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# A COMPARISON OF EARLY ADOLESCENT BEHAVIORAL HEALTH RISKS AMONG URBAN AMERICAN INDIANS/ALASKA NATIVES AND THEIR PEERS

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*Abstract: We sought to examine behavioral health indicators for an early adolescent population of American Indians/Alaska Natives (AI/AN) within an urban setting in Washington State. We conducted secondary data analyses from a randomized clinical trial implemented in local middle schools that compared AI/ANs (n = 43), non-Hispanic Whites (n = 620), and other racial/ethnic minority youth (n = 527) across a variety of behavioral health risks. AI/AN youth reported significantly more depressive symptoms than other racial/ethnic minorities as well as non-Hispanic Whites. They also reported more discrimination, more generalized anxiety, and were more likely to have initiated substance use, in comparison to non-Hispanic Whites. Psychosocial screening and early intervention are critically needed for AI/AN youth.*

## INTRODUCTION

American Indian and Alaska Native (AI/AN) persons have historically been understudied in the psychosocial literature. The population is growing, and yet according to U.S. Census data from 2010, approximately l.6% of the total United States population endorsed some degree of AI/AN heritage (U.S. Census Bureau, 2010). In comparison to other ethnic minority groups, there is little research that has addressed the strengths, disparities, and needs of AI/AN individuals. Even more so, there is a lack of psychological studies that have focused on AI/AN youth. This may be due to difficulties inherent to conducting child and adolescent research with AI/ANs (e.g., obtaining informed consent); however, this is an important research gap. In order to reduce health disparities that have greatly affected this population, it is important to have a robust research body to guide appropriate clinical interventions. We especially wish to highlight the importance of examining psychological development among early adolescents (enrolled in

middle schools) as an understudied area, as overall within the child development literature there are more studies on child populations (i.e., elementary school aged youth) and later adolescent populations (i.e., high school aged youth). Further, there have been limited studies that have addressed the functioning of AI/AN individuals within urban settings (versus rural settings or tribal reservations). Thus, taken together, we seek to examine behavioral health indicators among an extremely understudied group: AI/AN early adolescents living in an urban setting.

To our knowledge, there are only a handful of studies that have examined mental health among AI/AN adolescents (Beals et al., 1997; Manson, Ackerson, Dick, Baron, & Fleming, 1990; Whitesell et al., 2014). Regarding epidemiology, the research has predominantly focused on older adolescents. In general, AI/AN adolescents experience elevated rates of psychiatric disorders (Beals et al., 1997). One study found that AI/AN adolescents enrolled in a boarding school had depression rates as high as 58.1% (Manson et al., 1990). Among AI/AN adolescents seeking mental health treatment, mood disorders and adjustment disorder were the most common psychiatric diagnoses (not including substance use), and 84.2% reported having witnessed domestic violence (Dickerson & Johnson, 2012). There have also been elevated rates of psychiatric disorders among AI/AN adolescents detained in the juvenile justice system (Duclos et al., 1998). It is important to highlight that there is substantial heterogeneity among AI/AN adolescents (especially with regards to cultural practices), and cultural heterogeneity is associated with unique constellations of psychiatric risk factors (Novins, Beals, Roberts, & Manson, 1999). Research on clinical mental health interventions for early adolescent AI/ANs is even more limited compared to the epidemiological literature. One pilot study ($N$ = 8) found initial support for an intervention targeting depression among early adolescent AI/ANs (Listug-Lunde, Vogeltanz-Holm, & Collins, 2013). However, there is a need for more clinical studies targeting early adolescent AI/ANs in particular to both create appropriate clinical interventions and to research the generalizability of such interventions among this heterogeneous group.

In addition to having a greater risk of mental health difficulties, AI/AN youth are at greater risk for problematic substance use. Research suggests that substance use initiation typically occurs between the ages of 10 and 13 for AI/AN youth, making it all the more important to conduct further research with AI/AN early adolescents in particular (Beauvais, 1996). AI/AN youth are more likely than their peers to use tobacco, use inhalants, smoke cannabis, and, in some instances, drink alcohol (Hawkins, Cummins, & Marlatt, 2004). They are

also more likely to continue substance use after initiation and have higher rates of polysubstance use (Beauvais, 1992; Hawkins et al., 2004). It has been found that AI/AN adolescents show elevated rates of drug use in comparison to their non-AI/AN peers (Beauvais, 1996). Whitesell and colleagues (2014) examined predictors of escalating substance use among AI/AN youth and found that exposure to stress, early puberty, and deviant peer relationships were associated with increased substance use. In another sample of AI/AN youth, 70% identified at least one parent or grandparent who met lifetime criteria for an alcohol use disorder (Walker et al., 1996), which may also explain why AI/AN youth are at greater risk for substance use disorders. There is also significant complexity among this group, with some research finding distinctions between low-frequency and high-frequency cannabis use, tribal affiliation, gender, and other substance use (Novins & Mitchell, 1998). Importantly, there is evidence that community-delivered, culturally-grounded prevention programs can successfully address substance use among AI/AN youth (Donovan et al., 2015; Thomas et al., 2009).

Mental health and substance use problems among AI/AN adolescents may relate to their social integration among their peers and wider community, as socialization is an important aspect of adolescent development (see Fergusson & Woodward, 2002 for a longitudinal study examining psychosocial outcomes in an ethnically diverse adolescent sample). To address socialization processes, we were interested in examining two social integration constructs: school belongingness and perceived discrimination. School belongingness is the extent to which an individual feels connected to his/her school (Goodenow, 1993). A stronger sense of school belongingness is a protective factor against substance use for AI/AN youth, with a lower lifetime report of alcohol and cigarette use, lower frequency of alcohol and cigarettes, fewer substances ever used, and a later age of drug use initiation (Napoli, Marsiglia, & Kulis, 2003). These findings are consistent with research showing that lower school involvement is associated with increased substance use among AI/AN youth (Friese, Grube, & Seninger, 2015). Perceived discrimination, another aspect of social integration, has been found to be strongly associated with depressive symptoms among AI/AN adults (Whitbeck, McMorris, Hoyt, Stubben, & LaFromboise, 2002). There is also empirical support that discrimination may be an independent risk factor for substance use (LaFromboise, Hoyt, Oliver, & Whitbeck, 2006). There are also indications that perceived discrimination affects psychosocial functioning among AI/AN youth. For example, perceived discrimination has been linked to early substance use initiation among

AI/ANs in 5th through 8th grade (Whitbeck, Hoyt, McMorris, Chen, & Stubben, 2001). Much less literature addresses the effects of discrimination among AI/AN children and adolescents, and there is a need for more research on how discrimination affects their development.

In addition to a relatively limited literature addressing the behavioral health needs of AI/AN adolescents, there is a scarcity of empirical investigations that have examined the needs of AI/AN adolescents in urban settings. Approximately 70% of AI/ANs live outside of tribal reservations and within urban areas, where they generally have less familial and social support (Castor et al., 2006). Urbanization of AI/ANs has resulted from forced relocation (e.g., the Indian Relocation Act of 1956) and increased opportunities for education and employment in urban areas (Jackson, 2002; Wendt & Gone, 2012). Urbanization has resulted in poverty that is on par with poverty on reservations and considerably higher than in the general urban population (Dickerson & Johnson, 2010). Compared to their counterparts on reservations, urban AI/AN adolescents have less familial and social support, fewer opportunities to engage in traditional cultural practices, and less access to culturally appropriate health care services (Castor et al., 2006; Evans-Campbell, Lindhorst, Huang, & Walters, 2006).

Taken together, there has been very little research examining mental health, substance use, and social integration/isolation risks among early adolescent AI/ANs living in urban settings. Our study addresses behavioral and social health indicators among AI/AN early adolescents (attending 7th and 8th grades) within an urban setting. The purpose of this study was to compare rates and levels of depression and anxiety, early substance use initiation, and social integration (school belongingness and perceived discrimination) between AI/AN early adolescents, other racial/ethnic minority youth, and non-Hispanic White youth. Using secondary analyses of data from a large sample of middle school youth, we hypothesized that AI/AN early adolescents would report higher rates of depression, anxiety, and substance use in comparison to their peers (both non-Hispanic Whites and other minorities). We also used an exploratory approach to examine differences across social integration (i.e., school belongingness and perceived discrimination).

# METHODS

## Overview of Original Study

We conducted secondary analyses from a cross sectional screening survey that was used to identify 7th and 8th grade students eligible to enroll in a preventive mental health intervention study among early adolescents enrolled in four, urban middle schools in Washington State (McCarty, Violette, Duong, Cruz, & McCauley, 2013). Of the 2,650 students enrolled at these schools, 1,190 students (45%) returned parental consent forms to be included in the study. Those with elevated depression scores were eligible to participate in the full intervention study. We utilized data from the initial screening portion of that study ($N$ = 1,190). This study was approved by the Seattle Children's Research Institute Institutional Review Board and followed all laws and regulations for the protection of human subjects. Participants who assented and had parental consent to participate in the study completed an assessment battery including mental health, substance use, and social integration measures. Across all measures, no more than 7 data points were missing for any measure utilized in this study. See McCarty et al. (2013) for a full description of the original study.

## Participants

Of the 1,190 youth that provided assessment data for these analyses, 43 youth indicated that they primarily identified as AI/AN, 527 indicated other racial/ethnic minorities, including Asian ($n$ = 244), Latino ($n$ = 144), African American ($n$ = 43), Native Hawaiian or Pacific Islander ($n$ = 33), and all others ($n$ = 63), and 620 indicated non-Hispanic White. All participants were between the ages of 11 and 15. Of the total sample, 84.12% were either 12 or 13 years old. Among the AI/AN early adolescents, the average age was 12.58 years ($SD$ = .82), and 65.1% were female. All participants were enrolled in local, urban middle schools.

## Measures

### Depression

Depressive symptoms were assessed using the Mood and Feelings Questionnaire, Child Self-Report, Long Form (Angold et al., 1995; Burleson Daviss et al., 2006). This 32-item measure asks participants to report the frequency of depressive symptoms in the previous two

weeks (*most of the time*, *sometimes*, or *not at all*). Example items include "I felt I was no good anymore," "I felt I was a bad person," and "I felt lonely." This measure has been normed on early adolescents, but not explicitly among AI/AN youth. We examined depressive symptoms as both a continuous variable, as well as using a clinically-significant cutoff score of 29 (as suggested by Burleson Daviss et al., 2006). Possible scores on the measure range from 0 to 66. The MFQ was originally normed on participants between ages 6-17.

**Anxiety**

Data on anxiety came from the Revised Children's Anxiety and Depression Scale (RCADS; Chorpita, Moffitt, & Gray, 2005) to assess symptoms of anxiety. The RCADS is a 47-item measure that assesses specific types of anxiety (e.g., generalized anxiety disorder, panic disorder, social phobia, etc.). We used the Generalized Anxiety Disorder subscale for our analyses (6 items). Example items from the RCADS include "I worry when I go to bed at night" and "I worry about what is going to happen." The RCADS was normed on a sample of children in grades 3-12, with an average age of 12.9 years (*SD* = 2.7).

**Substance Use Prevalence**

Substance use data were collected by assessing lifetime prevalence of any use as an indicator of early initiation. Participants responded to three items that assessed whether they had ever used alcohol, cannabis, and tobacco. The tobacco items did not assess if tobacco was used in ceremony settings and/or as a part of cultural practices. A composite, dichotomous variable indicating any lifetime substance use was created from these three items.

**School Belongingness**

We assessed school belongingness using the Psychological Sense of School Membership scale (Goodenow, 1993). This measure contains 18 items that are rated on a 5-point Likert scale (1 = *not at all true*, 5 = *completely true*). Example items include "I feel like a part of my school" and "I can really be myself at school." A total score is summed and represents the degree to which a youth feels a sense of school belongingness and school connectedness. This measure was originally normed on a sample of participants with a mean age of 12.65 years (*SD* = .98).

**Perceived Discrimination**

Participants also completed the Multicultural Events Scale for Adolescents (MESA), and we used the discrimination subscale to examine the construct of perceived discrimination

(Gonzales, Gunnoe, Jackson, & Samaniego, 1995; Gonzales, Tein, Sandler, & Friedman, 2001). Participants were asked to rate if each event listed had "happened" or "did not happen" in the previous three months. The discrimination subscale contains six items. Examples include items such as "You were unfairly accused of doing something bad because of your race or ethnicity" and "People put you down for practicing the customs or traditions of your own race or ethnicity or country of origin." This measure was originally normed on a sample of participants with a mean age of 13.35 years (*SD* = .88).

### Data Analytic Plan

We first examined the bivariate data using Pearson correlations within the AI/AN group in order to examine how depression, anxiety, and social integration were related. We were particularly interested in the relationship between the mental health constructs (depression and anxiety) and the social integration constructs (school belongingness and perceived discrimination). We then used one-way ANOVAs and chi-square tests to examine racial/ethnic group differences of the entire sample regarding depression, anxiety, early substance use initiation, perceived discrimination, and school belongingness. We compared the AI/AN early adolescents to other racial/ethnic minorities as well as non-Hispanic White youth.

## RESULTS

### Bivariate Analysis

We examined the correlations between the continuous measures within our study, which included depression, anxiety, school belongingness, and perceived discrimination (see Table 1). Not surprisingly, depression and anxiety symptoms were positively correlated ($r = .68$, $p < .001$). Depression was negatively correlated with school belongingness, such that increases in depression were associated with less psychological connection with the school environment ($r = -.35$, $p = .02$). Perceived discrimination was positively correlated with both depression ($r = .36$, $p = .02$) and anxiety ($r = .35$, $p = .02$). School belongingness and perceived discrimination were not significantly correlated.

**Table 1**
**Bivariate Data Among American Indian/Alaska Native Early Adolescents (*n* = 43)**

| | Depression[1] | Anxiety[2] | School Belongingness[3] | Perceived Discrimination[4] |
|---|---|---|---|---|
| Depression[1] | - | - | - | - |
| Anxiety[2] | .68*** | - | - | - |
| School Belongingness[3] | -.35* | -.1 | - | - |
| Perceived Discrimination[4] | .36* | .35* | -.06 | - |

*Note*. [1] The Mood and Feelings Questionnaire. [2] Revised Children's Anxiety and Depression Scale. [3] Psychological Sense of School Membership. [4] Multicultural Events Scale for Urban Adolescents.
* signifies $p$ <.05. *** signifies $p$ <.001.

## Mental Health Outcomes

There was a statistically significant difference between racial/ethnic groups on the total depression score ($F(2, 111.57) = 11.31$, $p < .001$). Post-hoc tests indicated that the AI/AN group had a significantly higher depression score ($M = 18.30$, $SD = 13.67$) than non-Hispanic Whites ($M = 9.67$, $SD = 9.22$; $p = .001$) and other minorities ($M = 11.43$, $SD = 11.06$; $p = .007$). Notably, the AI/AN early adolescents reported nearly twice the level of depression compared to non-Hispanic White adolescents. There was also a significant difference between other minorities and non-Hispanic Whites, with other minorities reporting more depression ($p = .011$). These findings also held when we examined the percentage of participants reporting depression levels above the clinically-significant cut-off score of 29 ($x^2$ (2) = 23.81, $p < .001$). Among AI/AN early adolescents, 23.3% were above this threshold, compared to 5.2% of non-Hispanic Whites and 10.2% of other minorities. With regard to anxiety, there was a significant difference between racial/ethnic groups ($F(2, 1184) = 4.95$, $p = .007$), with AI/AN early adolescents reporting more anxiety symptoms ($M = 12.53$, $SD = 3.33$) than non-Hispanic Whites ($M = 10.8$, $SD = 3.4$; $p = .005$) and other racial/ethnic minority peers ($M = 10.98$, $SD = 3.66$; $p = .014$). See Table 2 for a summary of these findings.

## Substance Use

As shown in Table 2, AI/AN early adolescents were significantly more likely to report lifetime prevalence of substance use (30.2%), compared to 12% of non-Hispanic Whites and 16.7% of other racial/ethnic minorities. These differences were significant for each of the three

reported substances. For tobacco, 14% of AI/ANs reported lifetime use, compared to 2.4% of non-Hispanic Whites and 4.2% of other minorities. For alcohol, 25.6% of the AI/AN sample reported lifetime alcohol use, compared to 11.4% of non-Hispanic Whites and 14.6% of other minorities. For cannabis, 9.5% of AI/ANs reported lifetime cannabis use, compared to 2.6% of non-Hispanic Whites and 2.9% of other minorities.

**Table 2**
**Behavioral Health Indicators for Early Adolescents in Three Racial/Ethnic Groups**

| | American Indian/Alaska Native *n* = 43 | Non-Hispanic White *n* = 620 | Other Racial/Ethnic Minorities *n* = 527 | | |
|---|---|---|---|---|---|
| **Continuous Variables** | *M (SD)* | *M (SD)* | *M (SD)* | *F*(df) | *p* |
| Age | 12.58 (.82) | 12.74 (.7) | 12.8 (.88) | 1.79 (2, 1187) | .167 |
| Depression Total Score[1] | 18.30 (13.67) | 9.67 (9.22) | 11.43 (11.06) | 11.31 (2, 111.57) | <.001* |
| Anxiety[2] | 12.53 (3.33) | 10.8 (3.4) | 10.98 (3.66) | 4.95 (2, 1184) | .007* |
| School Belongingness[3] | 51.91 (10.77) | 55.67 (7.95) | 54.98 (9.91) | 3.05 (2,112.42) | .021* |
| Perceived Discrimination[4] | 1.35 (1.21) | 0.7 (.99) | 1.34 (1.38) | 42.28 (2, 113.61) | <.001* |
| **Categorical Variables** | *n* (%) | *n* (%) | *n* (%) | $X^2$ (df) | *p* |
| Gender (Female) | 28 (65.1) | 348 (56.1) | 287 (54.5) | 1.92 (2) | .383 |
| Depression Above Cutoff[2] | 10 (23.3) | 32 (5.2) | 54 (10.2) | 23.81 (2) | <.001* |
| Used Any Substance Use[5] | 13 (30.2) | 74 (12) | 87 (16.7) | 13.61 (2) | .001* |
| Used Alcohol[5] | 11 (25.6) | 70 (11.4) | 76 (14.6) | 8.30 (2) | .016* |
| Used Cannabis[5] | 4 (9.5) | 16 (2.6) | 15 (2.9) | 6.59 (2) | .037* |
| Used Tobacco[5] | 6 (14) | 15 (2.4) | 22 (4.2) | 16.04 (2) | <.001* |

*Note.* [1] The Mood and Feelings Questionnaire. [2] Revised Children's Anxiety and Depression Scale. [3] Psychological Sense of School Membership. [4] Multicultural Events Scale for Urban Adolescents. [5] Lifetime prevalence.

