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# Adverse Childhood Exposures and Alcohol Dependence Among Seven Native American Tribes

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**Background:** Alcohol abuse and alcoholism are leading causes of death among Native Americans. Little is known about the impact of negative childhood exposures, including parental alcoholism, childhood maltreatment, and out-of-home placement, on risk of lifetime DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th edition) diagnosis of alcohol dependence in this population.

**Methods:** Face-to-face interviews were conducted with 1660 individuals from seven Native American tribes from 1998 to 2001. Logistic regression was used to estimate the impact of specific types and number of different adverse childhood experiences on alcohol dependence. Relationships between tribe-specific cultural characteristics and alcohol dependence were also examined.

**Results:** There were significant tribal differences in rates of alcohol dependence and several adverse childhood exposures. Lifetime prevalence of alcohol dependence was high among all tribes (men: 21%–56%, women: 17%–30%), but one (men: 1%, women: 2%). High prevalence rates were documented for one or more types of adverse childhood experiences (men: 74%–100%; women: 83%–93%). For men, combined physical and sexual abuse significantly increased the likelihood of subsequent alcohol dependence (odds ratio [OR]=1.58; 95% confidence interval [CI], 1.10–2.27). For women, sexual abuse (OR=1.79; 95% CI, 1.21–2.66) and boarding school attendance increased the odds of alcohol dependence (OR=1.57; 95% CI, 1.03–2.40). Two separate patterns of dose-response relationships were observed for men and women. Significant inter-tribal differences in rates of alcohol dependence remained after accounting for tribe-specific cultural factors and geographic region.

**Conclusions:** Effects of childhood exposures on high-risk behaviors emphasize screening for violence in medical settings and development of social and educational programs for parents and children living on and near tribal reservations.

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## Introduction

Alcohol abuse and alcoholism contribute to high mortality rates among Native Americans.<sup>1</sup> From 1994 to 1996, alcoholism death rate among Native Americans was over seven times the rate for the U.S. general population.<sup>2</sup> The rate is conservative because deaths from alcohol-abusive causes, such as accidents, suicides, and homicides, were not included. Alcohol-related deaths are also shown to be high among this population.<sup>1</sup> These findings are part of a

growing literature that points to alcoholism, along with other high-risk behaviors, as leading causes of death.<sup>3</sup>

Previous studies identified childhood abuse as a risk factor for alcohol disorders,<sup>4,5,6</sup> whereas others have not.<sup>7</sup> Two recent large-scale investigations have contributed to research in this area. Felitti et al.<sup>8</sup> found a link between alcoholism and number of childhood exposures in a primary care setting. Another study showed that combined childhood sexual and physical abuse was associated with heavy drinking among women, whereas physical abuse alone increased the risk among men.<sup>9</sup> These findings suggest that childhood experiences are often, but not uniformly, associated with subsequent alcohol problems.

Few studies have been conducted with Native Americans, a population at risk of childhood adversity because of problems with alcoholism and low economic levels.<sup>10</sup> Findings from two studies are inconsistent. Researchers found that childhood physical abuse, but

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not sexual abuse, increased the odds of alcohol dependence,<sup>11</sup> whereas others documented a significant relationship between child sexual abuse and several psychiatric disorders among women, but not men.<sup>10</sup> Less is known about other common adverse events, such as separations from families.<sup>12</sup> Historically, many Native American children were removed from homes for involuntary boarding school placement,<sup>13</sup> adoption, or foster care.<sup>14</sup> To date, there is limited empirical support for an association between out-of-home placement and alcohol abuse. Two studies found no significant associations between boarding school experiences and alcohol dependence.<sup>15,16</sup> The inconsistent findings are difficult to evaluate because each study was limited to a single tribe.

The Native American population is vastly diverse, comprising over 557 federally recognized tribes across more than 35 states.<sup>17</sup> The impact of culture on responses to adverse experiences and alcohol abuse is unknown. Inter-tribal variability in alcohol use might be influenced by tribal integration, language, degree of ancestry,<sup>18</sup> as well as demographic and lifestyle characteristics.<sup>19</sup> Many Native Americans believe that the loss of culture contributes to alcohol-related problems.<sup>19</sup> Unfortunately, virtually all studies have used single-tribe data sets and lacked measurement of cultural beliefs and practices.

