57 (5.76, 7.49)******	**8.80 (7.53, 10.28)******
Alcohol/tobacco/marijuana	1.13 (0.85, 1.51)	**1.43 (1.05, 1.94)***	**1.13 (1.04, 1.23)****	1.07 (0.98, 1.17)
Inhalant drugs	0.96 (0.63, 1.45)	0.79 (0.47, 1.33)	1.04 (0.86, 1.26)	1.10 (0.92, 1.32)
Injection drugs	1.01 (0.40, 2.59)	1.86 (0.79, 4.40)	1.64 (0.96, 2.79)	1.08 (0.86, 1.36)
Early risk-taking behaviors	1.13 (0.47, 2.73)	1.25 (0.51, 3.04)	**1.55 (1.20, 2.00)*****	**1.83 (1.39, 2.40)******
Lack of school safety	1.63 (0.74, 3.58)	1.15 (0.80, 1.66)	**1.43 (1.13 1.81)****	**1.28 (1.13, 1.45)*****
Partner victimization	2.01 (0.92, 4.38)	1.02 (0.40, 2.62)	**1.88 (1.47, 2.39)******	**1.76 (1.27, 2.43)*****
Risky sexual behaviors	1.14 (0.79, 1.66)	1.01 (0.71, 1.45)	1.12 (0.99, 1.27)	**1.29 (1.14, 1.47)******
Unhealthy weight control	**4.54 (1.55, 13.33)****	2.21 (0.69, 7.10)	**3.86 (2.96, 5.03)******	**2.15 (1.43, 3.22)*****
Weapon carrying	1.59 (0.79, 3.22)	**1.34 (1.05, 1.72)***	**1.16 (1.01, 1.32)***	1.01 (0.95, 1.08)
Age	**0.77 (0.62, 0.97)***	1.00 (0.78, 1.28)	**0.85 (0.81, 0.90)******	**0.90 (0.84, 0.96)****

Note. OR = odds ratio; CI = confidence interval.

[a]Bolded odds ratios indicate a statistically significant association comparing those who reported ideation or attempt and those who did not within each group; odds ratios are adjusted for all other model predictors.

$^{*}p < .05$.

$^{**}p < .01$.

$^{***}p < .001$.

$^{****}p < .0001$.

youth reported significantly more partner victimization, lack of personal safety at school (feeling unsafe at school only), early risk taking behaviors, and risky sexual behaviors than the White youth, these clusters were significant predictors of suicide ideation/attempts for the White youth only.

Sadness/hopelessness was one of the strongest predictors of suicide ideation/attempts and the only risk factor that was common across the four racial/ethnic-gender groups. The importance of sadness/hopelessness as a predictor of suicide ideation/attempts is not surprising because we know that depression is the strongest predictor for suicidal behaviors (Foley, Goldston, Costello et al., 2006; LaFromboise, Medoff, Lee et al., 2007; LeMaster, Beals, Novins et al., 2004; Luke, Anderson, Gee et al., 2013). Our data show that American Indian youth have significantly more sadness/hopelessness than their White counterparts. This finding is consistent with some studies (Saluja, Iachan, Scheidt et al., 2004), but not all (Costello, Farmer, Angold et al., 1997; Pavkov, Travis, Fox et al., 2010). The reason for this discrepancy in findings on depression in American Indian youth is unclear; however it may result from variation in the age range of the study populations. For example, some studies focus on middle school youth (Costello, Farmer, Angold et al., 1997), who report the lowest prevalence of depressive symptoms, while others focus on high school (Pavkov, Travis, Fox et al., 2010; Wong, Sugimoto-Matsuda, Chang et al., 2012) aged youth or combine the age groups (Blum, Harmon, Harris et al., 1992; Freedenthal & Stiffman, 2004; Saluja, Iachan, Scheidt et al., 2004). This is important since research shows that depressive symptoms increase with age (Whitbeck, Yu, Johnson, Hoyt et al., 2008).