## Social Integration

There was a significant group difference regarding school belongingness between the groups ($F(2, 112.42) = 3.05$, $p = .021$), although post hoc analyses did not find significant differences between either the non-Hispanic Whites or the other minority peers. There were also significant differences between groups regarding perceived discrimination ($F(2, 113.61) = 42.48$, $p < .001$). Post hoc analyses indicated that the AI/AN early adolescents reported significantly more perceived discrimination ($M = 1.35$, $SD = 1.21$) than the non-Hispanic White group ($M =$

.7, *SD* = .99; *p* = .003). There were no significant differences on perceived discrimination between the AI/AN group and the other racial/ethnic minority group.

## DISCUSSION

We examined racial/ethnic group differences among urban AI/AN early adolescents (ages 11-15 years old), non-Hispanic Whites, and other racial/ethnic minorities on mental health and related risks by conducting secondary analyses from cross sectional data. We found that AI/AN youth reported nearly twice the level of depression as did non-Hispanic Whites. Significantly more AI/AN early adolescents also reported notable levels of depression than did other racial/ethnic minorities within the sample. Similar to studies with adults (Herne et al., 2014) and older adolescents (Borowsky, Resnick, Ireland, & Blum, 1999), there is evidence that early adolescents also report higher levels of depression. Further, we found that AI/AN early adolescents also reported more symptoms of generalized anxiety than their peers. Depression was correlated with lower school belongingness and greater perceived discrimination, which highlights the importance of addressing psychosocial functioning among this group. These findings indicate that elevated symptoms of depression as well as anxiety among AI/AN early adolescents are frequently present prior to enrollment in high school (Listug-Lunde et al., 2013).

Consistent with previous research, we also found that AI/AN early adolescents endorsed a higher lifetime prevalence of using any substance, as well as higher lifetime prevalence of tobacco use, alcohol use, and cannabis use. Prior studies have suggested that AI/AN early adolescents report elevated levels of parental substance use disorders, which may increase access or tolerance for substance use (Walker et al., 1996). Our findings are consistent with previous research that has found that AI/AN early adolescents are more likely to smoke tobacco (Hawkins et al., 2004). Our findings that they were also at an increased risk for using alcohol and cannabis are consistent with other studies that have found that AI/AN persons tend to initiate substance use at an earlier age (Beauvis, 1992; Hawkins et al., 2004).

Finally, we examined how AI/AN early adolescents compared with their peers and the wider community regarding two social integration constructs: school belongingness and perceived discrimination. AI/AN early adolescents reported significantly less school belongingness, and although we were unable to test for causal relationships because these were cross sectional analyses, feeling less connected to the school system may be related to depression

and anxiety or vice versa. Although cultural connectedness was not assessed in this study, previous research has found that cultural connectedness was positively associated with school belongingness (Snowshoe, Crooks, Tremblay, & Hinson, 2016). We also found that AI/AN early adolescents reported more perceived racial discrimination than non-Hispanic Whites, and this level was similar to other racial/ethnic minorities. Because discrimination is inherently unjust and associated with negative outcomes such as isolation and stress (Bombay, Matheson, & Anisman, 2014; Whitbeck et al., 2001; Whitbeck et al., 2002), the endorsement of discrimination among early adolescent AI/ANs is important to highlight. This too may be related to depression, anxiety, and substance use.

Our results speak to several potential clinical and prevention planning implications. The first is that early intervention is indicated among this group, as even urban (non-reservation), early adolescent AI/ANs report greater depression symptoms, greater anxiety symptoms, more substance use, and a higher level of perceived racial discrimination in comparison to their non-Hispanic White peers. Our study also highlights the need for screening of behavioral health indicators (e.g., school adjustment, perceived discrimination, substance use, depression, anxiety) in order to inform such interventions. Further, despite the observed disparities experienced by the AI/AN early adolescents, it is important to note that AI/AN persons are a resilient group with many cultural strengths. Our results indicate a need for targeted, culturally responsive assessment and intervention for this subgroup of AI/AN youth. In recent years, there has been some development of culturally adapted interventions for AI/AN youth (Donovan et al., 2015), and our investigation indicates the importance of broadening and disseminating such work. Taken together, our finding that AI/AN early adolescents endorsed behavioral health risk factors indicates a need to reduce such disparities through prevention planning and clinical interventions.

There are several important limitations to our investigation. The first is that our results were derived exclusively from cross sectional data, which prevented any causal inferences from being made. Second, we were unable to target the mechanisms of such disparities. Some potential mechanisms that have been cited in the literature include the impact of historical trauma (Whitbeck, Adams, Hoyt, & Chen, 2004), poverty (Sarche & Spicer, 2008; Wolfe et al., 2012), and limited access to culturally-appropriate health care services (Brown, Ojeda, Wyn, & Levan, 2000; Gone & Trimble, 2012). Also, tribal affiliation was not collected during the course of the

study (whether within the urban setting or on reservations), so we were unable to determine tribal membership among this subgroup of AI/AN youth or the level of connection and involvement with their respective tribes. Finally, due to small sample sizes, we were unable to further break down the analyses by age and gender. There were also notable sample size differences between racial/ethnic groups in our study. Because this was one of very few investigations that have examined behavioral health indicators among urban, AI/AN early adolescents, the results found in this study should be generalized cautiously.

Future research would benefit by specifically recruiting AI/AN early adolescents and following their mental health and substance use outcomes utilizing a prospective, longitudinal design. We also recommend piloting a culturally adapted, school-based intervention to identify at-risk AI/AN early adolescents and enhance their resiliency.

In conclusion, we found that early adolescent AI/ANs enrolled in middle schools in urban settings were at risk for a number of behavioral health risk factors, including elevated depression, anxiety, and substance use; less school belongingness; and increased discrimination. This population has been triply understudied in that there is a paucity of research addressing 1) AI/AN behavioral health in comparison to other racial/ethnic groups; 2) early adolescent AI/AN behavioral health; and finally 3) behavioral health needs of an early AI/ANs residing in an urban setting. Thus, we believe that these findings support the need for more research among this group, as well as the need for early intervention and prevention services.

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# OBESOGENIC BEHAVIORS, SELF-EFFICACY, AND DEPRESSIVE SYMPTOMS IN AMERICAN INDIAN CHILDREN

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*Background: American Indian (AI) children suffer from high rates of obesity, obesity-related disease, obesogenic behaviors, and depressive symptoms. Objective: Study was designed to determine the associations between depressive symptoms and obesogenic behaviors in school-aged AI children in Oklahoma. Methods: Study design was cross-sectional. Depressive symptoms, beverage intake, fruit and vegetable intake, meal frequency, physical activity, and screen time were self-reported. Results: Mean participant age was 10.5 ± 1.6 years (n = 121); 64% were overweight/obese. Depressive symptoms were associated with dieting and screen time. Conclusion: AI chronic disease prevention efforts will benefit by including measures for depression and associations of obesogenic behaviors and depressive symptoms in treatment planning.*

## INTRODUCTION

American Indians (AI), a widely diverse sub-population consisting of culturally and geographically distinct tribes and nations (Lycett, 2014), suffer from higher rates of type 2 diabetes and cardiovascular disease (Jacobs-Wingo et al., 2016). Even the youngest of this population are known to have these conditions (Wheelock et al., 2016), which are often associated with obesity. Overweight/obesity prevalence in AI children ranges from 20%-63% (Dennison et al., 2015; Tomayko, Weinert, Godfrey, Adams, & Hanrahan, 2016; Zephier, Himes, Story, & Zhou, 2006), compared with the 34% reported from U.S. nationally representative samples (Ogden, Carroll, Kit, & Flegal, 2014). Furthermore, behaviors known to contribute to obesity, like obesogenic behaviors, are more pronounced in AI children. Previously, a group of AI children were shown to have greater consumption of sugar-sweetened beverages and low participation in physical activity (Dennison et al., 2015). Seven-to-thirteen-year-old AI children in Oklahoma consume 309 kilocalories (a basic unit of energy) of sugar-sweetened

beverages daily (Dennison et al., 2015), compared with the 178 kcal consumed daily by 2-to-11-year-old non-AI children (Han & Powell, 2013). Participation in adequate physical activity is also lower in AI children, with only 32% of AI children in Oklahoma meeting moderate-to-vigorous physical activity recommendations (Dennison et al., 2015), as compared with 70% in a non-AI population of similar aged children (Fakhouri, Hughes, Brody, Kit, & Ogden, 2013). AI children also participate in approximately 3.7 ± 1.7 hours of screen time per day (Foulds, Rodgers, Duncan, & Ferguson, 2016). This rate is higher than that reported for non-AI children (2.2 ± 0.6 hours; Foulds et al., 2016; Marshall, Gorely, & Biddle, 2006). Approximately 8.6% of Oklahoma citizens self-identify as AI, making Oklahoma the fourth highest state for AI population per capita (Office of Minority Health, 2012), making it an ideal environment for examining obesogenic behaviors in AI children.

In this new research, the authors explore the associations of obesogenic behaviors with measures of self-efficacy and depressive symptoms in a similar group of children. Dietary and physical activity self-efficacy (one's confidence in their ability to make healthy choices) mediates obesogenic behaviors in adults (Boudreaux et al., 2003). Self-efficacy is positively associated with healthy choices concerning diet, physical activity, and screen time (Dennison, Sisson, & Morris, 2016). However, these findings are inconsistent (van Stralen et al., 2011), and other influences, such as depressive symptoms (Castillo, Francis, Wylie-Rosett, & Isasi, 2014), should be considered since self-efficacy is inversely related to depressive symptoms in adults (Konttinen, Silventoinen, Sarlio-Lahteenkorva, Mannisto, & Haukkala, 2010; Steca et al., 2014).

A recent review demonstrated that depressive symptoms are associated with less desirable health behaviors (Dennison et al., 2016). Specifically, higher depressive symptoms have been associated with inadequate fruit and vegetable intake and high intake of energy-dense foods, salty foods, and sweet foods by adolescents (Castillo et al., 2014; Hoare et al., 2014; Jacka et al., 2010). Higher depressive symptoms are associated with decreased moderate and vigorous physical activity participation (Dockray, Susman, & Dorn, 2009; Gray, Janicke, Ingerski, & Silverstein, 2008; Jacka et al., 2010; Motl, Birnbaum, Kubik, & Dishman, 2004; Rothon et al., 2010) and higher screen time in adolescents (Benson, Williams, & Novick, 2013; Castillo et al., 2014). The obesity/depression cycle is acknowledged by clinicians; the American Academy of Pediatrics (AAP) recommends screening children and youth for depression beginning at a BMI percentile of 85 or greater, the level at which overweight classifications begin (Barlow, 2007). It

is worth noting that AI youth are more severely afflicted by depression and depressive symptoms (25%; Johnson, 1994; Lemstra et al., 2011; Saluja et al., 2004; Stiffman, Alexander-Eitzman, Silmere, Osborne, & Brown, 2007; Zahran et al., 2005) and have a higher prevalence of depression than the general population (7.5%; Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015).

Several studies have examined the relationship of depressive symptoms and obesogenic behaviors (Benson et al., 2013; Bickham, Hswen, & Rich, 2015; Cao et al., 2011; Castillo et al., 2014; Dockray et al., 2009; Gray et al., 2008; Hoare et al., 2014; Irving, Wall, Neumark-Sztainer, & Story, 2002; Jacka et al., 2010; Johnson et al., 2008; Johnson, 1994; Kann et al., 2000; Kremer et al., 2014; Maras et al., 2015; Motl et al., 2004; Needham & Crosnoe, 2005; Ra & Gang, 2016; Rothon et al., 2010; Schmitz et al., 2002; Serdula et al., 1993; Sun et al., 2005; Wang, Fu, Lu, Tao, & Hao, 2014; Ybarra, Alexander, & Mitchell, 2005; Zahedi et al., 2014; Zahran et al., 2005). However, only one has examined depression and self-efficacy (Castillo et al., 2014), and none have specifically included AI youth. In order to follow the current American Academy of Pediatrics (AAP) recommendations (Spear et al., 2007) and facilitate effective obesity intervention programs targeting vulnerable populations, further exploration of the association of obesogenic behaviors and depressive symptoms' status and self-efficacy in AI children is warranted. The purpose of this study was to determine the relationship between depressive symptoms and obesogenic behaviors and whether self-efficacy mediates that relationship, independent of obesity, in pre-adolescent (7 to 13 years) AI children. We hypothesized that depressive symptoms would be associated with obesogenic behaviors and that self-efficacy would mediate this relationship.

## METHODS

### Study Design

This cross-sectional study was conducted during the first day of a diabetes prevention summer camp, Native Youth Preventing Diabetes (NYPD), in June 2015. Height and weight was measured by trained technicians. Participants completed dietary, physical activity, screen time, dietary/physical activity self-efficacy, and depressive symptoms through self-report surveys. Personnel, including tribal employees and organization volunteers, assisted children with reading

survey tools and were trained to avoid leading, social pressure, or directing responses. Approval from the NYPD coalition and the university Institutional Review Board was received before study initiation.

## Population

AI children who attended the NYPD camp were eligible for participation. Participation was not required for camp attendance, and camp recruitment was open to 7- to 13-year-old children affiliated with 13 Oklahoma-based tribes. With one exception, all parents or guardians returned the signed consent form to have their child participate ($n$ = 121). All children with parental consent assented. Children's ages, dates of birth, and sexes were reported by parents or guardians.

## Measures

### Body Mass Index (BMI)

Weight and height were measured using a Tanita TBF-310 Body Composition Analyzer (Tanita Corporation, Arlington Heights, Ill) and a Seca stadiometer (Seca Corporation, Chino, CA), respectively. Participants were measured wearing light clothing and without shoes. Participants' BMIs $(wt(lb)/(ht(in))^2 x703)$ and percentiles (Kuczmarski et al., 2000) were calculated for age in months and sex (Shape Up America!, 2013). The BMI percentiles were classified as defined by the Centers for Disease Control and Prevention (CDC; Centers for Disease Control, 2013) and collapsed as under/healthy weight ($<85^{th}$ percentile) and overweight/obese ($\geq 85^{th}$ percentile) to describe the sample.

### Depressive Symptoms

Depressive symptoms were assessed using the Child Depression Inventory, a 27-item survey that was previously validated in 6- to 17-year-old children (Cronbach's alpha = 0.86; Saylor, Finch, Spirito, & Bennett, 1984). Survey questions addressed feelings of sadness, self-worth, and depression. Answer options included three responses, with progressively serious indicators of depressive symptoms for each question (i.e., I feel sad some/most/all of the time). Outcomes considered to be of elevated risk were discussed privately with participants. It is important to distinguish between depression and depressive symptoms. For the purpose of this study, these are operationalized as follows: 1) depression is a clinical diagnosis made by mental

health professionals who often use various tools to assist in diagnosis, whereas 2) depressive symptoms are a continuous range of symptoms, without an official diagnosis of depression by a mental health care provider, often utilizing clinical tools. Most literature examining depression and obesogenic behaviors has used depressive symptoms rather than including official clinical diagnoses (Dennison et al., 2016). For our purposes, the term depressive symptoms will be used in lieu of a clinical diagnosis.

### Dietary Behaviors

*Sugar-sweetened Beverage Consumption*

Frequency and volume of sweetened juice/beverages, regular soda, diet soda, sweetened teas, and energy/sports drinks was measured using a modified Beverage Questionnaire-15 (Bevq-15) with moderate-to-strong test/retest reliability ($r^2$ = 0.52-0.95, $p < 0.001$; Hedrick et al., 2012). The survey was abbreviated to five questions to make it easier for younger children to understand. Frequency, volume, and type of beverage were used to calculate daily kilocalorie consumption.

*Meal Consumption*

Breakfast, lunch, and dinner consumption frequency was assessed using three items from the Project Eating Among Teens (EAT) survey (DeLong et al., 2008). Response options included "never," "1-2 days," "3-4 days," "5-6 days," and "every day" per week (Cronbach's alpha = 0.57; Neumark-Sztainer, Wall, Perry, & Story, 2003). As reported in a previous study, the median value for each answer option was used to calculate weekly frequency of meals (Larson, Neumark-Sztainer, & Story, 2009). For example, "1-2 days" was calculated as 1.5 days.

*Fruit and Vegetable Consumption*

Fruit and vegetable consumption were assessed using five items from the Youth Risk Behavior Surveillance survey (Kann et al., 2000). Questions assessed the frequency of fruit, salad, potato, carrot, and "other" vegetable consumption. Questionnaire responses included "0 times," "1-3 times during the past 7 days," "4 to 6 times during the past 7 days," "1 time/day," "2 times/day," "3 times/day," and "4 or more times/day." Accuracy and validity values for this survey have not been reported. Consistent with YRBSS methodology (CDC, 2015), the median value for each answer option range was used to calculate daily fruit and vegetable consumption. For example, "1-3 times during the past 7 days" was calculated as 0.28 times in the past 7 days.

### Physical Activity Behaviors

Type and duration of physical activity behavior was evaluated using three items from the Project Eat survey (DeLong et al., 2008). Questions assessed time spent in mild (e.g., slow walking), moderate (e.g., slow bicycling), and vigorous (e.g., running, fast bicycling) physical activity. Questionnaire responses included "never," "less than 0.5 hours/week," "0.5-2 hours/week," "2.5-4 hours/week," and "6+ hours/week." Moderate test-retest reliability has been reported (mild physical activity $r = 0.54$, moderate physical activity $r = 0.53$, and vigorous physical activity $r = 0.72$) for 12- to 18-year-old children (Larson, Neumark-Sztainer, Story, van den Berg, & Hannan, 2011). While this tool has not been validated in younger participants, our previous work with this tool shows no age difference (Dennison et al., 2015). As reflected in the Project EAT instrument development, the median value for each answer option range was used to calculate time spent in physical activity per week. For example, "0.5-2 hours/week" was calculated to be 1.25 hours per week (Project EAT and F-EAT Surveys Psychometrics, n.d.).

### Screen Time Behaviors

Screen time behavior questions from the Project EAT survey assessed time spent watching TV, using a computer, playing sedentary electronic games, and playing non-sedentary electronic games (i.e., exergaming) on weekdays and weekend days (DeLong et al., 2008). Questionnaire responses included "0 hours/day," "0.5 hour/day," "1 hour/day," "2 hours/day," "3 hours/day," "4 hours/day," and "5+ hours/day." Actual values for each answer option were used to calculate screen time. The correlation coefficients of these questions for 12- to 18-year-old children has been reported to be $r = 0.67$ (watching TV/DVD), $r = 0.81$ (using computer), $r = 0.84$ (sedentary video games), and $r = 0.73$ (non-sedentary video games; Project EAT and F-EAT Surveys Psychometrics, n.d.). This tool is not validated in younger participants. However, its length and difficulty are similar to that of the other self-report surveys used in the present study.