This is the first study to examine alcohol dependence and childhood maltreatment among several, geographically diverse, Native American communities. This article reports results from the Ten Tribes Study, a collaboration of Native American Nations and Confederations, the University of Arizona (UA), and the National Institute on Alcohol Abuse and Alcoholism (NIAAA). The project measured genetic and environmental vulnerability factors of alcoholism among seven tribes. In the present investigation, the authors examined the prevalence of lifetime DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th edition) alcohol disorders and adverse childhood experiences. The impact of specific types and number of categories of adverse childhood exposures on alcohol dependence was estimated. Childhood exposures under investigation included parental alcoholism, maltreatment, and out-of-home placement. The relationship among tribal, cultural, and regional characteristics and alcohol dependence was also examined.

## Methods

Tribes were recruited by solicitation with the aim of representing geographic diversity. Seven tribes participated in the project: one tribe each from the Bemidji (Minnesota), Oklahoma City (Oklahoma), Portland (Oregon), and Nashville (Tennessee) Indian Health Service (IHS) areas and three tribes from the Phoenix (Arizona) area. The human research protocol was approved by the UA Institutional Review Board,

NIAAA, and each collaborating community. A memorandum of agreement was developed, approved by the tribal council of each tribe, and signed by each institution before undertaking any research activities.

## Participants

Participants were selected randomly from tribal enrollment lists, voting registers, or health service registries, utilizing the most accurate source identified by executives of each tribe. Recruitment included a letter of introduction, telephone contact, and a minimum of three home visits. Refusal rate among contacted individuals ranged from 14% to 34% across the tribes. A total of 1670 respondents completed the study interviews. Out of this total, 10 interviews were omitted from the analyses because of missing data. Participants were 41% male and 59% female. Among men, average age was 40.5 years (20–81 years), 74% were high school graduates, and 55% had a household income of \$15,000 or higher. Among women, average age was 39.5 years (aged 20–88 years), 81% were high school graduates, and 59% had a household income of \$15,000 or higher.

## Survey Methods

Data were collected by face-to-face interviews from 1998 to 2001. Participants were each paid \$25. Interviewers were Native Americans from the same or different tribes based on the tribal leaders' preferences. Tribes 1 through 4 used tribal members, whereas Tribes 5 through 7 used a team of non-affiliated Native Americans as interviewers. All interviewers were trained by the researchers, using a 240-page training manual, practice interviews, and supervision. Data quality management included field editing and independent review.

## Interview Questions

**Demographic factors.** Demographic variables used in the analyses included gender, age, education level, and household income. The influences of these variables on alcohol dependence were assessed and controlled.

**Childhood exposures.** Nine categories of childhood exposures were examined. Parental alcoholism was measured using questions from the Alcohol Use Disorders and Associated Disabilities Interview Schedule<sup>20</sup> (AUDADIS). Respondents were placed in one of three categories: (1) no parental alcoholism, (2) one or both parents with alcoholism, or (3) unknown.

Five categories of childhood maltreatment were used: (1) physical abuse, (2) physical neglect, (3) sexual abuse, (4) emotional abuse, and (5) emotional neglect. Childhood maltreatment was measured using the Childhood Trauma Questionnaire<sup>21</sup> (CTQ), a 25-item questionnaire that assesses abuse and neglect before the age of 18. For instance, participants rated the statement "Someone in my family hit or beat me" on a 5-point scale that ranged from "never true" to "very often true." (The version of this scale available when the study was done did not include three items in the current version. To address this problem, the mean values of four items were inputted for the fifth response on the physical abuse, physical neglect, and emotional abuse factors, and then the standard scoring procedure was implemented.) Cronbach alpha statis-

**Table 1.** Percentage of lifetime alcohol disorders among Native American tribes

Variable	Total (N=1660)		Tribe 1 (n=298)		Tribe 2 (n=289)		Tribe 3 (n=278)		Tribe 4 (n=297)		Tribe 5 (n=99)		Tribe 6 (n=99)		Tribe 7 (n=300)		
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W	
Lifetime alcohol disorders																	
Alcohol abuse <sup>a</sup>	9	5	12	6	11	6	4	3	7	9	2	4	18	5	10	3	
Alcohol dependence <sup>b</sup>	30	18	1	2	36	17	29	18	43	24	56	30	21	24	31	24	

<sup>a</sup>Varied significantly by gender ( $p<0.01$ ).

<sup>b</sup>Varied significantly by gender ( $p<0.001$ ) and tribal community ( $p<0.001$ ).

M, men; W, women.

tics for the factors were relatively similar with and without the mean substitution items (range without substitution: 0.66–0.94; range with substitution: 0.80–0.94). The factors were converted to dichotomous variables by using empirically validated, clinical cutoff points. The cutoff points for each factor has a sensitivity and specificity of 0.85 or better.<sup>22</sup>

The sexual abuse category was supplemented with an item from the Posttraumatic Stress Diagnostic Scale<sup>23</sup> in order to utilize a more comprehensive definition of sexual abuse. Participants were asked: Did you experience “sexual contact when you were younger than 18 with someone who was at least 5 years or older?” An additional 5% of women and 14% of men were identified as sexually abused.