The fact that substance abuse is greater in the American Indian youth may be an indication that they are self-medicating. Substance abuse and depression frequently co-occur in youth (Rao, 2006), so examination of factors underlying these co-morbidities in this population is warranted. That three out of the four groups had issues with unhealthy weight control is not surprising when seen from the perspective of researchers who see fasting, purging, or taking diet pills to lose weight as a method of coping with stress, similar to the use of substances as a maladaptive coping strategy (Corte & Stein, 2000).

The limited number of statistically significant predictors for the American Indian youth may indicate that the YRBS does not capture the areas of greatest risk for them. For example, a risk factor that was not included was discrimination, which has been linked to substance use (Whitbeck, Hoyt, McMorris et al., 2001) and suicide ideation (Yoder, Whitbeck, Hoyt et al., 2006) in middle school aged American Indian youth.

Also, baseline data from a Canadian First Nations longitudinal health survey show significantly greater suicide ideation/attempts among both youth and adults who had at least one parent or grandparent attend the now renowned abusive federal boarding schools for American Indian children (Adams, 1995; Archuleta, Child, & Lomawaima, 2005; Child, 1998) compared to offspring of non-attendees (RHS National Team, 2007). In addition, several generations of American Indian children have been disproportionately placed in foster care or adopted out, almost exclusively with non-Native families (Guerrero, 1979; Unger, 1982). The abuse and lack of nurturance in the federal boarding schools where children were not even allowed to speak their own language was a poor preparation for learning to parent their own children (Haskell & Randall, 2009). Even removing children from their families has consequences that may be detrimental to forming healthy relationships and cultural identity, (e.g., the intergenerational transmission of traditions), as well as mental health (resulting in substance abuse to cope with stress) (Haskell & Randall, 2009;

Kirmayer, Brass, Holton et al., 2007; Tatz, 1999; Wexler, 2006).

It is interesting that partner victimization was not associated with suicide ideation/attempts in the American Indian youth in the multiple predictor models even though it was significantly more prevalent in the American Indian than White youth and was also predictive in the White youth. This is not consistent with the limited sexual assault data in Native youth, where ever being sexually assaulted was a significant predictor for suicide attempts (Borowsky, Resnick, Ireland et al., 1999; For the Cedar Project Partnership, Moniruzzaman, Pearce et al., 2009). Due to the cross-sectional nature of the data in the current study and the wording of the sexual assault question, it was not possible to determine the context in which the violence occurred, i.e., whether child sexual abuse was involved. So we ran *post hoc* multiple predictor models for the American Indian youth with dating violence and sexual assault as separate, unclustered variables to see if they contributed differently to the model, but they did not. Neither dating violence nor sexual assault was statistically significant predictors of suicide ideation/attempts in these post hoc analyses.

Most studies of suicide in American Indians focus on risk and relatively few studies have examined protective factors. Research indicates that several psychosocial factors, such as religion/spirituality (Davidson & Wingate, 2011; Garroutte, Goldberg, Beals et al., 2003; Gould, Greenberg, Velting et al., 2003) and strong social support (Borowsky, Resnick, Ireland et al., 1999) may be protective against suicide ideation/attempts across racial/ethnic groups. Enculturation (i.e., participation in traditional social and spiritual activities and cultural identity) and high self-esteem have been reported to be protective against suicide ideation among middle school aged American Indian youth (Yoder, Whitbeck, Hoyt et al., 2006) but this has not been studied in older youth. Since factors related to self-esteem and culture are not available in our dataset we could not test this hypothesis in our sample.