### Self-Efficacy

Dietary self-efficacy was assessed using a nine-item assessment tool from the Project Eat Survey (Neumark-Sztainer, Wall, Story, & Perry, 2003) that asks the participant how confident they are to choose healthy foods while in various scenarios. Responses ranged from "not at all sure" to "very sure." The psychometric properties for these questions have not been reported. However, the tool has been used in other studies targeting older children, adolescents, and adults

(Irving et al., 2002; Larson, Neumark-Sztainer, Hannan, & Story, 2007; Larson, Story, Perry, Neumark-Sztainer, & Hannan, 2007; Neumark-Sztainer et al., 2002; Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007; Neumark-Sztainer, Wall, Perry, & Story, 2003). Physical activity self-efficacy was assessed using three items from the Project Eat Survey (DeLong et al., 2008) that determined whether the participant agreed that they could be physically active despite time, weather, and travel constraints. Responses ranged from "agree a lot" to "disagree a lot." Internal consistency of the tool has been tested in children ages 12-18 years (Cronbach's alpha = 0.73; Pearson's *r* value = 0.71; Project EAT and F-EAT Surveys Psychometrics, n.d.). This tool was chosen for its previous use in an AI population (DeLong et al., 2008), ease of administration, and readability. Searches for similar validated tools in a younger population yielded no results before study initiation. Since there is not a congruent measure of screen time self-efficacy and similar to a previous study (Castillo et al., 2014), the physical activity self-efficacy score was used in the fully adjusted screen time linear regression analysis.

## Data Analysis

Descriptive characteristics were calculated for all variables (Table 1). Sex differences in obesogenic behaviors were examined using an independent *t*-test. Individual crude bivariate linear regression models that included each behavioral independent variable and the depressive symptoms dependent variable were calculated (data not presented). Correlations between potential confounders (e.g., age, sex, BMI percentile, behavioral self-efficacy), depressive symptoms, and each obesogenic behavior were calculated. The gender test was performed to determine if sex needed to be included as a covariate. Based on significant correlations and *t*-tests amongst hypothesized confounders and model variables, each bivariate linear regression model (single behavioral predictor and depressive symptom outcome) was adjusted for pertinent confounders. Mediating relationships were calculated using the Sorbel test (Quantpsy.org, 2001). SPSS© version 20 was used for descriptive and regression analyses.

**Table 1**
**Descriptive Characteristics of 7 to 13-year-old AI children (*n* = 121)**

| | % (n) or mean ± SD |
|---|---|
| **Demographics** | |
| Female | 60.3 (73) |
| Male | 39.7 (48) |

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**Table 1 Continued**
**Descriptive Characteristics of 7 to 13-year-old AI children (*n* = 121)**

| | % (n) or mean ± SD |
|---|---|
| **Number of Children by Age (years)** | |
| 7 | 1.7 (2) |
| 8 | 10.7 (13) |
| 9 | 16.5 (20) |
| 10 | 17.4 (21) |
| 11 | 19.8 (24) |
| 12 | 25.6 (31) |
| 13 | 8.3 (10) |
| Mean Age | 10.5 ± 1.6 |
| **Weight Characteristics** | |
| BMI percentile | 80.7 ± 24.2 |
| Underweight/normal weight | 36.3 (44) |
| Overweight/obese | 63.6 (77) |

## RESULTS

The sample consisted of 121 children (60% female) with a mean age of 10.5 ± 1.6 years. Approximately 64% were classified overweight/obese, and 12% met criteria for depressive symptoms. Males consumed more sweet tea, energy/sports drinks, and total sugar-sweetened beverages and spent more time in sedentary video game usage on both weekdays and weekends. Table 2 shows the obesogenic behavior data for total sample, males, and females. Average daily total sugar-sweetened beverage intake for the group was 381.9 ± 248.1 kcal; average daily total fruit and vegetable serving consumption was 1.9 ± 0.9 average daily total moderate + vigorous physical activity time (hours) was 0.7 ± 0.5; and average daily screen time (hours) was 7.2 ± 5.7 (weekday) and 7.3 ± 6.1 (weekend).

**Table 2**
**BMI, Child Depression Inventory (CDI), and obesogenic behavior characteristics (mean ± *SD*) for 7- to 13-year-old AI children (*n* = 121)**

| | Total Sample | Females | Males | *p*-value |
|---|---|---|---|---|
| **CDI Score** | 0.38 ± 0.29 | 0.38 ± 0.30 | 0.37 ± 0.27 | 0.812 |
| **BMI percentile** | 80.7 ± 24.2 | 80.5 ± 25.7 | 80.1 ± 22.0 | 0.929 |
| **Diet Intake Behaviors** | | | | |
| *Daily Sugar-sweetened beverage intake (kilocalories)* | | | | |
| Sweet juice | 102.1 ± 98.4 | 101.7 ± 104.3 | 102.8 ± 89.9 | 0.950 |
| Diet soda | 1.3 ± 1.5 | 1.2 ± 1.4 | 1.4 ± 1.7 | 0.628 |
| Regular soda | 112.5 ± 106.9 | 97.7 ± 93.1 | 135.0 ± 122.7 | 0.077 |
| Sweet tea | 64.8 ± 70.7 | 47.0 ± 55.6 | 91.9 ± 82.2 | **0.001** |
| Energy/sports drinks | 101.4 ± 111.9 | 76.1 ± 86.2 | 139.7 ± 134.7 | **0.005** |
| All sugar-sweetened beverages | 381.9 ± 248.1 | 323.7 ± 207.7 | 470.7 ± 279.0 | **0.002** |

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**Table 2 Continued**
**BMI, Child Depression Inventory (CDI), and obesogenic behavior characteristics (mean ± *SD*) for 7- to 13-year-old AI children (*n* = 121)**

| | Total Sample | Females | Males | *p*-value |
|---|---|---|---|---|
| **Diet Intake Behaviors** | | | | |
| *Daily Fruit/Vegetable Intake (servings frequency)* | | | | |
| Fruit | 1.1 ± 1.4 | 1.0 ± 1.2 | 1.3 ± 1.6 | 0.271 |
| Salad | 0.6 ± 0.9 | 0.6 ± 0.9 | 0.6 ± 1.0 | 0.925 |
| Potato | 0.6 ± 1.0 | 0.6 ± 1.1 | 0.6 ± 0.9 | 0.930 |
| Carrot | 0.7 ± 1.2 | 0.6 ± 1.0 | 1.0 ± 1.4 | 0.105 |
| Other vegetables | 1.1 ± 1.2 | 1.0 ± 1.1 | 1.2 ± 1.3 | 0.426 |
| All fruit and vegetables | 1.9 ± 0.9 | 1.9 ± 0.9 | 2.1 ± 1.0 | 0.338 |
| *Meal Consumption Per Week (frequency)* | | | | |
| Breakfast | 5.1 ± 2.5 | 5.1 ± 2.5 | 5.0 ± 2.6 | 0.740 |
| Lunch | 5.6 ± 2.2 | 5.7 ± 2.1 | 5.5 ± 2.4 | 0.403 |
| Supper | 6.3 ± 1.6 | 6.4 ± 1.5 | 6.1 ± 1.7 | 0.310 |
| All meals | 16.9 ± 5.1 | 0.6 ± 0.1 | 0.6 ± 0.2 | 0.383 |
| *Physical Activity Behaviors (hours per day)* | | | | |
| Vigorous | 0.4 ± 0.3 | 2.9 ± 2.1 | 2.5 ± 2.2 | 0.362 |
| Moderate | 0.3 ± 0.3 | 2.2 ± 2.0 | 2.1 ± 2.1 | 0.789 |
| Mild | 0.3 ± 0.3 | 2.0 ± 2.2 | 1.7 ± 2.1 | 0.462 |
| Moderate + vigorous | 0.7 ± 0.5 | 0.7 ± 05 | 0.7 ± 0.6 | 0.503 |
| **Screen Time Behaviors (hours per day)** | | | | |
| *Weekday* | | | | |
| Watching television/videos | 2.0 ± 1.8 | 2.0 ± 1.9 | 2.8 ± 1.8 | 0.582 |
| Using computer | 0.9 ± 1.6 | 0.7 ± 1.4 | 1.2 ± 1.8 | 0.154 |
| Playing sedentary video games | 1.3 ± 1.6 | 0.9 ± 1.0 | 2.1 ± 2.0 | **<0.001** |
| Playing non-sedentary video games | 1.1 ± 1.5 | 1.0 ± 1.2 | 1.4 ± 1.9 | 0.174 |
| Other electronic device use (tablets, phones, etc.) | 1.9 ± 1.9 | 2.0 ± 1.8 | 1.8 ± 1.9 | 0.496 |
| *Weekend* | | | | |
| Watching television/videos | 2.0 ± 1.8 | 2.1 ± 1.8 | 2.0 ± 1.8 | 0.728 |
| Using computer | 0.9 ± 1.7 | 0.7 ± 1.5 | 1.2 ± 1.9 | 0.103 |
| Playing sedentary video games | 1.3 ± 1.7 | 1.0 ± 1.5 | 1.9 ± 2.0 | **0.008** |
| Playing non-sedentary video games | 1.2 ± 1.6 | 1.0 ± 1.3 | 1.4 ± 1.9 | 0.193 |
| Other electronic device use (tablets, phones, etc.) | 1.9 ± 1.9 | 2.1 ± 1.9 | 1.6 ± 1.7 | 0.170 |
| Total screen time per average weekday (hrs) | 7.2 ± 5.7 | 6.5 ± 4.7 | 8.5 ± 6.9 | 0.079 |
| Total screen time per average weekend day (hrs) | 7.3 ± 6.1 | 6.8 ± 5.4 | 8.1 ± 7.0 | 0.295 |

Correlational analysis (not shown) showed associations between age and sports drinks, other vegetable intake, vigorous physical activity, weekday and weekend television use, and other electronic device use. Sex was correlated with sweet tea, energy/sports drinks, total sugar-sweetened beverage intake, and weekday/weekend sedentary video game use. Table 3 displays the results of the adjusted linear regression models for the sample. When adjusted for potential confounders, as identified in correlational analysis (see table 3 subscript), higher depressive symptoms were associated with higher diet soda intake and lower breakfast, lunch, and supper frequency. There was no association between depressive symptoms and frequency of fruit and

vegetable consumption or hours spent in physical activity. Regarding screen time, depressive symptoms were associated with one weekday behavior and several weekend behaviors. Higher depressive symptoms were associated with more hours per weekday of "other" electronic use. In addition, higher depressive symptoms were associated with more hours per weekend day spent watching television/videos, using a computer, playing sedentary video games, "other" electronic use, and total hours of screen time. Dietary and physical activity self-efficacy were not mediators in the relationship between depressive symptoms and obesogenic behaviors.

**Table 3**
**Adjusted association between BMI and obesogenic behaviors and depressive symptoms in 7- to 13-year-old AI children (*n* = 121)**

| Predictor Variable | Beta + SE (Unstandardized) | p-value |
|---|---|---|
| **BMI Percentile** | 0.001 ± 0.001 | 0.305 |
| **Dietary Intake Behaviors** | | |
| *Daily Sugar-sweetened Beverage intake (kilocalories)* | | |
| Sweet juice | 0.000 ± 0.000 | 0.761 |
| **Diet soda** | **0.044** ± 0.017 | **0.012** |
| Regular soda | 0.000 ± 0.000 | 0.373 |
| Sweet tea [c] | 0.000 ± 0.000 | 0.569 |
| Energy/sports drinks [a, c] | 0.000 ± 0.000 | 0.282 |
| All sugar-sweetened beverage intake [c] | 0.000 ± 0.000 | 0.349 |
| *Daily fruit/vegetable intake (servings frequency)* | | |
| Fruit | -0.024 ± 0.019 | 0.213 |
| Salad | -0.026 ± 0.028 | 0.347 |
| Potato | -0. 006 ± 0.025 | 0.818 |
| Carrots [b] | -0.041 ± 0.023 | 0.075 |
| Other vegetables [a, b] | -0.007 ± 0.023 | 0.750 |
| All fruit and vegetable intake | -0.050 ± 0.029 | 0.081 |
| *Meal consumption per week (frequency)* | | |
| Breakfast | **-0.038** ± 0.010 | **<0.001** |
| Lunch | **-0.030** ± 0.012 | **0.012** |
| Supper | **-0.048** ± 0.016 | **0.003** |
| All meals | **-0.020** ± 0.005 | **<0.001** |
| *Physical Activity Behaviors (hours per day)* | | |
| Vigorous [a, e] | -0.058 ± 0.084 | 0.491 |
| Moderate [b, e] | 0.054 ± 0.087 | 0.537 |
| Mild | 0.001 ± 0.012 | 0.952 |
| Moderate + vigorous [e] | -0.005 ± 0.048 | 0.918 |
| **Screen Time Behaviors (hours per day)** | | |
| *Weekdays* | | |
| Watching television/videos [a, e] | 0.007 ± 0.015 | 0.653 |
| Using computer | 0.032 ± 0.017 | 0.055 |
| Playing sedentary video games [c, e] | 0.008 ± 0.017 | 0.655 |
| Playing non-sedentary video games | 0.013 ± 0.017 | 0.444 |
| Other electronic device use (tablets, phones, etc.) [a, e] | **0.030** ± 0.014 | **0.034** |
| Total screen time per weekday [e] | 0.007 ± 0.004 | 0.090 |

continued on next page

**Table 3 Continued**
**Adjusted association between BMI and obesogenic behaviors and depressive symptoms in 7- to 13-year-old AI children (*n* = 121)**

| Predictor Variable | Beta + SE (Unstandardized) | p-value |
|---|---|---|
| **Screen Time Behaviors (hours per day)** | | |
| *Weekend Days* | | |
| Watching television/videos [a] | **0.036** ± 0.015 | **0.014** |
| Using computer | **0.037** ± 0.015 | **0.019** |
| Playing sedentary video games [c, e] | **0.032** ± 0.015 | **0.033** |
| Playing non-sedentary video games | 0.020 ± 0.016 | 0.236 |
| Other electronic device use (tablets, phones, etc.) [a, b, e] | **0.029** ± 0.014 | **0.043** |
| Total screen time per weekend day [e] | **0.010** ± 0.004 | **0.009** |

SE = standard error. Specific pertinent covariates were determined by *t*-test (gender) and correlation and are identified by superscripts. Models without superscripts did not have any significant correlations or *t*-test differences. Bolded values indicate statistical significance (p <0.05).
Adjusted for: [a] age, [b] BMI %ile, [c] sex, [d] dietary self-efficacy, [e] physical activity self-efficacy

## DISCUSSION

The primary findings of this project have been previously supported in the literature and include the significant relationships observed between depressive symptoms and obesogenic behaviors, such as diet soda consumption (Fowler, 2016), meal skipping (Fulkerson, Sherwood, Perry, Neumark-Sztainer, & Story, 2004), and certain screen time variables (weekday "other" electronic use and weekend TV/video, computer, sedentary video games, "other," and total screen time use (Bickham et al., 2015). Of equal importance is the absence of significant relationships between depressive symptoms and BMI percentile, sugar-sweetened beverage intake, fruit and vegetable intake, and physical activity. Contrary to previous reports (Boudreaux et al., 2003; Konttinen et al., 2010; Steca et al., 2014), self-efficacy was not a mediator in the relationships between depressive symptoms and obesogenic behaviors. The younger age of the population may have contributed to this outcome, as younger children have diminished control of their obesogenic behavior decisions. Self-efficacy may also be less of a contributor in the AI population due to inherited feelings of historical trauma that result in diminished personal confidence (Kirmayer, Gone, & Moses, 2014).

The prevalence of overweight/obesity in this sample of AI children was 60%, which is higher than national reports (17%; Ogden, Carroll, Kit, & Flegal, 2014) but lower than a similar study conducted by our team in 2013 (63%; Dennison et al., 2015). Consistent with previous reports (Saluja et al., 2004; Stiffman et al., 2007), depressive symptoms were higher (12%) than

found in a nationally representative sample (3%; Halfon, Larson, & Slusser, 2013). Compared with this sample (382 kcal per day), 309 kcal per day was previously reported as daily sugar-sweetened beverage kcal intake in a similar population, with the biggest difference in energy/sports drink consumption (57 kcal vs. 102 kcal; Dennison et al., 2015). Fruit and vegetable intake in this sample was 1.9 servings per day. This intake is substantially below the 5 per day recommendation (Guenther, Dodd, Reedy, & Krebs-Smith, 2006) and earlier reports of nationally representative data (3.4-3.8 servings per day) with children of similar ages (Guenther et al., 2006). Time spent in moderate/vigorous physical activity was 0.7 hours/day, which is more than previous reports in a similar population (0.6 hours per day; Dennison et al., 2015) and national recommendations of one hour per day of moderate-to-vigorous physical activity (Kirschenbaum & Gierut, 2013). Screen time for this population was 7.2-7.3 hours per day (weekday, weekend), which is higher than previous reports in a similar population (4.8 hours per day; Foulds et al., 2016), higher than reported in non-AI children (3.2-3.9 hours per day; Foulds et al., 2016; Marshall et al., 2006), and higher than the recommendation of <2 hours per day (Kirschenbaum & Gierut, 2013).

Similar to a previous report, diet soda and meal intake frequency were positively associated with depressive symptoms (Dennison et al., 2016). Meal skipping may be a function of a heightened awareness of obesity-related chronic diseases in this population and subsequent inappropriate actions to prevent them, similar to disordered eating. Within the younger participants of this age group, meal skipping may be a function of the absence of food or regularly timed meals in the home as opposed to an intentional choice to avoid a meal. Well-intended, but misconstrued, nutrition education directed at this population may drive restrictive eating practices by over-emphasizing foods to be avoided and under-emphasizing foods that should be encouraged (Schlundt, Rowe, Pichert, & Plant, 1999).

No physical activity variables were associated with depressive characteristics. The existing literature regarding the relationship between depressive symptoms and physical activity is inconsistent. Some studies demonstrate no relationship between depressive symptoms and physical activity (Hoare et al., 2014; Johnson et al., 2008; Maras et al., 2015; Schmitz et al., 2002), while others indicate that higher physical activity is associated with lower depressive symptoms (Cao et al., 2011; Castillo et al., 2014; Kremer et al., 2014; Rothon et al., 2010). Since AI children have a higher risk for depressive symptoms (Johnson, 1994; Lemstra et al., 2011;

Saluja et al., 2004; Stiffman et al., 2007; Zahran et al., 2005) than do non-AI children, physical activity may have a blunted effect in decreasing the symptoms of depression in this population.

The relationships between screen time and depressive symptoms are more consistent than with other obesogenic behaviors examined. However, we observed differences between weekday and weekend screen time. More weekend screen time variables were significantly associated with depressive symptoms than weekday screen time variables, with the exception of weekday "other" electronic use. This may be due to the propensity for "other" electronic use to be related to social media, in which relationships are found to be more isolating and less satisfactory than face-to-face relationships (Bickham et al., 2015). Depressive symptoms and weekend screen time associations may be a result of similar circumstances where routine peer face-to-face interactions are absent on the weekends. Depressive symptoms also drive the use of "other" electronics as a coping or "escape" mechanism (Bickham et al., 2015). "Other" electronic use, which includes tablet and mobile phone use, are primarily used for texting and accessing social media sites (Reid Chassiakos, Radesky, Christakis, Moreno, & Cross, 2016) and have been shown to contribute to depressive symptoms through cyber-bullying and disconnectedness as previously described (O'Keeffe & Clarke-Pearson, 2011).