Three categories of out-of-home placement were assessed: (1) boarding school placement, (2) foster care placement, and (3) adoption. For example, respondents were asked: “Were you adopted as a child?” (yes/no).

**Alcohol disorders.** Lifetime diagnoses of DSM-IV<sup>24</sup> alcohol abuse and dependence were obtained from the AUDADIS. Diagnoses of alcohol abuse required one out of four criteria, and dependence included a minimum of three of seven symptoms within a 12-month period. The AUDADIS diagnoses have shown to be reliable<sup>25</sup> and have been used extensively in alcohol studies in the general population. Given that more severe drinking problems increase the likelihood of alcohol-related problems and illnesses, study analyses focused on lifetime alcohol dependence as the variable of interest.

**Cultural variables.** Cultural characteristics were assessed by a questionnaire designed by the researchers based on previous research.<sup>26,27</sup> The 48-item questionnaire assessed different aspects of tribal affiliation. Specific content of the standard questions was adapted for each tribe based on data from tribal focus groups. Factor analysis of the data yielded four factors consistent across all tribes: Language Value (importance of the retention of traditional language), Language Knowledge (knowledge of the meaning of specific tribal words), Geography (proximity of living near tribal lands), and Tribal Identity (involvement in traditional beliefs and practices). To allow for comparisons across factors and tribes, item scores were converted to a common metric (e.g., possible scores on a 5-point scale included 0, .25, .50, .75, 1.00). Each factor score was computed as the sum of items divided by number of items.

## Data Analysis

Analyses were conducted using SPSS (SPSS, Inc., Chicago IL, 2001). The prevalence of alcohol disorders and negative childhood exposures was estimated. Using chi-square tests, the authors determined group differences by gender and tribe. Logistic regressions were conducted to investigate the relationships between adverse childhood experiences and alcohol dependence. Because few studies have been conducted with Native Americans, each childhood exposure was screened for a significant association with alcohol dependence. Subsequent logistic regressions tested childhood exposures that were significant predictors ( $p<0.05$ ) in the initial models. To assess dose–response effects, analyses were performed with the number of categories of exposures as the predictor variable. Because of significant associations, analyses were controlled for age and tribal community. Regressions were conducted separately for men and women. To examine inter-tribal variability, cultural and regional factors were tested as predictors in separate regressions for alcohol dependence.

## Results

### Prevalence of Alcohol Disorders

Table 1 presents the prevalence rates of lifetime alcohol disorders for each tribe. Among men, 9% were diagnosed with alcohol abuse and 30% with alcohol dependence. Among women, 5% were diagnosed with alcohol abuse and 18% with alcohol dependence. Both alcohol disorders varied significantly by gender (men:  $p<0.01$ ; women:  $p<0.001$ ). Alcohol dependence varied significantly by tribe ( $p<0.001$ ).

### Prevalence of Childhood Exposures

Table 2 shows the prevalence rates of adverse childhood experiences for each tribe. More than half of men and women reported having at least one parent with alcohol problems. The most prevalent types of maltreatment were physical neglect (men: 45%; women: 43%) and physical abuse (men: 40%; women: 42%). The least prevalent category was emotional neglect (men: 20%;

**Table 2.** Percentage of adverse childhood exposures among Native American tribes

Variable	Total (N=1660)		Tribe 1 (n=298)		Tribe 2 (n=289)		Tribe 3 (n=278)		Tribe 4 (n=297)		Tribe 5 (n= 99)		Tribe 6 (n= 99)		Tribe 7 (n=300)	
	M	W	M	W	M	W	M	W	M	W	M	W	M	W	M	W
	Parental alcoholism <sup>a</sup>	64	65	75	58	48	49	55	69	55	67	79	75	79	71	71
Childhood abuse																
Physical abuse <sup>a</sup>	40	42	11	23	44	42	51	50	35	40	70	46	58	41	42	56
Physical neglect <sup>a</sup>	45	43	46	38	28	33	41	44	32	41	74	59	64	42	58	57
Sexual abuse <sup>b</sup>	24	31	4	10	17	24	27	43	21	25	40	27	39	36	37	53
Emotional abuse <sup>b</sup>	23	36	9	22	13	30	29	44	22	29	40	45	30	36	31	49
Emotional neglect <sup>a</sup>	20	23	34	17	14	22	20	27	11	17	16	27	6	21	27	34
Out-of-home placement																
Boarding school attendance <sup>a</sup>	24	27	39	42	18	19	11	8	19	32	63	66	18	27	19	21
Foster care placement <sup>a</sup>	10	13	3	7	5	6	19	21	14	19	19	27	0	11	11	12
Adoption	5	6	6	4	6	5	8	6	3	5	7	7	0	3	3	9

<sup>a</sup>Varied significantly by tribal community ( $p<0.001$ ).