This study is subject to several limitations. First, these data are limited by the nature of self-report data, namely, underreporting and recall bias; and, by the fact that they are cross-sectional, which makes attribution of causality difficult. Second, data are only collected on youth enrolled in school. Youth who have dropped out of school and may be at even higher risk are not included. The average dropout rate for Montana American Indian students during the study time-period was about 6.5%, compared to about 2.5% for White students (Montana Office of Public Instruction, 2010). In addition, the YRBS no longer includes socioeconomic variables, which may be important given the extensive poverty of American Indian youth (Foley, Goldston, Costello et al., 2006; Singh & Kogan, 2007). There are also no questions related to other risk factors which may be relevant for American Indian youth, such as discrimination (Whitbeck, Chen, Hoyt et al., 2004; Yoder, Whitbeck, Hoyt et al., 2006), exposure to suicide of others (Borowsky, Resnick, Ireland et al., 1999; Freedenthal & Stiffman, 2004), out-of-home placement (Katz, Au, Singal et al., 2011), or access to and utilization of mental health care services (Gone & Trimble, 2012). In addition, there is only one question that could possibly reflect depression and no questions related to PTSD or other relevant mental health issues (Foley, Goldston, Costello et al., 2006). To test whether low power could be responsible for the lack of significant predictors in the American Indian youth, we used JMP Pro Version 11 to calculate effect sizes. Using Cohen's effect size taxonomy (Cohen, 1988), these analyses revealed that our gender-specific sample sizes for the American Indian youth correspond to 80% power for effect sizes around

.20–.22, which is equivalent to small or perhaps medium effect sizes. This leads us to believe that low power is not an issue. It should also be noted that the YRBS does not differentiate between what are perceived as negative behaviors/emotions and aspects of these behaviors/emotions that may have culturally distinct meanings in American Indian youth. For example, the concept of depression or sadness/hopelessness, though normally seen as negative in other populations, can have positive connotations for American Indian youth, i.e., be perceived as a strength, if it is born with a sense of honor and kept in one's heart as a reminder to have compassion for others (O'Nell, 1996). Another example is the topic of tobacco smoking, normally perceived as a risk behavior in mainstream society, but which may be part of traditional ceremonial practices to which the youth would respond affirmatively. An American Indian youth may also admit to carrying a weapon. However, the survey does not differentiate between a weapon that is part of ceremonial and/or dance regalia, i.e., as symbolic of warrior status, so we do not know how they interpret "weapon" when they respond. Furthermore, the YRBS does not differentiate between urban and reservation American Indian youth. As stated above, it also does not include questions related to protective factors. Inclusion of these types of variables in future research may contribute to improving knowledge of the issues underlying suicide ideation/attempts in this population. In spite of these limitations, the YRBS is a readily available source of risk factor data that covers a broad range of suicide ideation/attempts questions that show both convergent and discriminant validity (May & Klonsky, 2011).

As strengths, this study combined 7 years of YRBS data for statistically meaningful numbers of American Indian youth and no study to date has examined gender- and racial/ethnic-specific differences in this regionally representative sample. Many American Indians are cautious, meaning that openness with outsiders is minimal and information is not freely shared (*American Indian Education Handbook.*, 1982). However, given the anonymous nature of the YRBS, these results are more likely to provide an accurate reflection of American Indian youth behavior than structured interviews. In addition, the complex sampling design and non-response weighting allow for generalizability across Montana high school students as well as students from states with similar population characteristics.

Despite the public health importance of suicide, only limited research has been conducted on suicide risk in American Indian youth (Olson & Wahab, 2006). Despite the caveats, this study has some important public health implications. It shows that factors predicating suicide ideation/attempts in American Indian and White youth differ and that our current databases are probably not capturing some of the risk factors that are relevant for prediction of suicide ideation/attempts in American Indian youth. The fact that age was inversely associated with suicide ideation/attempts indicates that early intervention should be a high priority. The current data also tell us that screening for sadness/hopelessness, school safety, and substance use, as well as referral to culturally meaningful and gender-specific counseling are important. Future research aimed at identifying risk factors for suicide in American Indian youth should include culturally relevant factors such as discrimination and out-of-home placement, as well as protective factors such as social support and enculturation in order to design evidence-based interventions based on cultural strengths.

AUTHOR NOTE

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