The absence of a significant mediation between depressive symptoms and self-efficacy in diet, physical activity, and screen time is noteworthy. Due to the lack of validated screen time self-efficacy assessments and particularly the use of a physical activity self-efficacy assessment tool in this sample, broader interpretations of this finding are difficult. BMI percentile was not found to be associated with depressive symptoms or the relationship between depressive symptoms and obesogenic variables, a finding that is similar to a report regarding overweight/obese children seeking weight management treatment (Benson et al., 2013). This further highlights the need for in-depth pediatric clinical assessments for both depression and obesogenic behaviors, regardless of BMI status in AI children, as both of these risk factors (depressive symptoms and obesogenic behaviors) are more prevalent in this population.

## Strengths/Limitations

One of the unique aspects of this study, and an important contribution to the literature, is the focus on AI children and youth, a population historically resistant to scientific examinations and at elevated risk for disease. While the AI population as a whole is diverse, the inclusion of

participants who originate from Oklahoma lends to generalizability for AI children in Oklahoma. The cross-sectional nature of this study does not allow for trend or intervention analysis. While no body weight guidelines were used in recruitment for the NYPD camp, parents may have been more likely to send their children, and participate in the study, if they perceived their child was more at-risk for obesity or type 2 diabetes development. Tools used were validated in the pediatric population, thus strengthening findings; however, some of the tools were not validated in the youngest members of this population. As with any study, accuracy is questionable in self-report questionnaires. However, all precautions to include appropriate tools and professional oversight were employed to reduce inaccurate responses. While the study size was relatively small, the participants resided in both rural and urban areas, which provided better generalizability to the Oklahoma AI population. However, caution would be prudent in generalizing these findings to other populations. This study would have been strengthened by the addition of biometric values, including glucose, lipid, and blood pressure measurements that provide downstream outcomes of obesogenic behaviors and signify the presence of chronic disease. The addition of parental obesogenic behavior assessment would also provide insight into participant health choices.

## Clinical Applications

Given the findings of this study, some applications can be made for clinicians working with this population in a mental or physical health capacity. A counter-balance to increased restrictive eating as a result of diet education oversaturation may be an adjustment in practice recommendations to highlight foods that should be included, instead of what should be avoided. This information may also alert clinicians to the need for depression screening in the presence of patient diet restriction. As shown in previous reports (Kremer et al., 2014), the authors believe that a decrease in sedentary screen time and increase in physical activity in this population will lead to healthy socialization and an improvement in depressive symptomology. This information can lead educators in emphasizing reduced non-social screen time for both depressive symptom prevention and obesogenic behavior control. Although not examined in this study, it is likely that parental involvement in encouraging healthy food intake (ensuring healthy foods are available) and reducing screen time (setting healthy limits) should be considered in practical applications.

## CONCLUSION

In summary, these findings highlight the need for obesity prevention in AI children and emphasize the significance of depressive symptoms in obesity development. This study also shows that some obesogenic behaviors, specifically diet soda intake, meal skipping, and screen time variables, are associated with depressive symptoms. Concepts that would expand the utility of this study and further the efforts to prevent and slow the progression of chronic disease in this population include biometric considerations. The addition of biometric values to this study would provide valuable outcomes that result from obesogenic behaviors and depression. Biometric values that would enhance these outcomes include blood glucose, blood pressure, and blood lipids, as these indicators are often associated with chronic disease development.

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# THE ASSOCIATION BETWEEN POSITIVE RELATIONSHIPS WITH ADULTS AND SUICIDE-ATTEMPT RESILIENCE IN AMERICAN INDIAN YOUTH IN NEW MEXICO

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*Abstract: This study examined the 2013 New Mexico Youth Risk and Resiliency Survey (NM-YRRS) to determine whether cultural connectedness and positive relationships with adults protected against suicide attempts among American Indian and Alaska Native (AI/AN) youth and whether these relationships differed by gender. The sample included 2,794 AI/AN students in grades 9 to 12 who answered the question about past-year suicide attempts. Protective factor variables tested included relationships with adults at home, school, and the community. The language spoken at home was used as a proxy measure for cultural connectedness. Positive relationships with adults were negatively associated with the prevalence of past-year suicide attempts in bivariate analysis. However, language spoken at home was not associated with the prevalence of suicide attempts. Multivariate analysis showed that among girls, relationships with adults at home, at school, and in the community were independently associated with lower suicide-attempt prevalence. Among boys, only relationships with adults at home showed such an association. These results have important implications for the direction of future research about protective factors associated with AI/AN youth suicide risk as well as in the design of suicide intervention and prevention programs.*

## INTRODUCTION

Suicide among American Indian and Alaska Native (AI/AN) youth is a major public health concern. The 2015 suicide death rate for AI/AN youth aged 13 to 19 years (15.3/100,000) is nearly twice the overall U.S. rate for that age group (8.1; Centers for Disease Control and Prevention [CDC] "WISQARS," n.d.). The CDC identified suicide as the second leading cause of death among AI/AN Americans who are 15 to 34 years of age (CDC, 2015).

Risk factors for youth suicide include alcohol and other substance abuse, physical or sexual abuse, poverty, a psychological disorder, impulsivity, social isolation, access to lethal means, sexual minority status, and one or more previous suicide attempts (Balis & Postolache, 2008; Bostwick et al., 2013; Westefeld et al., 2010; Wexler, Silveira, & Bertone-Johnson, 2012). A qualitative analysis by Olson, Wahab, Thompson, and Durrant (2011) of suicide notes left by Hispanic, Anglo (White, non-Hispanic), and AI/AN children and adults who died from suicide in New Mexico revealed five common motivators: feelings of alienation, feelings of inadequacy or failure, being psychologically overwhelmed, a desire to leave problems behind, and a desire for reunification with deceased family members and friends in an afterlife. The authors observed an overall lack of difference in motivation among races, except for the alienation category, which included more Hispanic and AI/AN people than Anglos. Other studies have identified a significant association between perceived discrimination and suicidal ideation among AI/AN youth (LaFromboise, Hoyt, Oliver, & Whitbeck, 2006; Yoder, Whitbeck, Hoyt, & LaFromboise, 2006; Freedenthal & Stiffman, 2004). Suicidal ideation and behavior have been linked to historical and intergenerational trauma (i.e., mass trauma resulting from colonization) among North American indigenous peoples (U.S. Department of Health and Human Services, 2010; Duran, 2006; Elias et al., 2012; Goodkind et al., 2010).

Compared with risk factors for suicide, factors associated with a *reduced* risk of suicide (protective or resilience factors) have received less attention. However, an understanding of protective/resilience factors for AI/AN youth is important for two principal reasons. First, understanding and preventing suicide among AI/AN youth requires more than a knowledge of risk factors, as prevention and treatment efforts that focus exclusively on risk factors may subject AI/AN youth to further trauma (Goldston et al., 2008; Hummingbird, 2011). Second, interventions to mitigate youth suicide risk (including among AI/AN youth) that seek to increase protective factors may be more effective than those that aim to reduce risk factors (Borowsky, Ireland, & Resnick, 2001; Borowsky, Resnick, Ireland, & Blum, 1999; Duran, 2006; Freedenthal & Stiffman, 2004).

Social scientists are studying protective factors such as positive relationships in the home, school, and community as predictors of outcomes in their own right. In 2006, researchers found that AI students' perception that neighbors cared about them was associated with a significant reduction in past-year suicide attempts compared with an absence of this perception (18.3% vs

30.8%; Chino & Fullerton-Gleason, 2005). Chandler and Proulx (2006) identified strong cultural continuity (the degree to which practices or procedures exist that work to preserve a sense of identity) as protective against AI/AN youth suicide at the community level. Additionally, sexually abused AI/AN adolescents who perceived caring and attention from family, adults, people at school, and tribal leaders were found to be less likely to have suicidal thoughts and behaviors than those who did not have this perception (Pharris, Resnick, & Blum, 1997).

The purpose of this study was to measure associations between positive relationships with adults, cultural connectedness, and suicide-attempt resilience among AI/AN youth in New Mexico. Hypotheses tested included 1) that suicide attempts would be less common among AI/AN students who reported high levels of adult support at home, in school, and in the community compared with those who reported lower levels of adult support; and 2) the effect size of the protective variables identified would differ between female and male students.

## METHODS

### Study Design

Data from the 2013 New Mexico Youth Risk and Resiliency Survey (NM-YRRS) constituted the sample. The NM-YRRS is part of the CDC's Youth Risk Behavior Surveillance System (YRBSS; Brener et al., 2013). Briefly, the YRBSS is a biennial survey that collects cross sectional data about health risk behaviors, including suicide attempts, from a representative sample of public school students in grades 9 through 12. In addition to questions from the YRBSS, the NM-YRRS contains questions adapted from the California Healthy Kids Survey to measure resilience factors in the home, at school, and in the community (Constantine & Benard, 2001). The University of New Mexico Human Research Protections Office and the Southwest Tribal Institutional Review Board approved the protocol.

The NM-YRRS uses the YRBSS sampling methodology but includes an additional sample, which is drawn by using a stratified, two-stage complex sample design that is a modified version of the YRBSS sampling protocol. The main modifications are stratification of schools at the school district level and an oversampling of AI/AN youth by conducting a census in schools with a high proportion of AI/AN students. The New Mexico Department of Health, New Mexico

Public Education Department, and University of New Mexico Prevention Research center collected data for the 2013 NM-YRRS between September and December 2013 during regular class times; the overall response rate was 71.5%.

## Measures

Students were considered to be AI/AN if they answered "American Indian or Alaska Native" to the question, "Which of these groups best describes you (select only one response)?" Students who did not answer this question but who selected *only* "American Indian or Alaska Native" to the question, "What is your race (select one or more responses)?" were also considered AI/AN. Of the 19,080 participants, 3,446 (18.1%) self-identified as AI/AN.

Suicide attempts during the previous year were assessed using responses to the question, "During the past 12 months, how many times did you actually attempt suicide?" Response options were *zero times, one time, two or three times, four or five times,* and *six or more times*. Responses were dichotomized as zero attempts and one or more attempts. A total of 2,794 AI/AN students (81.1%) answered the question about suicide attempts. Two students did not indicate their sex, so their surveys were excluded, leaving a sample of 2,792.

The NM-YRRS includes seven statements designed to elicit information about protective factors related to relationships with adults (Table 1). The seven variables measured aspects of the home, school, and community environment (with community defined as outside the home or school). For each variable, students were asked, "How true do you feel the following statements are for you?" The four response options (Table 1) ranged from *not true at all* to *very much true*. Because the NM-YRRS does not include a direct measure of cultural connectedness, the research team used language spoken at home as a proxy measure of this factor. The survey asked, "How often do you speak a language other than English at home?" The five response options (Table 1) ranged from *never* to *all of the time*.

## Statistical Analysis

These analyses used unweighted data. Chi-square testing assessed differences between boys and girls in levels of agreement with resilience statements. The study epidemiologist stratified all other analyses by sex and controlled for age.

The first hypothesis predicted a negative relationship between the presence of protective variables and past-year suicide attempt. The study epidemiologist tested this hypothesis using logistic regression after determining that relationships were ordinal.

Multivariable models identified variables that remained significant after controlling for age, grade in school, and other protective factors. The study epidemiologist constructed models to identify the most concise group of variables required to predict the odds of a suicide attempt for girls and boys separately. Factors found to be significantly associated with suicide attempts in bivariate testing were included in the full multivariable models. The epidemiologist removed variables one at a time based on changes in each model's positive likelihood ratio and the parameter estimates for individual variables. Results were considered significant at $p < .05$. All analyses were conducted using Stata version 13 software (StataCorp LP, 2013).

## RESULTS

### Prevalence Data

The prevalence of past-year suicide attempts among AI/AN respondents to the NM-YRRS (13.9%; 95% CI, 12.6%–15.1%) was higher than that for NM high school students overall (9.4%; 95% CI, 7.7%–11.3%). The majority of respondents (51.3%) were female. AI/AN girls had a higher prevalence of suicide attempts (16.7%; 95% CI, 14.3%–18.1%) than AI/AN boys (10.8%; 95% CI, 9.1%–12.4%). Age was not significantly associated with suicide attempts among either girls (OR, .82; 95% CI, .67–1.0) or boys (OR, .88; 95% CI, .70–1.1).

Levels of agreement with protective factor statements and with how often a language other than English was spoken at home are shown in Table 1. The statement "in my home, there is a parent or some other adult who believes that I will be a success" was endorsed more strongly by female than by male students ($p = .011$). Girls also provided more support than boys for the statements about parents knowing the student's whereabouts ($p < .0001$); teachers who believe the student will be successful ($p = .001$); and having an adult outside the home or school who cares ($p = .0003$) or tells the student that he/she did a good job ($p = .003$).

**Table 1**
**Distribution of responses to resilience-factor statements in relation to prevalence of suicide attempt in the past year among AI/AN high school girls (*n* = 1,463) and boys (*n* = 1,329) in New Mexico in 2013**

| Statement/response | Response (%) | | Suicide-attempt prevalence (%) | |
|---|---|---|---|---|
| | *Girls* | *Boys* | *Girls* | *Boys* |
| How often do you speak a language other than English at home?[a] | | | | |
| Never | 23.5 | 23.8 | 16.0 | 9.4 |
| Less than half the time | 38.1 | 33.8 | 15.5 | 9.0 |
| About half the time | 19.4 | 20.2 | 16.8 | 11.5 |
| More than half the time but not all of the time | 11.1 | 12.6 | 16.7 | 10.1 |
| All of the time | 7.9 | 9.6 | 23.2 | 15.8 |
| In my home, there is a parent or some other adult who is interested in my school work. | | | | |
| Not true at all | 6.6 | 7.8 | 32.3 | 20.6 |
| A little true | 18.0 | 19.6 | 20.6 | 15.2 |
| Pretty much true | 28.2 | 30.5 | 18.7 | 10.8 |
| Very much true | 47.1 | 42.1 | 11.7 | 5.9 |
| In my home, there is a parent or some other adult who believes that I will be a success. | | | | |
| Not true at all | 3.3 | 5.4 | 32.6 | 34.3 |
| A little true | 10.0 | 8.6 | 32.1 | 15.0 |
| Pretty much true | 16.1 | 18.4 | 21.8 | 12.3 |
| Very much true | 70.6 | 67.5 | 12.3 | 7.4 |
| When I am not at home, one of my parents or guardians knows where I am and who I am with. | | | | |
| Not true at all | 4.4 | 8.0 | 32.8 | 31.3 |
| A little true | 15.0 | 16.8 | 24.5 | 15.0 |
| Pretty much true | 25.9 | 30.8 | 20.5 | 9.2 |
| Very much true | 54.8 | 44.4 | 11.0 | 5.8 |
| At my school, there is a teacher or other adult who listens to me when I have something to say. | | | | |
| Not true at all | 9.2 | 11.9 | 34.4 | 16.3 |
| A little true | 26.5 | 21.7 | 22.6 | 12.6 |
| Pretty much true | 31.6 | 35.3 | 12.2 | 9.6 |
| Very much true | 32.7 | 31.2 | 10.7 | 7.5 |

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**Table 1, Continued**
**Distribution of responses to resilience-factor statements in relation to prevalence of suicide attempt in the past year among AI/AN high school girls (*n* = 1,463) and boys (*n* = 1,329) in New Mexico in 2013**

| Statement/response | Response (%) | | Suicide-attempt prevalence (%) | |
|---|---|---|---|---|
| | *Girls* | *Boys* | *Girls* | *Boys* |
| At my school, there is a teacher or some other adult who believes that I will be a success. | | | | |
| Not true at all | 5.4 | 8.8 | 37.3 | 16.5 |
| A little true | 18.1 | 15.9 | 23.5 | 17.8 |
| Pretty much true | 27.8 | 30.8 | 15.5 | 8.1 |
| Very much true | 48.7 | 44.5 | 12.0 | 8.2 |
| Outside of my home and school, there is an adult who really cares about me. | | | | |
| Not true at all | 5.2 | 7.6 | 34.2 | 21.3 |
| A little true | 10.4 | 12.4 | 22.8 | 15.7 |
| Pretty much true | 17.5 | 21.0 | 18.4 | 10.0 |
| Very much true | 66.8 | 59.0 | 13.6 | 8.1 |
| Outside of my home and school, there is an adult who tells me when I do a good job. | | | | |
| Not true at all | 8.4 | 12.5 | 33.3 | 20.8 |
| A little true | 14.7 | 14.7 | 21.5 | 13.8 |
| Pretty much true | 26.2 | 27.4 | 17.0 | 8.6 |
| Very much true | 50.6 | 45.5 | 11.9 | 7.6 |

AI/AN = American Indian/Alaska Native.
[a] Proxy measure of cultural connectedness.

Table 1 shows the prevalence of past-year suicide attempt in relation to each level of response to a predictor variable, with the results stratified according to sex. The prevalence of past-year suicide attempts declines with increasing levels of hypothesized protective factor variables. The exception was the variable pertaining to language, which showed the highest prevalence of suicide attempts among those reporting the highest level of speaking a language other than English at home. There were few differences between girls and boys in effect sizes (ORs) for relationships with adults at home and in the community (Table 2). However, the odds of a suicide attempt decreased more for girls than for boys as positive relationships with adults at school increased.

**Table 2**
**Odds ratios for suicide attempt in the past year among AI/AN high school girls and boys in New Mexico in 2013, according to resilience factor**

| Resilience factor | Girls | | Boys | |
|---|---|---|---|---|
| | OR (95% CI) | *p* value | OR (95% CI) | *p* value |
| Speak language other than English at home | 1.09 (.97–1.2) | .14 | 1.13 (.99–1.3) | .072 |
| Parent/adult interested in my school work | .68 (.59–.79) | .000 | .62 (.52–.75) | .000 |
| Parent/adult believes I will be a success | .59 (.51–.68) | .000 | .57 (.48–.68) | .000 |
| Parent/guardian knows where I am when not home | .62 (.53–.72) | .000 | .53 (.44–.63) | .000 |
| Teacher/school adult listens to me | .61 (.52–.70) | .000 | .74 (.62–.89) | .001 |
| Teacher/school adult believes I will be a success | .64 (.55–.74) | .000 | .71 (.60–.85) | .000 |
| Outside adult who cares about me | .70 (.60–.81) | .000 | .69 (.58–.82) | .000 |
| Outside adult who tells me when I do a good job | .67 (.58–.77) | .000 | .68 (.58–.80) | .000 |

## Multivariable Modeling

Table 3 shows the results of the multivariable modeling. Among girls, relationships with adults in the home, at school, and in the community continued to be significant after controlling for other variables. The odds of a suicide attempt declined by more than 20% for each level of increasing agreement with three variables: parents/guardians knowing the student's whereabouts, teachers listening, and adults in the community telling the student that he/she did a good job. Getting good grades in school also reduced the odds of a suicide attempt among girls. The final model for boys included only relationships with adults in the home. Among boys, the odds of a suicide attempt decreased by more than 30% for each level of agreement with having a parent who believes in their success and a parent or guardian knowing their whereabouts.

**Table 3**
**Multivariable modeling results: odds ratios for suicide attempt in the past year among AI/AN high school girls and boys in New Mexico in 2013, according to resilience factor**

| Resiliency factor | Girls | | Boys | |
|---|---|---|---|---|
| | OR (95% CI) | *p* value | OR (95% CI) | *p* value |
| Parent/adult believes I will be a success | — | — | .68 (.55–.85) | .001 |
| Parent/guardian knows where I am when not home | .78 (.66–.94) | .007 | .68 (.54–.84) | .000 |
| Teacher/school adult listens to me | .74 (.62–.89) | .001 | — | — |
| Outside adult who tells me when I do a good job | .78 (.65–.92) | .003 | — | — |
| Age[a] | .90 (.79–1.03) | .130 | 1.06 (.90–1.24) | .49 |
| Grades in school[a] | .69 (.59–.82) | .000 | .87 (.71–1.08) | .20 |

AI/AN = American Indian/Alaska Native; CI = confidence interval; OR = odds ratio
[a] Control variable.

## DISCUSSION

This study shows that positive relationships with adults—in the home, school, and community—are associated with reduced rates of suicide attempts among AI/AN youth in New Mexico. The association was stronger for girls than boys. Approximately one in three girls who reported the lowest level of agreement (*not at all true*) with the protective factor statements about all three types of adult relationships reported a suicide attempt in the past year. Boys and girls differed with respect to the adults with whom a relationship provided protection against a suicide attempt. Final models indicated that positive relationships with adults at home, school, and in the community remained significantly protective for girls, whereas for boys, only relationships with adults in the home remained protective.

Previous studies have also found perceived support from adults at home and in the community to be associated with reduced suicide attempts among AI/AN adolescents (LaFromboise et al., 2006). The current study provides further evidence of the importance of adults other than parents in suicide resilience in this population and also identifies male/female differences with respect to the influence of adults in the home compared with other adults.

Language spoken at home was not statistically significantly associated with past-year suicide attempts for either boys or girls. Although not significant, the results suggest that

speaking a language other than English at home all the time may be positively associated with suicide-attempt risk. Acculturation, a process wherein attitudes and behaviors of people from one culture are changed through contact with a different culture, may partially explain this relationship (U.S. Department of Health and Human Services, 2010). A study examining the relationship between acculturation and health risk factors in *immigrant* adolescents found an association between language spoken at home and suicide ideation and attempts, with those speaking a language other than English at increased risk for psychosocial risk factors (Yu, Huang, Schwalberg, Overpeck, & Kogan, 2003). For AI/AN people, acculturation and resulting "cultural voids" have also been associated with depression and suicide (U.S. Department of Health and Human Services, 2010). However, language represents only one dimension of culture. Additional cultural aspects, such as spirituality and cultural continuity, are also associated with suicide attempts among AI/AN and Canada's First Nations people (Garroutte et al., 2003; Chandler & LaLonde, 1998). Without including other important aspects of culture, language spoken at home is likely an inexact proxy of cultural connectedness. To clarify this issue, alternative or additional measures of cultural connectedness should be developed for use in surveys that include a large proportion AI/AN youth.

Study limitations include use of self-reported, cross-sectional data and missing data. The association between suicide attempts and protective factors is not necessarily causal and may have been influenced by factors not measured by the survey. The NM-YRRS is administered only to students who attend public schools in New Mexico; therefore, these results may not apply to NM AI/AN youth who are homeschooled or have dropped out of school, or to AI/AN adolescents in other states.

Results of this study may inform programs and policies that support protective and resilience factors while reducing risk (Tousignant, Vitenti, & Morin, 2013). Youth suicide prevention should seek to boost protective factors—at both the individual and community level—while simultaneously reducing individual risk factors (Freedenthal & Stiffman, 2004; Goldston et al., 2008; Bearinger et al., 2005; Berger, Wallace, & Bill, 2009). The findings of this study demonstrate the limitations of a strictly quantitative study of the factors that impact AI/AN suicidal behavior. Because AI/AN youth have unique lived experiences, further research using in-depth qualitative measures would be a significant benefit to further exploring these lived experiences, the protective factors in these youths' lives, and the overlap of community and

home environments in mitigating risk. Additionally, the results of this study indicate that protective factors for AI/AN boys and AI/AN girls are distinct.

These unique findings provide an opportunity to move the research and eventual development of effective interventions forward. Possible future research questions on this topic suggested by these results include the following: 1) Why are AI/AN boys less likely than AI/AN girls to have a protective relationship with an adult outside the home? 2) Who in the home is most likely to provide AI/AN boys the protection against suicidal ideation and behavior, and what are the dynamics involved in that relationship? 3) Which adults in the school or community are most likely to provide AI/AN girls the protection against suicidal ideation and behavior, and what are the dynamics involved in that relationship? Prevention and intervention programs need to keep in mind that protective factors for AI/AN boys and girls are potentially distinct from each other, and these distinctions may impact the development of those programs.

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# AMERICAN INDIAN AND WHITE ADOPTEES: ARE THERE MENTAL HEALTH DIFFERENCES?

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*Abstract: Adult adoptees are at increased risk for mental health problems compared to nonadoptees. However, little is known about subsets of adoptees that may be more or less vulnerable to mental health problems. The purpose of this study was to explore the presence of mental health problems of American Indian (AI) persons compared to White persons who were separated from their birth families during childhood by foster care and/or adoption. Family systems theory guided the study. AI adoptees reported higher percentages of problems than White adoptees on all mental health problems measures (e.g., substance abuse, mental health, self-injury, and suicide). Data analysis included a series of chi-square statistics and logistic regression models. AI adoptees were more likely to report mental health problems, including alcohol addiction, alcohol recovery, drug recovery, self-assessed eating disorder, eating disorder diagnosis, self-harm, and suicidal ideation than were Whites.*

## INTRODUCTION

Mental health is a critical component of overall health, as reflected by the Substance Abuse and Mental Health Services Administration's (2015) definition of *healthy* as "overcoming or managing one's disease[s] as well as living in a physically and emotionally healthy way" (p. 1). It is difficult, however, to assess the overall mental health of selected population groups because the literature often approaches the study of mental health by investigating discrete mental health problems, such as depression, suicidal ideation, or substance abuse, rather than taking an integrated approach. This study is grounded in a holistic theory (family systems theory), creating the space for studying a combination of mental health problems simultaneously. Using such a holistic theory allows for the study of mental health problems as a whole comprised

of varying individual parts (e.g., addiction, recovery, self-injury, suicidal ideation, and suicide attempt).

Mental health problems are a pressing public health issue affecting large numbers of people across the U.S. If left undiagnosed or untreated, mental health problems create cascading stress for individuals, family systems, and entire populations. Galson (2009) states that "mental illness can weave itself through all aspects of one's life: physical health, parenting, work, childbearing, finances, caregiving, and common daily activities" (p. 189). In beginning to paint the landscape of mental health problems in the U.S., 7.6% of Americans have reported experiencing depression (Pratt & Brody, 2014). Persons experiencing depression may also report comorbid conditions such as substance abuse, suicidal ideation, and suicide attempts. In the U.S., 9.4% of Americans reported illicit drug use within the preceding month, and 6.6% reported alcohol dependence or problems related to their alcohol use (National Institute on Drug Abuse, 2015). Persons experiencing substance abuse disorders are also at risk for suicidal ideation and attempt (Kessler, Borges, & Walters, 1999). Comparing these statistics of people with substance abuse disorders to those of the general population, 3.7% of American adults reported having suicidal thoughts, with 1% having planned suicide and 0.5% having actually attempted suicide (Centers for Disease Control and Prevention [CDC], 2012).

Gone and Trimble (2012) state, "although relatively little evidence is available, existing data suggest that [American Indian/Alaska Native] adults and youth suffer a disproportionate burden of mental health problems compared with other Americans. Specifically, clear disparities have emerged for [American Indian/Alaska Native] substance abuse, violence, posttraumatic stress, and suicide" (p. 131). Beals et al. (2005) found a greater presence of alcohol disorders in American Indians (AI) compared to other populations. In an assessment of health status and behavioral risks, Holm, Vogeltanz-Holm, Poltavski, and McDonald (2010) found that AI adults from rural reservations showed greater prevalence of alcohol use compared to national samples. Suicide is the second leading cause of death among AI/Alaska Native persons between the ages of 15 and 34 years (CDC, 2012).

Although mental health problems affect individuals across all ages, races and ethnicities, and genders, particular subgroups are adversely affected to a greater degree. For instance, adults who were separated from their parents in childhood, including adoptees, experience higher risks of mental illness and substance use compared to nonseparated persons (Cubito & Obremski

Brandon, 2000; Levy-Shiff, 2001; Pesonen et al., 2007; Räikkönen et al., 2011; Wierzbicki, 1993). Adult adoptees have significantly higher levels of psychological maladjustment compared to normative data (although despite their elevated scores, they do not approach levels typically found in an outpatient clinical population; Cubito & Obremski Brandon, 2000). Adoptees are also more likely to meet criteria for substance abuse or dependence than nonadoptees (Tieman, van der Ende & Verhulst, 2005), and they have increased risks compared to nonadoptees in suicidal ideation (Festinger & Jaccard, 2012) and suicide attempts (Keyes, Malone, Sharma, Iacono, & McGue, 2013; Slap, Goodman, & Huang, 2001; Von Borczyskowski, Hjern, Lindblad, & Vinnerljung, 2006). Adopted and/or fostered individuals who travel through the child welfare system (i.e., former child welfare clients) are more likely than their counterparts in the general population to have been hospitalized for a suicide attempt and to be at risk for depression (Vinnerljung, Hjern, & Lindblad, 2006).

Furthermore, little is known about subsets of adoptees that may be even more vulnerable to mental health problems, such as 1) White adoptees from the Baby Scoop Era, which began after World War II, continued into the 1970s, and was characterized by increased premarital pregnancies and higher rates of infant adoptions (Andrews, 2011); and 2) AI adults who have unique experiences of forced removal from their tribal communities and coerced adoption while they were children. Both adoptee subsets experienced adoption as forced as most often adoptees (especially infants and young children) do not have a choice in their own adoption. Lack of choice is a similar characteristic between AIs and Whites, but AIs have a number of unique experiences, such as being placed in White homes, that may distinctly affect their mental health. Cultural comparisons in studying adoptees are critical to disentangling the mental health problems that are unique to AI adoptees versus those that they share in common with Whites. Having an AI/White comparison sample creates the space for contributions to such questions as a) do mental health problems cut across both AI and White adoptee groups and b) are AI adoptees at greater risk for particular types of mental health problems?

It is believed that historical trauma contributes to the mental health problems of AIs (both adoptees and nonadoptees) and that such problems stem from loss of lives, land, and important aspects of AI cultures (Brave Heart & DeBruyn, 1998). Furthermore, the unique context of AI adoptees (e.g., historical losses, assimilation, systematic child removal) suggests their mental health outcomes might differ from adoptees of other races for a number of reasons. Between

1878 and 1930, AI children were forced to attend boarding schools based on the belief that their families were inferior; this action has been described as the first wave of child removal (Red Horse et al., 2000). Around the same time as the Baby Scoop Era, the U.S. federal government systematically removed AI children from their families and placed them into foster care, adoptive homes, or institutions through the Indian Adoption Project, a collaborative effort between the Bureau of Indian Affairs and Child Welfare League of America (Jacobs, 2013; Red Horse et al., 2000). Under the Indian Adoption Project, 395 AI children were adopted. However, the project set the precedent for other agencies. Many AI adoptees were placed in non-AI homes, making theirs an experience of transracial adoption despite remaining on national soil. National data collected from social service agencies and private adoption agencies suggest that 25-35% of AI children were placed in foster or adoptive homes in the 1960s and 1970s (Jacobs, 2013).

Across adoptee populations, treatment by caregivers within the foster care or adoptive environment affects the occurrence, exacerbation, or stabilization of mental health problems. Distinct types of abuse (e.g., physical, emotional, sexual, spiritual) are interdependent and, thus, have a cumulative effect on adoptees (Finkelhor, Ormrod, & Turner, 2007; Greeson et al., 2011; Sabina & Straus, 2008). Such poly-victimization creates a ripe environment for the onset of mental health problems, especially when experienced from a caregiver. For instance, poly-victimization is predictive of trauma symptoms (Finkelhor et al., 2007) and post-traumatic stress symptoms (Greeson et al., 2011; Sabina & Straus, 2008). It has been associated with higher rates of internalizing problems (Greeson et al., 2011), psychological distress (Richmond, Elliott, Pierce, Aspelmeier, & Alexander, 2008) and mental health maladjustment (Hooven, Nurius, Logan-Greene, & Thompson, 2012). Scholars have also explored the connection between poly-victimization and mental health problems outside of adoption literature. This study not only investigates the existence of mental health problems among adoptees but the effect of poly-victimization on the occurrence of mental health problems.

## Family System Theory

A considerable amount of previous literature was devoted to examining individual mental health problems in selected groups of adoptees. Focusing on single classifications of mental health fails to reveal the presence of other forms of potentially comorbid problems (e.g., substance abuse, suicidal ideation, suicide attempt). A more holistic approach to studying the

mental health of adoptees is needed. Mental health status is not just a function of the internal working of an individual but also the family context in which they live and the interactions of the members within that family context. Family systems theory provides such a theoretical grounding not only of the family context of the adoptee but the institutional systems that interconnect with the adoptee and their adopted family. Considering the family context is important, as an adoptee's connection to and experiences in their foster and/or adoptive family also plays a role in shaping mental health.

Family systems theory grew out of general systems theory in the late 1960s (Gray, Duhl, & Rizzo, 1969). Family systems theory has been used across a variety of fields including family social science, sociology, and psychiatry (Whitchurch & Constantine, 1993). An assumption of family systems theory applied in this study is that a system must be understood as a whole rather than in components as the whole is greater than the sum of its parts (Whitchurch & Constantine, 1993). A person's mental health is a system in itself, comprised of smaller subsystems (e.g., depression, suicidal ideation, substance abuse) within a larger suprasystem (health) that coexists within the family context. Another assumption of family systems theory is that components of a system mutually influence each other; therefore, they are interdependent. Poly-victimization was important to explore because distinct types of abuse are interrelated.

Although studies of adoption are plentiful, few have explored the mental health problems of AI individuals displaced from their biological families by foster care and/or adoption. There is not a good overall picture of the mental health of AI adoptees. The purpose of this study is twofold: 1) to explore the presence of a variety of mental health problems among AIs compared to Whites who were separated from their birth families during childhood by foster care and/or adoption, and 2) to investigate the conditions that create a greater probability of mental health problems, including the unique experience of AI adoptees who have been forcibly removed from their families.

This study contributes to the literature in a number of ways. First, by investigating mental health problems of AI adult adoptees who were forcibly removed from their families as children, this study fills a void in both the mental health literature and the literature about the AI experience. Comparing AI adoptees to White adoptees provides a context from which to understand the impact of forced removal beyond the adoptee experience itself. The comparison provides additional contextual underpinnings in that the current literature on mental health

problems is based primarily within the White experience. Second, because adoption research, and specifically research with AI adoptees, historically has either focused on preadolescence or relied on parent or professional report, this study adds to the small body of research focused on the voices of adoptees (Carriere, 2005; Landers, Danes, & White Hawk, 2015; Peterson, 2002). Third, this study expands on previous atheoretical literature through its grounding in family systems theory that creates the space to approach the study of mental health problems in a more conceptually integrated way. Fourth, based on its family systems orientation, this study provides a more holistic picture of adoptee mental health by investigating a variety of mental health problems simultaneously. Fifth, this study incorporates poly-victimization, a key concept explored throughout mental health and child maltreatment literature. Lastly, most previous research focusing on AI adoptees is qualitative in its methodological approach (e.g., Carriere, 2005); this study's quantitative approach allows for more widespread generalization of the study findings.

Grounded in literature and family systems theory, the authors developed the following hypotheses:

**Hypothesis 1**: AI adoptees exhibit greater mental health problems and poly-victimization than White adoptees.

Hypothesis 2 is the same for each mental health problem so within brackets is the list of all the problems with an identifying letter for each problem.

**Hypothesis 2**: AI adoptees have a greater probability of experiencing a) alcohol addiction, b) alcohol recovery, c) drug addiction, d) drug recovery, e) eating disorder, f) eating disorder diagnosis, g) self-injury, h) suicidal ideation, and i) attempted suicide compared to White adoptees when controlling for demographics (age, gender, married/cohabitating, poverty, college degree) and poly-victimization.

## METHODS

### Sampling Procedures

Study data originated from the Experiences of Adopted and Fostered Individuals Project, which was developed through a community-based participatory research project with collaboration among First Nations Repatriation Institute (FNRI), Adoptees Have Answers

(AHA), and the University of Minnesota. Research questions were defined by community and academic partners; the academic partners then utilized their formalized research skills to execute data collection and analyses (University of Minnesota, 2015).

Data were collected from AI and White adults who self-identified as having experienced adoption and/or foster care during childhood, hereafter referred to as *adoptees*. Targeted purposive sampling was used to collect data. Study participants were recruited via two community agencies serving adoptees (FNRI, AHA) and online via listserv distribution and advertising. Recruitment also occurred via a closed Facebook group for Native American adoptees, the National Indian Child Welfare Association (NICWA) Facebook page, two tribal Facebook pages, print and media sources of popular adoption organizations such as Adoption Today (printed and electronic version), Evan B. Donelson enews, American Adoption Congress enews, Adopt Source enews, and the enews of local Native newspapers. In addition, 600 fliers were placed in conference packets at NICWA's annual conference in 2013. The survey was made available both in online and paper-pencil versions. Informed consent was obtained as a precursor to starting the survey. Respondents were told the survey would take 45-75 minutes to complete.

## Sample Description

The total sample ($N$ = 336) was reduced to 295 as we narrowed it to include only respondents who consistently identified themselves as either AI ($n$ = 129) or White ($n$ = 166); the 41 respondents who identified as African American, Latino, Asian American, or biracial, did not provide their race, or answered inconsistently across the two race questions were dropped. The AI respondents answered "Yes," "I suspect so," or "I don't know" to the question "Are you an American Indian / Native American?" and additionally identified themselves as AI in an open-ended race question. The two questions were used together to determine AI race status as a validity check. Approximately one third of the AI sample came from Ojibwe, Lakota, and Dakota Nations. The following other tribes were identified: Omaha, Cree, Cherokee, Ho-Chunk, Chickasaw, and Navajo. The White respondents answered "No" to the question "Are you an American Indian / Native American?" and identified themselves as White in an open-ended race question.

The sample of 295 was narrowed further to 233 as a result of missing data: 62 participants who were missing responses across all of the mental health questions, which was the main focus of this paper, were dropped. Missing data were addressed through listwise deletion. The final sample ($n$ = 233) is comprised of 99 AI respondents and 134 White respondents. Participants with complete data were compared to participants who were dropped due to missing data using $t$-tests and chi-squared tests. No significant differences were found between participants with complete data and those that were dropped with regard to age, gender, income, or education.

## Measures

### Demographic Characteristics

This study included a series of demographic characteristics because such characteristics have commonly been included in previous adoption literature. These variables included age (Beals et al., 2005; Festinger & Jaccard, 2012; Holm et al.,2010; Keyes et al.,2013; Slap et al.,2001; Tieman et al., 2005; Von Borczyskowski et al.,2006; Wierzbick, 1993); gender (Cubito & Obremski Brandon, 2000; Levy-Shiff, 2001; Wierzbick, 1993; Tieman et al., 2005); socioeconomic status, income, or poverty (Beals et al., 2005; Slap et al., 2001; Tieman et al., 2005; Von Borczyskowski et al.,2006); education (Holm et al.,2010); and marital status (Beals et al., 2005; Holm et al.,2010). Although many of these demographic characteristics have not been significantly related to mental health problems, we suggest that with some of these demographics there is greater probability of having more stress, perhaps making a person more susceptible to mental health problems. Demographic characteristics were included in our study in order to verify if they were indeed not meaningful contributors to mental health problems. For instance, being poor, having low educational attainment, being female, or being a young adult or an elderly person might make persons more susceptible to stress.

Given the limited data available on the mental health problems of AI adoptees and the exploratory nature of this study, we aimed to provide a holistic picture of adoptee mental health problems by using self-report, single-item measures. These authors assumed that most participants would not self-report these problems if they had not experienced them. In addition, we asked not only about addictions to alcohol and drugs, but also whether participants went through recovery for those addictions, realizing that respondents might be at various stages

within the addiction/recovery process. Previous research suggests that "retrospective self-reports may yield biased estimates of disorder, typically, these are thought to be underestimates" (Beals et al., 2005, p. 107; Kessler, 2000). In essence, retrospective self-report tends to underreport problems.

**Alcohol Addiction**

Participants were asked, "Do you consider yourself addicted to alcohol?" The item was coded as 0 (*No)* and 1 (*Yes).*

**Alcohol Recovery**

Participants were asked, "Are you currently in recovery for alcoholism?" The item was coded as 0 (*No)* and 1 (*Yes).*

**Drug Addiction**

This question was posed to participants about their potential drug addiction: "Do you consider yourself addicted to any kind of drugs other than alcohol?" The item was coded as 0 (*No)* and 1 (*Yes).*

**Drug Recovery**

A recovery question was also asked of participants: "Are you currently in recovery for drug addiction?" The item was coded as 0 (*No)* and 1 (*Yes).*

**Self-assessed Depression**

Depression is characterized by a range of symptoms, including, but not limited to, loss of interest or pleasure, feeling sad or empty, loss of energy, and feeling worthless, as well as changes in appetite and sleep (American Psychiatric Association, 2013). Participants were asked: "Have you ever been depressed?" The item was coded as 0 (*No)* and 1 (*Yes).*

**Depression Diagnosis**

Participants were also asked if they had had a diagnosis of depression: "Have you ever been diagnosed as depressed?" The item was coded as 0 (*No)* and 1 (*Yes).*

**Self-assessed Eating Disorder**

Participants were asked if they had an eating disorder: "Do you consider yourself to have an eating disorder?" The item was coded as 0 (*No)* and 1 (*Yes).*

**Eating Disorder Diagnosis**

Participants were also asked if they had an eating disorder diagnosis: "Have you ever been diagnosed as having an eating disorder?" The item was coded as 0 (*No)* and 1 (*Yes)*.

**Self-injury**

Self-injury without suicidal intention was investigated with this question: "Have you ever injured yourself on purpose but without suicidal intention?" The item was coded as 0 (*No)* and 1 (*Yes)*.

**Suicidal Ideation**

Suicidal ideation was captured by this question: "Have you ever contemplated or planned suicide?" The item was coded as 0 (*No)* and 1 (*Yes)*.

**Suicide Attempt**

Suicide attempts were discovered through asking this question: "Have you ever attempted suicide?" The item was coded as 0 (*No)* and 1 (*Yes)*.

**Poly-victimization**

Poly-victimization represents the experience of multiple abuse types and the accumulation of their effect within the interpersonal relationship with the adoptive/foster caregiver. Definitions of physical, emotional, and sexual abuse were drawn from the National Child Abuse and Neglect Data System. First, respondents who experienced foster care were asked, "Did you experience abuse in any foster home?" For each type of abuse (physical, emotional, sexual, spiritual), response options were: *none*, *single incident*, *several times*, and *long-term*. Second, respondents who experienced adoption were asked, "Did you experience abuse in your adoptive home?" For each type of abuse, response options were: *none*, *single incident*, *several times*, and *long-term*. These items were dichotomized to create dummy variables representing whether respondents had experienced the particular type of abuse in either context. If the participant reported none, then the variable was 0; anything other than a report of 0 the variable was 1. The dichotomized variables were then summed representing the total experience of victimization (Finkelhor et al., 2007). Questions about abuse are retrospective, asking participants to remember experiences from their time in foster care and adoptive home environments. Of the various types of retrospective questions, episodic events using personal recollection of a particular event (abuse) from an individual's past are the most reliable of autobiographical memory forms (Herrmann, 1994).

### Data Analysis

Analyses were performed using SPSS Version 22. Chi-square analyses were used to test Hypothesis 1 and logistic regression was used to test Hypothesis 2. The plan for statistical power was .80, and our sample size was large enough to detect a medium size effect ($p$ = .05; Cohen, 1992). Nine different logistic regression models were conducted to assess whether the seven predictor variables—age, gender, married or cohabitating, poverty, college degree, poly-victimization, and being AI—significantly predicted whether the adopted and/or fostered individual reported the following outcomes: alcohol addiction, alcohol recovery, drug addiction, drug recovery, eating disorder, eating disorder diagnosis, self-injury, suicidal ideation, and suicide attempt. These nine models were run based on significant differences revealed in the preliminary analyses (*t*-tests and chi-squares). Mental health problems where there were not initially significant differences (self-assessed depression, depression diagnosis, and hospitalization for mental health) were not explored in the logistic regression analyses.

## RESULTS

The majority (56.2%) of the sample experienced both foster care and adoption; the remaining experienced only foster care or only adoption. The mean age of respondents was 48.96 years ($SD$ = 10.79), and 81% were female. Approximately half of the respondents (56.5%) were married or cohabitating. Personal annual incomes from all sources ranged from less than $10,000 to $55,000 or more (median = $35,000-54,999). The range of the respondents' highest completed education ranged from less than high school to more than a bachelor's degree, with 48.4% of respondents holding a bachelor's degree or higher.

In comparing the White and AI adoptees, the Whites had greater income (47.4% had an income of $55,000 or more, compared to 24.5% for the AI adoptees). The AI adoptees were also more likely to receive Social Security Disability income (15.5% compared to 2.2%). In addition, AI adoptees were more likely to have a college degree and to be married or cohabitating.

## Results of Hypothesis Testing

### Hypothesis 1

To investigate whether AI and White adoptees differed on substance abuse problems (e.g., alcohol addiction and drug addiction), recovery (alcohol recovery and drug recovery), mental health problems (e.g., depression, depression diagnosis, self-assessed eating disorder, eating disorder diagnosis), self-harm, suicidal ideation, and suicide attempt, chi-square statistics were conducted. Table 1 shows the Pearson chi-square results and indicates that AI and White adoptees were significantly different on alcohol addiction ($X^2$ = 18.536, *df* = 1, *N* = 226, *p* = .001), alcohol recovery ($X^2$ = 18.977, *df* = 1, *N* = 227, *p* = .001), drug addiction ($X^2$ = 3.898, *df* = 1, *N* = 228, *p* = .048), drug recovery ($X^2$ = 8.708, *df* = 1, *N* = 229, *p* = .003), self-assessed eating disorder ($X^2$ = 7.532, *df* = 1, *N* = 228, *p* = .006), eating disorder diagnosis ($X^2$ = 5.125, *df* = 1, *N* = 230, *p* = .024), self-harm ($X^2$ = 7.968, *df* = 1, *N* = 228, *p* = .005), suicidal ideation ($X^2$ = 8.236, *df* = 1, *N* = 228, *p* = .004), and suicide attempt ($X^2$ = 3.997, *df* = 1, *N* = 232, *p* = .046). AI adoptees were more likely than expected under the null hypothesis to self-report alcohol addiction, alcohol recovery, drug addiction, drug recovery, self-assessed eating disorder, eating disorder diagnosis, self-harm, suicidal ideation, and attempted suicide than Whites. There were no significant differences for depression and depression diagnosis.

**Table 1**
**Chi-square of Adopted and/or Fostered Individuals**

| | American Indian (*n* = 99) | | White (*n* = 134) | | | | |
|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *n* | | *p* |
| **Self-assessed Substance Abuse** | | | | | | | |
| Alcohol Addiction | 0.28 | 0.45 | 0.07 | 0.25 | 226 | 18.536 | **0.001** |
| Alcohol Recovery | 0.21 | 0.41 | 0.03 | 0.17 | 227 | 18.977 | **0.001** |
| Drug Addiction [a] | 0.14 | 0.35 | 0.06 | 0.24 | 228 | 3.898 | **0.048** |
| Drug Recovery [b] | 0.10 | 0.31 | 0.02 | 0.12 | 229 | 8.708 | **0.003** |
| **Mental Health** | | | | | | | |
| Depression (Self-assessed) | 0.88 | 0.33 | 0.82 | 0.39 | 230 | 1.368 | 0.242 |
| Depression Diagnosis | 0.53 | 0.50 | 0.53 | 0.50 | 228 | 0.000 | 0.989 |
| Hospitalized for Mental Health Condition | 0.21 | 0.41 | 0.14 | 0.34 | 231 | 2.506 | 0.113 |
| Eating Disorder (Self-assessed) | 0.31 | 0.47 | 0.16 | 0.37 | 228 | 7.532 | **0.006** |
| Eating Disorder Diagnosis | 0.15 | 0.36 | 0.06 | 0.24 | 230 | 5.125 | **0.024** |

continued on next page

**Table 1, Continued**
**Chi-square of Adopted and/or Fostered Individuals**

| | American Indian (*n* = 99) | | White (*n* = 134) | | | | |
|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *n* | | *p* |
| **Self-harm and Suicide** | | | | | | | |
| Self-injury Without Suicidal Intention | 0.36 | 0.48 | 0.20 | 0.40 | 228 | 7.968 | **0.005** |
| Contemplated Suicide | 0.59 | 0.49 | 0.40 | 0.49 | 228 | 8.236 | **0.004** |
| Attempted Suicide | 0.28 | 0.45 | 0.17 | 0.38 | 232 | 3.997 | **0.046** |

[a] Addicted to any kind of drug other than alcohol
[b] In recovery from any kind of drug other than alcohol

### Hypothesis 2a: Alcohol Addiction

In the logistic model for alcohol addiction, when all seven predictor variables (demographic characteristics, poly-victimization, and AI) were controlled, they significantly predicted whether the person reported alcohol addiction, $X^2$ = 41.852, *df* = 7, *N* = 224, $p < .001$. Table 2 presents the odds ratios, which suggest that the odds of alcohol addiction increased for males and AIs.

### Hypothesis 2b: Alcohol Recovery

In the alcohol recovery model, when all seven predictor variables were controlled, they significantly predicted whether the person was in alcohol recovery, $X^2$ = 36.848, *df* = 7, *N* = 225, $p < .001$. The odds ratio indicates that the experience of alcohol recovery increased with age and for males, those in poverty, and AIs.

### Hypothesis 2c: Drug Addiction

In the logistic model for drug addiction, when all seven predictor variables were controlled, they significantly predicted whether the person reported drug addiction, $X^2$ = 17.877, *df* = 7, *N* = 227, $p < .013$. Table 2 also presents the odds ratios, which suggest that the odds of drug addiction decreased with age and increased for males.

### Hypothesis 2d: Drug Recovery

In the model for drug recovery, when all seven predictor variables were controlled, they significantly predicted whether the person was in drug recovery, $X^2$ = 23.267, *df* = 7, *N* = 227, $p < .002$. Table 2 also presents the odds ratios, which suggest that the odds of drug recovery increased for those in poverty and AIs.

### Hypothesis 2e: Eating Disorder

In the logistic model for eating disorders, when all seven predictor variables were controlled, they significantly predicted whether the person reported having an eating disorder, $X^2$ = 17.365, *df* = 7, *N* = 227, *p* < .015. Table 2 indicates that the odds of experiencing an eating disorder increased for AIs.

### Hypothesis 2f: Eating Disorder Diagnosis

In the model for a diagnosed eating disorder, when all seven predictor variables were controlled, they significantly predicted whether the person reported an eating disorder diagnosis, $X^2$ = 15.981, *df* = 7, *N* = 228, *p* < .026. Table 2 presents the odds ratios, which suggest that the odds of experiencing an eating disorder diagnosis increased with poly-victimization and for AIs.

**Table 2**
**Regression Models Predicting Alcohol Addiction, Alcohol Recovery, Drug Addiction, Drug Recovery, Eating Disorder, and Eating Disorder Diagnosis of Adopted and/or Fostered Individuals**

| | *B* | *SE* | *Odds ratio* | *p* | *B* | *SE* | *Odds ratio* | *p* |
|---|---|---|---|---|---|---|---|---|
| | **Alcohol Addiction (*n* = 224)** | | | | **Alcohol Recovery (*n* = 225)** | | | |
| Age | 0.042 | 0.022 | 1.043 | 0.056 | 0.080 | 0.029 | 1.083 | **0.007** |
| Gender (0 males) | -1.805 | 0.462 | 0.164 | **0.001** | -1.387 | 0.556 | 0.250 | **0.013** |
| Married/Cohabitating | -0.511 | 0.433 | 0.600 | 0.239 | -6.330 | 0.526 | 0.531 | 0.229 |
| Poverty | 0.519 | 0.623 | 1.680 | 0.405 | 1.364 | 0.682 | 3.912 | **0.046** |
| College Degree | 0.101 | 0.441 | 1.107 | 0.818 | 0.529 | 0.531 | 1.697 | 0.319 |
| Poly-victimization | 0.219 | 0.144 | 1.245 | 0.127 | 0.027 | 0.173 | 1.027 | 0.877 |
| American Indian | 1.360 | 0.462 | 3.897 | **0.003** | 1.920 | 0.617 | 6.824 | **0.002** |
| | **Drug Addiction (*n* = 227)** | | | | **Drug Recovery (*n* = 227)** | | | |
| Age | -0.046 | 0.023 | 0.955 | **0.048** | 0.042 | 0.036 | 1.043 | 0.237 |
| Gender (0 males) | -1.232 | 0.550 | 0.292 | **0.025** | -1.042 | 1.661 | 0.353 | 0.197 |
| Married/Cohabitating | 0.209 | 0.530 | 1.233 | 0.693 | 1.250 | 2.898 | 3.491 | 0.089 |
| Poverty | 0.737 | 0.666 | 2.090 | 0.268 | 2.443 | 9.283 | 11.508 | **0.002** |
| College Degree | -0.971 | 0.570 | 0.379 | 0.089 | -0.462 | 0.426 | 0.630 | 0.514 |
| Poly-victimization | -0.150 | 0.164 | 0.860 | 0.361 | -0.401 | 2.542 | 0.670 | 0.111 |
| American Indian | 1.014 | 0.539 | 2.756 | 0.060 | 2.403 | 7.398 | 11.055 | **0.007** |
| | **Eating Disorder (*n* = 226)** | | | | **Eating Disorder Diagnosis (*n* = 228)** | | | |
| Age | 0.015 | 0.016 | 1.015 | 0.343 | -0.038 | 0.023 | 0.963 | 0.105 |
| Gender (0 males) | 0.664 | 0.497 | 1.942 | 0.182 | -0.090 | 0.613 | 0.914 | 0.884 |
| Married/Cohabitating | 0.145 | 0.348 | 1.157 | 0.676 | -0.250 | 0.467 | 0.779 | 0.592 |
| Poverty | 0.771 | 0.472 | 2.163 | 0.102 | 0.654 | 0.595 | 1.922 | 0.272 |
| College Degree | -0.272 | 0.345 | 0.762 | 0.430 | 0.951 | 0.498 | 2.587 | 0.056 |
| Poly-victimization | 0.159 | 0.112 | 1.173 | 0.156 | 0.323 | 0.163 | 1.381 | **0.048** |
| American Indian | 0.773 | 0.350 | 2.167 | **0.027** | 1.052 | 0.500 | 2.864 | **0.035** |

### Hypothesis 2g: Self-injury

In the logistic model for self-injury, when all seven predictor variables were controlled, they significantly predicted whether the person reported self-injury, $X^2$ = 39.997, *df* = 7, *N* = 226, $p < .001$. Table 3 presents the odds ratios, which suggest that the odds of self-injury decreased with age and increased with poly-victimization and for AIs.

### Hypothesis 2h: Suicidal Ideation

In the model for suicidal ideation, when all seven predictor variables were controlled, they significantly predicted whether the person reported suicidal ideation, $X^2$ = 42.708, *df* = 7, *N* = 226, $p < .001$. Table 3 presents the odds ratios, which suggest that the odds of suicidal ideation decreased with age and increased with poverty, poly-victimization, and for AIs.

### Hypothesis 2i: Suicide Attempt

In the suicide attempt model, when all seven predictor variables were controlled, they significantly predicted whether the person reported a suicide attempt, $X^2$ = 28.760, *df* = 7, *N* = 230, $p < .001$. Table 3 indicates that the odds of experiencing a suicide attempt increased with poverty and when the adoptee experienced poly-victimization.

**Table 3**
**Regression Model Predicting Self-injury, Suicidal Ideation, and Suicide Attempts of Adopted and/or Fostered Individuals**

| | **Self-injury (*n* = 226)** | | | | **Suicidal Ideation (*n* = 226)** | | | | **Suicide Attempt (*n* = 230)** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *B* | *SE* | *Odds ratio* | *p* | *B* | *SE* | *Odds ratio* | *p* | *B* | *SE* | *Odds ratio* | *p* |
| Age | -0.067 | 0.017 | 0.935 | **0.001** | -0.017 | 0.014 | 0.983 | 0.208 | -0.025 | 0.017 | 0.975 | 0.137 |
| Gender (0 males) | -0.031 | 0.435 | 0.969 | 0.943 | -0.852 | 0.390 | 0.426 | **0.029** | -0.177 | 0.457 | 0.838 | 0.698 |
| Married/ Cohabitating | -0.461 | 0.342 | 0.631 | 0.177 | 0.109 | 0.308 | 1.115 | 0.724 | 0.412 | 0.359 | 1.510 | 0.251 |
| Poverty | 0.451 | 0.476 | 1.570 | 0.343 | 1.476 | 0.555 | 4.373 | **0.008** | 1.022 | 0.463 | 2.779 | **0.027** |
| College Degree | 0.337 | 0.348 | 1.401 | 0.333 | 0.373 | 0.307 | 1.452 | 0.224 | 0.160 | 0.358 | 1.174 | 0.654 |
| Poly-victimization | 0.368 | 0.113 | 1.445 | **0.001** | 0.429 | 0.102 | 1.536 | **0.001** | 0.423 | 0.121 | 1.526 | **0.001** |
| American Indian | 0.848 | 0.355 | 2.335 | **0.017** | 0.647 | 0.315 | 1.910 | **0.040** | 0.523 | 0.363 | 1.688 | 0.150 |

## DISCUSSION

This study's purpose was to investigate the mental health problems of AI and White adoptees and to investigate the conditions that create a greater probability of mental health problems, including the experience of poly-victimization. The study was not an investigation of an individual mental health outcome (e.g., depression), but rather of mental health problems composed of self-assessed substance abuse, mental health variables (e.g., depression, hospitalization for a mental health condition, eating disorders), and self-injury and suicide. Family systems theory guided all aspects of this study. Data analysis included a series of chi-square statistics and logistic regression models.

Previous studies have suggested that adult adoptees are at increased risk for mental health problems. Our analysis comparing the mental health problems of AI adoptees to White adoptees, underscores the vulnerabilities not only of adoptees, but those particularly reported by AI adoptees. It appears that AI adoptees are even more vulnerable to mental health problems within the adoptee population. AI adoptees compared to White adoptees were more likely to report alcohol addiction, alcohol recovery, drug addiction, drug recovery, self-assessed eating disorder, eating disorder diagnosis, self-injury, suicidal ideation, and suicide attempt. However, no significant differences were found in preliminary analyses exploring differences between AI and White adoptees with regard to self-assessed depression or diagnosed depression. This finding suggests that it doesn't matter if an adoptee is AI or White, adoptees in general experience depression.

In terms of the probability of various mental health problems occurring in adult adoptees based on certain contextual characteristics, variation occurred by mental health problem. For suicide, being in poverty had a higher odds ratio than that of being an AI; the odds ratio for experiencing poly-victimization and being AI was about the same in predicting suicidal ideation or suicide attempt. However, for alcohol addiction, being AI had a higher odds ratio than either being in poverty or experiencing poly-victimization when predicting alcohol addiction. In predicting drug addiction or an eating disorder, the odds ratio of being in poverty and being AI was similar and poly-victimization was half of their ratio in predicting each disorder. We cannot, however, surmise from this analysis the pile-up or multiplier effect of these contextual characteristics on the prediction of these mental health disorders. This multiplier effect is something that needs to be pursued in future research efforts.

This study builds upon previous atheoretical research through the integration of family systems theory. Family systems theory offers a holistic orientation in that it assumes that a system (the mental health of the adoptee in this study) must be understood as a whole rather than in its component parts. This study investigated the odds of experiencing a number of mental health problems. Doing so provided a picture of the total mental health status of these adoptees after controlling for individual and contextual factors. This approach contrasts to other studies that explore mental health outcomes individually, which can obscure other problems.

Ours is one of the first quantitative studies about AI adoptees. By providing a comparison of White and AI adoptees, this study filled a gap within the literature related to the mental health problems of AI adoptees. Findings from the present study suggest that, although all adoptees are vulnerable to mental health problems, AI adoptees are particularly vulnerable. It appears that AI adoptees have a unique experience. One way of understanding the differences for AIs is through application of the concept of historical trauma. Although this study did not specifically explore historical trauma, we suggest that the historical trauma of AI adoptees contributes to their increased mental health problems, asserting that such problems stem from historical loss of lives, land, and important aspects of AI culture (Brave Heart & DeBruyn, 1998).

Historical trauma is believed to be inherited through one's ancestors. Applied to this study, it is the notion that AI adoptees experience trauma through their lived experiences of being separated from their families and culture, a phenomenon referred to as "blood memory." The past is highly relevant in AI culture; therefore, the mere acknowledgement of what has occurred (historical trauma, blood memory) is a first step in the healing process. Knowledge of the phenomenon of blood memory may be particularly beneficial to AI adoptees as they search to understand their health in relationship to their ancestors. The idea of blood memory may also aid in reducing the stigma and shame tied to experiences of mental health problems, as it helps place those problems in both familial and historical contexts. Furthermore, since storytelling is a major activity in AI culture, having adoptees seek the stories of their own ancestors begins to fill the "hole" created by being torn from their families of origin. AI adoptees sharing their own stories gives relevance to their history and elicits more healing.

In addition to race, other variables explored in our study appear to increase the probability of experiencing certain mental health problems. Poverty is one such variable; it was significantly associated with recovery from both alcohol and drugs and with suicidal ideation and

having attempted suicide. Poverty appears to increase adoptees' vulnerability to mental health problems because of the additional stress it places on the individual. In our analyses, although poverty mattered in predicting alcohol and drug recovery, it was not significantly associated with current alcohol or drug addiction. It may be that adoptees living in poverty are able to access greater services through the welfare system, which allows them to enter into recovery.

Another variable that increased the probability of experiencing mental health problems was poly-victimization. Poly-victimization was significantly associated with having an eating disorder diagnosis, self-injury, suicidal ideation, and having attempted suicide. This finding makes sense when considering stress pile-up (i.e., the pile-up of multiple stressors), as poly-victimization represents the cumulative and interconnected components of victimization. Adoptees exposed to multiple types of victimization may be at even greater risk for mental health problems.

## CONCLUSIONS AND LIMITATIONS

Although this research provided an overall glimpse into the mental health problems of AI adoptees, it is not without limitations. First, given that this is the first attempt at exploring mental health problems for AI adoptees, our findings are exploratory in nature. Second, our study did not determine the causes of increased mental health problems in AI adoptees as no causal relationships can be inferred using cross-sectional design. Third, we used a purposive sampling strategy; therefore, the findings cannot be generalized to all adoptees. Future research should expand upon this research through the use of validated measures of various classifications of mental illnesses (e.g., depression). Fourth, the measurement of constructs included in this study pose constraints. Scholars have criticized the use of retrospective self-report. Although previous research suggests that "retrospective self-reports may yield biased estimates of disorder; typically, these are thought to be underestimates" (Beals et al., 2005, p. 107; Kessler, 2000). Given that other authors have said that self-report measures are underestimates, future research should be done to more accurately capture the presence of these mental health problems. Lastly, future research might explore how the race of the foster/adoptive family, and/or how racially congruent foster/adoptive homes, may shape adoptee mental health.

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# STRESSFUL LIFE EVENTS AND SELF-REPORTED POSTPARTUM DEPRESSIVE SYMPTOMS 13-24 MONTHS AFTER LIVE BIRTH AMONG NON-HISPANIC AMERICAN INDIAN/ALASKA NATIVE MOTHERS IN OREGON: RESULTS FROM A POPULATION-BASED SURVEY

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*Abstract. Objectives: We explored the association between stressful life events and postpartum depressive symptoms among non-Hispanic American Indian and Alaska Native (AI/AN) mothers. Methods: We analyzed self-reports of stressful life events and depressive symptoms from 298 AI/AN respondents and conducted logistic regression to examine their association. Results: Of the AI/AN mothers who responded, 29.7% reported depressive symptoms during their second postpartum year. Partner-related and traumatic stressful life events were significantly associated with increased risk of postpartum depressive symptoms. Conclusions: AI/AN women should receive intensive screening for depression through the second postpartum year. Programs that address stressful life events may be part of a plan to decrease postpartum depression.*

## INTRODUCTION

Research has shown that American Indian and Alaska Native (AI/AN) women experience high rates of stressful life events and intimate partner violence, including both physical and sexual assault (Walters & Simoni, 2002). Other research has found that AI/AN women experience high rates of depression (Evans-Campbell, Lindhorst, Huang, & Walters, 2006; Whitbeck, McMorris, Hoyt, Stubben, & Lafromboise, 2002). There is a lack of research exploring potential associations between postpartum stressful life events, including intimate partner violence, and postpartum depression among AI/AN women. This study attempts to fill that gap in the literature by exploring the association between stress and depressive symptoms

among mothers in their second postpartum year. It is hoped that this paper will help to guide clinical practice by improving the diagnosis and treatment of postpartum depression, which will ultimately lead to improved mental and physical health outcomes for both mothers and their children.

Postpartum depression was first described in the early 1950s (Hemphill, 1952). It was originally described as a biologic experience of middle class women (Brody, 1968) and was thought to be limited to the "baby blues," which occurs shortly following childbirth and is thought to be due to hormonal causes, such as hormonal withdrawal (Kendell, 1987). However in the 1980s, researchers began to understand postpartum depression as a condition that persists beyond the immediate postpartum period, which can affect any mother and is influenced by external causes (Hapgood, Elkind, & Wright, 1988; O'Hara, Rehm, & Campbell, 1983; Paykel, Emms, & Rassaby, 1980). Symptoms of postpartum depression can include depressed mood or loss of interest or pleasure; changes in appetite, sleep, energy; difficulty thinking, concentrating, or making decisions; and suicidal ideation (American Psychiatric Association, 2013).

Most of the literature about the effects of postpartum depression on children is based on maternal depression in the first postpartum year. Studies have shown both short-term and long-term effects of maternal depression on infant physical growth, cognitive development, and behavioral adjustment (Murray et al., 1999; Surkan, Ettinger, Ahmed, Minkovitz, & Strobino, 2012). For example, children of depressed mothers are more likely to exhibit eating or sleeping difficulties (Righetti-Veltema, Conne-Perreard, Bousquet, & Manzano, 2002). A systematic literature review found that perinatal maternal mental health problems (including postpartum depression) increased the likelihood that school-age children experienced suboptimal global, behavioral, cognitive, and socio-emotional development (Kingston & Tough, 2014). Studies have described a number of maternal behaviors that may be altered by postpartum depression that may mediate these effects on children. Depressed mothers show less touch (Ferber, Feldman, & Makhoul, 2008), less smiling (Righetti-Veltema et al., 2002), less engagement (Lovejoy, Graczyk, O'Hare, & Neuman, 2000), and less infant-directed speech (Riessland, Shepherd, & Herrera, 2003) toward their child. Depressed mothers also show less reading, singing songs, telling stories, and playing games with their child (Paulson, Dauber, & Leiferman, 2006). In addition to these effects on behavior and development, children of depressed mothers may suffer other negative health effects. Depressed mothers are less likely to breastfeed (Field,

Hernandez-Reif, & Feijo, 2002; McLearn, Minkovitz, Strobino, Marks, & Hou, 2006a). Infants of depressed mothers are less likely to get routine well child care and less likely to receive up-to-date immunizations (Minkovitz et al., 2005). Depressed mothers are less likely to provide a safe environment including using car seats, safety latches, and electric outlet covers (McLearn, Minkovitz, Strobino, Marks, & Hou, 2006b).

Prevalence of postpartum depression depends on the diagnostic criteria used and the time frame over which the depression is measured (Boyce & Stubbs, 1994). A meta-analysis found a point prevalence of 8.5-11.0% during pregnancy and 6.5-12.9% for the first postpartum year (Gaynes et al., 2005). Most of these studies were predominantly of non-Hispanic White mothers. More recent studies have explored the prevalence of postpartum depression among minority women. A North Carolina study of a racially mixed U.S. population found depression in 18.7% of Native American women, 17.6% of White women, and 14.8% of African American women (Wei, Greaver, Marson, Herndon, & Rogers, 2008). Another study, based on Pregnancy Risk Assessment Monitoring System (PRAMS) data, used data from 17 states and found self-reported depressive symptoms among 9.0%-16.1% of White women, 18.6%-40.6% of non-Hispanic Black women, and 14.2%-23.4% of Hispanic women (Brett, Barfield, & Williams, 2008).

Many researchers have explored stressful life events including intimate partner violence. Prevalence estimates vary according to which events and what time periods are being explored. PRAMS is a collaborative program of the Center for Disease Control and Prevention (CDC) and state health departments. PRAMS surveys ask a standard set of questions about 13 stressful life events that may have occurred in the 12 months before delivery. Using those questions, a multi-state PRAMS study found that 64% of respondents reported having experienced at least one stressful life event (Whitehead, Brogan, Blackmore-Prince, & Hill, 2003). A North Carolina population-based study of postpartum women, using the same questions, found that 14% of women interviewed a few months after a live birth reported 5 or more stressful life events (Martin et al., 2001). In Oregon, using a different methodology, 13.3% of Oregon women 18 to 64 years of age were estimated to have been victims of physical abuse (physical assault, sexual coercion, or injury) by an intimate partner during the past year (Glick, Johnson, & Pham, 1999). Stressful life events, including intimate partner violence, have been found to be temporally associated with both pregnancy-related and non-pregnancy-related depression (Brown, 1970;

Golding, 1999; Gross, Wells, Radigan-Garcia, & Dietz, 2002; Herrick, 2000; Kessler, 1997; LaCoursiere, Hirst, & Barrett-Connor, 2012; O'Hara, 1995).

## METHODS

Oregon PRAMS is a surveillance program supported by the CDC and implemented by the Oregon Public Health Division. The CDC PRAMS methodology has been described elsewhere (Gilbert, Shulman, Fischer, & Rogers, 1999). Oregon PRAMS methodology is similar to the CDC's. A stratified random sample of live births is drawn each month with oversampling of racial/ethnic minorities, including AI/AN women. Mothers receive a second survey, PRAMS-2, shortly after the index child's second birthday. This analysis is based on data from PRAMS-selected women who had a live birth in 2004-2007 and completed both the PRAMS and the PRAMS-2 surveys. Birth certificates and PRAMS and PRAMS-2 data were linked to create the final dataset.

The Oregon PRAMS-2 survey includes questions on maternal depressive symptoms and stressful life events, including intimate partner violence. Like PRAMS, the Oregon PRAMS-2 survey is administered by mail and phone in both English and Spanish. The mean age of the index child when the mother responds to the PRAMS and PRAMS-2 surveys is, respectively, 3 and 25 months. Because PRAMS oversamples for maternal race/ethnicity, a complex weighting mechanism is used in order to adjust for the stratified sampling. In addition to weighting for maternal race/ethnicity, the data is also weighted for non-response and non-coverage (caused by failure to reach individuals depending on the contact method).

The sample for this study was drawn from the 183,275 live births from January 1, 2004 through December 31, 2007 in Oregon. Of the 11,684 women who were sampled, 7,684 women responded to the PRAMS survey. Among these, 3,938 women responded to the PRAMS-2 survey. Among these, 462 women were identified as non-Hispanic American Indian or Alaska Native (AI/AN). Weighting back to the original PRAMS sampling frame, the weighted response rate for PRAMS-2 was 27.6% among AI/AN women. After excluding the 162 women who had been pregnant since the birth of the index child and 2 women who did not answer the question regarding pregnancies since the birth of the index child, our final sample consisted of 298 AI/AN women.

Access to the PRAMS-2 data for this study was facilitated by the authors who include staff at the Oregon Public Health Division, the institution that conducts the survey in conjunction with the CDC. The Oregon Public Health Division has a data use agreement with the CDC which mandates confidentiality measures to protect the participants of the survey.

**Definition of Outcome Measures**

The main outcome measure in this analysis is self-reported symptoms of depression 13 to 24 months after the birth of the index child from the PRAMS-2 survey (shortly after the child's second birthday). Mothers were asked whether, in the past 12 months, there had been a period of two or more weeks when they had been a) sad, blue, or depressed for most of the day and/or b) lost interest or pleasure in most things they usually cared about or enjoyed. Mothers were considered to have self-reported depressive symptoms if they answered "yes" to either of these questions. These questions were modeled after questions used in the PRAMS survey. This method of assessing the presence of depressive symptoms has been shown to be useful for detecting depression in primary care and perinatal settings (Gjerdingen, Crow, McGovern, Miner, & Center, 2009; Kroenke, Spitzer, & Williams, 2003; Smith, Gotman, Lin, & Yonkers, 2010; Whooley, Avins, Miranda, & Browner, 1997). The U.S. Preventive Services Task Force (USPSTF) concluded that "shorter screening tests, including simply asking questions about depressed mood and anhedonia, seem to detect most depressed patients and, in some cases, do better than the original instrument from which they were derived." This conclusion may not be completely accurate among AI/AN populations since cultural accuracy of this approach was not tested (USPSTF, 2009). Future research could involve determining the sensitivity and specificity of the questions in PRAMS-2 for identifying depressive symptoms.

**Definition of Covariates**

PRAMS-2 asked mothers whether they experienced any of 13 stressful life events in the past 12 months. These events are similar to those asked in the PRAMS survey (at about 3 months postpartum) and categorized using principal component analysis (Ahluwalia, Merritt, Beck, & Rogers, 2001). This categorization has been used by other researchers (Dozier, Nelson, & Brownell, 2012; Gross et al., 2002; Jewell, Dunn, Bondy, & Lieferman, 2010; LaCoursiere et al., 2012; Lu & Chen, 2004). Partner-related stressful life events were affirmative responses to "I got

separated or divorced from my spouse or partner" or "I argued with my spouse or partner more than usual." Traumatic stressful life events were "I was homeless," "I was in a physical fight," "my spouse or partner or I went to jail," or "someone very close to me had a bad problem with drinking or drugs." Financial stressful life events were "I moved to a new address," "I lost my job even though I wanted to go on working," "my spouse or partner lost his or her job," or "I had a lot of bills I couldn't pay." Emotional stressful life events were "A close family member was very sick and had to go into the hospital," "I was very sick," or "someone very close to me died." If mothers answered "yes" to any of the events in a category, they were considered to have experienced that category of stressful life event.

Mothers were also asked in PRAMS-2 about five different types of intimate partner violence in the 12 months before completion of the survey. The questions asked whether an intimate partner (current or former spouse, boyfriend, girlfriend, or date) had 1) yelled and screamed at you, threatened you, or made you feel unsafe; 2) tried to limit your contact with family or friends; 3) prevented you from knowing about or having access to your shared income, even when you asked; 4) pushed, hit, slapped, kicked, choked, or physically hurt you in any other way; or 5) had sex with you against your will or without your consent. If mothers responded "yes" to any of these options, they were considered to have experienced intimate partner violence. Because of Oregon child abuse laws and the desire to maximize the confidentiality of respondents, PRAMS and PRAMS-2 do not ask questions about intimate partner violence of women who were less than 20 years old at the time of the index birth. The 24 women in the study sample who were less than 20 years old were counted as "no" responses to the intimate partner violence variable.

Other covariates examined were maternal age at birth and urban/rural county of residence from the birth certificate; pregnancy intention from PRAMS; and maternal education, marital status, social support, and poverty status from PRAMS-2. Using household income and number of household dependents, respondents were categorized as being either less than or greater or equal to 100% of the Federal Poverty Level (FPL; U.S. Department of Health and Human Services, 2013). Mother's county of residence was categorized as rural if she lived in a county with less than 60 persons per square mile according to the 2010 census.

### Statistical Techniques

To confirm the results of previous studies, prevalence rates of postpartum depressive symptoms and stressful life events, including intimate partner violence, were calculated among the analysis sample of AI/AN mothers. Bivariate logistic regression was conducted to examine the association between each covariate and postpartum depressive symptoms separately among the analysis sample. Multivariable logistic regression was then conducted using a backwards elimination technique to determine which covariates were statistically significantly associated with postpartum depressive symptoms among AI/AN women. The initial multivariable model included each of the four categories of stressful life events, intimate partner violence, and the seven other covariates previously described and listed in Table 1. Multivariable logistic regression was run and the covariate with the least significant association to self-reported depressive symptoms was removed from the model. This process was repeated until only covariates with a significance of p-value < 0.05 remained in the model. Unless otherwise noted, all frequencies are unweighted and all percentages are weighted. Stata 11.0 was used to account for the three stage complex survey weighted design.

## RESULTS

Among the 298 non-Hispanic AI/AN respondents, 29.7% experienced self-reported depressive symptoms 13-24 months postpartum. In terms of stressful life experiences, 68.0% reported financial events, 60.8% reported emotional events, 45.8% reported partner-related events, 37.9% reported traumatic events, and 18.7% reported intimate partner violence (see Table 1).

**Table 1**
**Prevalence of self-reported depressive symptoms and stressful life events including intimate partner violence 13-24 months postpartum among non-Hispanic AI/AN mothers of 2 year olds in Oregon who had not been pregnant again since the birth of the index child, Oregon PRAMS-2, 2004-2007 births (*n* = 298)**

| Covariate | Unweighted Frequency | Weighted Percentage |
|---|---|---|
| Postpartum Depressive Symptoms | 85 | 29.7% |
| Partner-related stressful life events | 132 | 45.8% |
| Separated or divorced from partner | 45 | 14.5% |
| Argued with spouse or partner more than usual | 100 | 34.3% |
| Traumatic stressful life events | 106 | 37.9% |
| Became homeless | 22 | 7.8% |
| Was in a physical fight | 20 | 6.8% |

continued on next page

**Table 1, Continued**
**Prevalence of self-reported depressive symptoms and stressful life events including intimate partner violence 13-24 months postpartum among non-Hispanic AI/AN mothers of 2 year olds in Oregon who had not been pregnant again since the birth of the index child, Oregon PRAMS-2, 2004-2007 births (*n* = 298)**

| Covariate | Unweighted Frequency | Weighted Percentage |
|---|---|---|
| Traumatic stressful life events | | |
| Spouse, partner or self went to jail | 28 | 9.4% |
| Someone very close had a problem with drinking or drugs | 91 | 31.7% |
| Financial stressful life events | 193 | 68.0% |
| Moved to a new address | 100 | 33.3% |
| Lost own job | 33 | 11.4% |
| Spouse or partner lost job | 44 | 15.8% |
| Had a lot of bills they couldn't pay | 143 | 48.9% |
| Emotional stressful life events | 178 | 60.8% |
| Family member was hospitalized | 132 | 46.5% |
| Were very sick themselves | 66 | 22.3% |
| Someone very close to them died | 83 | 28.8% |
| Intimate partner violence | 49 | 18.7% |
| Verbal abuse | 41 | 14.5% |
| Limitation of contact with friends or family | 18 | 6.4% |
| Prevention of access to income | 12 | 3.9% |
| Physical abuse | 19 | 6.0% |
| Sexual abuse | 1 | 0.4% |

Among the 298 non-Hispanic AI/AN respondents, women with the following characteristics were the most likely to have reported depressive symptoms 13-24 months postpartum: those who experienced intimate partner violence, those with low or no social support, those with less than a $12^{th}$ grade education, those who are < 20 years old, those who experienced at least one traumatic stressful life event, and those who experienced at least one partner related stressful life event (see Table 2).

In bivariate logistic regression analyses, all four categories of stressful life events including intimate partner violence were significantly associated with self-reported postpartum depressive symptoms. In addition, low maternal education, low household income, low maternal social support, and single marital status were associated with postpartum depressive symptoms. In multivariable logistic regression analyses, the covariates that were significantly associated with self-reported postpartum depressive symptoms were having had at least one partner-related stressful life event (AOR 2.40, 95% confidence interval 1.34-4.30) or at least one traumatic stressful life event (AOR 2.11, 95% confidence interval 1.17-3.79; see Table 2).

**Table 2**
**Self-reported depressive symptoms 13-24 months postpartum among non-Hispanic AI/AN mothers of 2 year olds in Oregon, Oregon PRAMS-2, 2004-2007 births (*n* = 298)**

| Risk Factor | n (unweighted) | % Depressed (weighted) | Bivariate OR (95% CI) | Multivariable OR (95% CI) |
|---|---|---|---|---|
| Total | 298 | | | |
| Partner-Related Stressful Life Events[a,*] | | | | |
| Yes | 132 | 43.5% | 2.92 (1.70-5.00) | 2.40 (1.34-4.30) |
| No | 166 | 20.8% | Referent | Referent |
| Traumatic Stressful Life Events[b,*] | | | | |
| Yes | 106 | 44.4% | 2.66 (1.56-4.54) | 2.11 (1.17-3.79) |
| No | 192 | 23.1% | Referent | Referent |
| Financial Stressful Life Events[c,*] | | | | |
| Yes | 193 | 39.5% | 3.68 (1.95-6.94) | |
| No | 105 | 15.1% | Referent | |
| Emotional Stressful Life Events[d,*] | | | | |
| Yes | 178 | 35.6% | 1.76 (1.01-3.07) | |
| No | 120 | 23.9% | Referent | |
| Intimate Partner Violence* | | | | |
| Yes | 49 | 51.8% | 3.07 (1.59-5.92) | |
| No | 244 | 25.9% | Referent | |
| Pregnancy Intention | | | | |
| Pregnancy Unintended | 128 | 36.1% | 1.63 (0.96-2.75) | |
| Pregnancy Intended | 168 | 25.8% | Referent | |
| Maternal Social Support[†] | | | | |
| None/Low Support | 32 | 51.7% | 2.70 (1.23-5.93) | |
| Moderate/High Support | 264 | 28.4% | Referent | |
| Maternal Age at Birth | | | | |
| <20 years old | 24 | 44.2% | 1.93 (0.83-4.80) | |
| 20 to 34 years old | 232 | 29.0% | Referent | |
| >=35 years old | 42 | 34.8% | 1.31 (0.62-2.78) | |
| Marital Status[†] | | | | |
| Not Married | 137 | 39.8% | 2.27 (1.33-3.86) | |
| Married | 161 | 22.6% | Referent | |
| Maternal Education[†] | | | | |
| Less than 12th grade | 33 | 49.4% | 2.85 (1.28-6.32) | |
| 12th grade or GED | 95 | 32.4% | 1.28 (0.72-2.29) | |
| More than 12th Grade | 169 | 26.2% | Referent | |
| Household Income[†] | | | | |
| <=100% Federal Poverty Level | 111 | 42.5% | 2.54 (1.47-4.39) | |
| >100% Federal Poverty Level | 172 | 22.6% | Referent | |
| Maternal Residence at Child's Birth | | | | |
| Rural County | 137 | 30.3% | Referent | |
| Urban County | 161 | 31.8% | 1.08 (0.64-1.81) | |

[a] Partner-Related Stressful Life Events: separated/divorced, argued more than usual
[b] Traumatic Stressful Life Events: homeless, physical fight, went to jail, problem with drinking/drugs
[c] Financial Stressful Life Events: moved, lost job, lot of bills
[d] Emotional Stressful Life Events: family member hospitalized, very sick, someone close died
*13-24 months postpartum
[†] At 24 months postpartum
Not all columns of unweighted numbers add up to 298 because of unanswered questions.

## DISCUSSION

Three main themes will be included in the following discussion. These include causes of postpartum depression among AI/AN women, including historical and current trauma, methods of detection and diagnosis of postpartum depression, and treatment of postpartum depression and other mental health conditions among AI/AN communities.

Since colonial times, European-Americans throughout North America, including the Pacific Northwest, have made and broken treaties with American Indians, established and abolished reservations, and vacillated between extermination and assimilation of AI/AN people. In Oregon, tribes were confined to reservations as early as 1840 (Haines, 1950). Twentieth century federal assimilation policy for selected tribes led to decreased economic opportunities and decreased social supports. For example, the Klamath tribes in southern Oregon were relatively wealthy in the early 1950s from harvesting timber on their lands (Haynal, 2000). The Klamath tribes were terminated in 1954, leading to tribal members being cut off from services for education, health care, housing, and related resources. Termination directly caused decay within the tribe, including poverty, alcoholism, high suicide rates, low educational achievement, disintegration of the family, poor housing, high school dropout rates, disproportionate numbers in penal institutions, increased infant mortality, decreased life expectancy, and loss of identity (Clements, 2009).

### High Prevalence of Postpartum Depressive Symptoms and Stressful Life Events Among AI/AN Women

We found high levels of postpartum depressive symptoms and stressful life events, including intimate partner violence, among AI/AN women 13-24 months after a live birth. Findings from previous studies on the prevalence of depression among AI/AN communities have been mixed, with some finding rates lower than the general population (Beals et al., 2005; Brett et al., 2008) and some finding rates higher (Duran et al., 2004; Wei et al., 2008). Findings from previous studies on stress experienced by AI/AN communities have also yielded mixed results (Manson, Beals, Klein, & Croy, 2005; Sarche, Tafoya, Groy, & Hill, 2017).

Low maternal education, low household income, and low maternal social support were associated with postpartum depressive symptoms in bivariate analysis but were not in the final model due to a lack of statistical significance. We found that partner-related stressful life events

(separated/divorced or arguing) and traumatic stressful life events (homeless, fighting, jail, drinking/drug use) were statistically significantly associated with postpartum depressive symptoms. The behavioral effects of alcohol and drugs for many AI/ANs have followed the historical trauma of shame, fear, and anger that has passed from one generation to the next as a consequence of federal policies to displace AI/ANs and assimilate them away from reservations. Our findings point toward the need for upstream interventions to decrease postpartum depression. Our study seems to be the first to have studied self-reported postpartum depressive symptoms among AI/AN women in the second postpartum year.

The Life Course perspective provides a framework to understand the impact of a variety of stressors over multiple generations (Fine & Kotelchuck, 2010). The stressful life event questions on the PRAMS-2 survey are an imperfect proxy for chronic stress. The assessment of chronic stress would probably be improved by adding information about perceived discrimination, as asked on a few PRAMS surveys. Most of the work about chronic stress and racism has explored chronic stresses experienced by Black women, but it is possible that the chronic stresses experienced by AI/AN women are associated with similar outcomes. For AI/ANs in the U.S., the relationship with Europeans has been very stressful. Many of our respondents and their ancestors likely endured forced assimilation, poverty, and racism (Brown, 1970; Dunbar-Oritz, 2014). Federal boarding schools in Oregon began in the 19$^{th}$ century and "focused on the destruction of Native languages and cultures and the enforcement of assimilation policies" (Collins, 2015). The removal of one to three generations of children to boarding schools has resulted in parents who do not have the parenting and coping skills that many who grew up with their parents and grandparents possess. Likewise, federal policies displaced AI/ANs onto reservations that lacked capital to support economies with education, training, jobs, and natural resources. These factors all contribute to lost hope and depression among mothers of young children.

**More Early Detection for Postpartum AI/AN Women Who Experience Stressful Life Events**

We found an association, in the second postpartum year, between depressive symptoms and two types of stressful life events (partner-related and traumatic). Our findings are consistent with previous research about depression in the first postpartum year (Gross et al., 2002; Herrick, 2000; O'Hara, 1995), but no research has explored stressful life events and depression after the

first postpartum year. Other covariates which had significant bivariate associations with postpartum depressive symptoms did not survive in the final multivariable model. This may be due to collinearity between similar types of stress or demographic variables. Of note is the fact that the covariates which did not survive the multivariable modelling include chronic types of stress such as having low social support, being unmarried, having low education, and being low income.

Clinicians should increase efforts to systematically screen for intimate partner violence, other stressful life events, and depression throughout the first and second postpartum year and facilitate connection with behavioral health, community, and social service resources to help women during pregnancy and the postpartum period. Researchers should also explore whether any of the following activities lead to decreased stressful life events: programs to increase father involvement; prenatal providers routinely screening for partner-related issues; and programs to increase social support for the mother from either family members or peer support groups.

## Clinical Implications

We found that 29.7% of AI/AN women in the sample reported depressive symptoms during their second postpartum year. To the extent to which providers screen for postpartum depression, that screening is usually done in the first three postpartum months. Our findings imply that the period for screening should be expanded at least through the second postpartum year.

Screening alone is not sufficient to reduce rates of postpartum depression. The USPSTF recommends screening adults for depression when staff-assisted depression care supports are in place to assure accurate diagnosis, effective treatment, and follow-up (O'Connor, Whitlock, Beil, & Gaynes, 2009; U.S. Preventive Task Force, 2009). They found that "primary care depression screening programs were likely to be effective when other staff provided part of the depression care, such as assessment and monitoring in coordination with the primary care provider's treatment, or when extra efforts were made to enroll patients in specialty mental health treatment" (O'Connor et al., 2009).

Many communities have insufficient capacity to provide care for women with postpartum depression. There is need for increased funding of the Indian Health Service (IHS) and urban programs within IHS. Providers screening postpartum women will need to develop systems to

help women who have been screened and diagnosed. Many providers will need further training to increase their ability to provide care for depressed women. IHS has supported efforts to integrate behavioral health care with primary care across Indian Country through the Improving Patient Care collaborative since 2006 (IHS, 2010). Incentives such as those being directed at the formation of Accountable Care Organizations (Coordinated Care Organizations in Oregon) and Patient Centered Medical Homes may help providers to develop integrated behavioral health and primary care practice models in an effort to increase availability of services. Unfortunately, these systems do not integrate with the Indian health system so almost all Indian health providers are excluded from the process. Accountable Care Organizations could learn from integrated care that IHS has been delivering since 1955.

A 2012 (Urban Indian Health Institute, 2012) review of literature about depression among AI/ANs does not focus on pregnancy-related depression but makes broad suggestions about prevention and treatment of depression for all AI/ANs. Their suggestions include: including family and community; incorporating traditional knowledge of health and spirituality; using prevention and treatment methods that focus on active skills building; integrating screening and treatment with prevention or primary care; and expanding cultural competency of mental health providers. They recommend further research into the relative effectiveness of Western mental health treatment methods versus more culturally-grounded approaches to treatment. They also recommend further research into pathways to care and help-seeking behaviors of AI/ANs to explore barriers to care.

Although many women have little contact with their own providers during the first and second postpartum years, they have multiple visits with their pediatric provider for well child care. An encouraging new approach to care for women with postpartum depression is to have pediatricians screen, refer, and treat mothers when they bring their children for well child care. The American Academy of Pediatrics (AAP) encourages pediatricians to implement postpartum depression screening, referral, and treatment (Earls, 2010). Recent work has found that this approach is effective (Chaudron, Szilagyi, Campbell, Mounts, & McInerny, 2007; Chaudron et al., 2004; Olson et al., 2005; Sheeder, Kabir, & Stafford, 2009). The Oregon Pediatric Society (the Oregon chapter of the AAP) trains primary care providers to screen mothers for postpartum depression (Oregon Pediatric Society, n.d.). More recently, the AAP Committee on Native American Child Health (CONACH) has assessed IHS, Tribal, and urban Indian clinical practices

in the Northwest, including Oregon, in their ability to provide this care and encouraged efforts to improve pediatric-based screening for maternal depression. Another opportunity for accessing AI/AN mothers in order to identify and address postpartum depression is through home visiting programs, such as the Maternal, Infant, and Early Childhood Tribal Home Visiting program. These programs have demonstrated success in improving the parenting skills and mental health of AI/AN mothers (Barlow et al., 2015; Lyon et al., 2015).

## Resiliency and Traditional Spiritual Practices as Protective Factors

While clinical intervention is a crucial component of addressing the high prevalence of postpartum depression among AI/AN women in Oregon, traditional cultural and spiritual practices that build on resilience are also important protective factors that must be considered. Multiple studies have found that AI/AN individuals who participate in traditional cultural and spiritual practices have lower rates of mental health conditions such as depression (Kading et al., 2015, Shendo et al., 2012; Wexler, 2006). In addition, interventions to address depression among AI/AN individuals have been found to be more successful when they incorporate traditional cultural practices and support in addition to treatments such as psychotherapy and pharmaceutical intervention (Gone, 2009; Gone & Alcántara, 2007). One of the key components of involving traditional culture in interventions to address depression among AI/AN women is that these practices develop resiliency, which helps to offset the impact of stressful life events (Kirmayer, Dandeneau, & Williamson, 2011; Tsethlikai & Rogoff, 2013). Ensuring that the strengths of AI/AN communities are leveraged by including traditional culture, practices, and spirituality as key components of any depression intervention will facilitate the best possible mental health outcomes for AI/AN women in Oregon.

## Limitations

The main limitation of this study is that it is cross sectional since both the independent and dependent variables are assessed for the second postpartum year, and the lack of temporality means we therefore cannot assess causality. We believe that it is more likely that depressive symptoms result from, rather than cause, stressful life events. Another limitation is that all data is self-reported; however, the validity of self-report, specifically for PRAMS methodology, has been found to be superior to interview for certain exposures and behaviors (Beck et al., 2002). A

further limitation is that the weighted response rate in PRAMS-2 for AI/AN women was 27.6%. Other limitations of the methodology included being unable to determine if the maternal county of residence at 25 months postpartum was the same as at birth (for the purpose of calculating rurality) and how many mothers < 20 years of age experienced intimate partner violence. In addition, the PRAMS and PRAMS-2 survey questions are not developed to be specifically culturally responsive to AI/AN women. Further research could involve evaluating the appropriateness of these surveys among AI/AN women and the potential development of a culturally specific survey. A final limitation of the study is that the generalizability of the findings to AI/AN women outside of Oregon are not clear.

### Strengths

The main strength of this study is that it is a population-based random sample of AI/AN residents who had a live birth in Oregon. Our results are therefore generalizable to all Oregon AI/AN women. Another strength is that due to the structure of the follow-back survey, we were able to explore depressive symptoms in the second postpartum year. Additionally, the survey design allows inquiry about stressful life events in the second postpartum year. Finally, the study helps to fill a gap in the literature on the effects of stress on depressive symptoms in the second postpartum year among AI/AN mothers.

## CONCLUSIONS

AI/AN women in Oregon are at high risk of postpartum stressful life events and depression. Women who have experienced partner-related and traumatic postpartum stressful life events are at significantly increased risk for postpartum depressive symptoms. Providers should systematically screen pregnant and postpartum women for stressful life events in addition to routine screening for depression at least through the second postpartum year. Women who are found to have depressive symptoms should be referred for care; integration of primary care and behavioral health in the provider's office can help facilitate coordinated care for postpartum depression. Pediatric providers should be enlisted to screen mothers for depression and refer them for treatment when young children come for well child care. Further research is needed to explore whether early detection and remediation of stressful life events can decrease postpartum depression.

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