<sup>b</sup>Varied significantly by gender ( $p<0.01$ ) and tribal community ( $p<0.001$ ).

M, men; W, women.

women: 23%). Twenty-five percent of the sample attended boarding school, whereas 5% were adopted. Sexual and emotional abuse varied significantly by gender. Significant inter-tribal variability existed for all adverse exposures, except adoption. The majority (86%) of participants experienced one or more categories of adverse exposures. There were significant gender differences among individuals with no exposures and those with four or more. There were significant tribal differences among individuals in each number of risks category.

### Relationships Between Single Childhood Exposures and Alcohol Dependence

In logistic regression, some types of childhood exposures, but not all, were associated with alcohol dependence among men (Table 3). Risk of alcohol dependence was greater among men who reported parental alcoholism, physical abuse, physical neglect, or combined physical and sexual abuse. For women, all types of childhood exposures increased the risk of alcohol dependence. Parental alcoholism, physical abuse, sexual abuse, combined physical and sexual abuse, emotional abuse, and emotional neglect were each associated with a 2-fold increase in risk of alcohol dependence.

### Relationships Between Multiple Childhood Exposures and Alcohol Dependence

Using multivariate regressions, only combined physical and sexual abuse significantly increased odds of alcohol dependence among men (Table 4). Among women, sexual abuse and boarding school attendance increased the likelihood of alcohol dependence. The remaining adverse childhood exposures did not achieve significance.

### Dose-Response Effects of Childhood Exposures

Men and women had two separate patterns of dose-response relationships (Table 5). For men, the relationship between number of categories of exposures and alcohol dependence was best represented by a concave curve. Men who reported three different categories of adverse experiences had a 4-fold increased risk of alcohol dependence, whereas men with four or more different categories had a 3-fold increased risk. For women, multiple different types of childhood exposures increased the risk of alcohol dependence. Women with four or more categories had a 7-fold increased risk of alcohol dependence.

**Table 3.** Single childhood exposures and adjusted odds ratios (OR)<sup>a</sup> of alcohol dependence

Exposures	Men		Women	
	OR	95% CI	OR	95% CI
<b>Parental alcoholism</b>	2.14	1.45–3.15	2.51	1.62–3.89
<b>Childhood abuse</b>				
Physical abuse	1.47	1.02–2.11	2.02	1.43–2.86
Physical neglect	1.54	1.06–2.25	1.64	1.16–2.32
Sexual abuse	1.46	0.98–2.18	2.40	1.68–3.43
Both physical and sexual	1.58	1.10–2.27	2.31	1.60–3.35
Emotional abuse	1.33	0.88–1.99	2.08	1.47–2.94
Emotional neglect	0.69	0.42–1.14	2.16	1.49–3.13
<b>Out-of-home placement</b>				
Boarding school attendance	1.44	0.92–2.25	1.79	1.19–2.70
Foster care placement	1.45	0.84–2.51	1.77	1.13–2.75

<sup>a</sup>OR adjusted for age and tribal community.

Due to small sample size, adoption not included in these analyses. CI, confidence interval.

**Table 4.** Multiple childhood exposures ( $p < 0.05$ ) and adjusted odds ratios (OR)<sup>a</sup> of alcohol dependence

Exposures	Men		Women	
	OR	95% CI	OR	95% CI
<b>Parental alcoholism</b>	— <sup>b</sup>	—	1.00	1.00–1.00
<b>Childhood abuse</b>				
Physical abuse	—	—	1.42	0.96–2.09
Physical neglect	—	—	—	—
Sexual abuse	ns <sup>c</sup>	ns	1.79	1.21–2.66
Both physical and sexual	1.58	1.10–2.27	—	—
Emotional abuse	ns	ns	—	—
Emotional neglect	ns	ns	1.49	0.99–2.25
<b>Out-of-home placement</b>				
Boarding school attendance	ns	ns	1.57	1.03–2.40
Foster care placement	ns	ns	—	—

<sup>a</sup>OR adjusted for age and tribal community.

<sup>b</sup>Dashes indicate that variable was removed from model using backward stepwise regressions.

<sup>c</sup>Not significant (ns) at  $p < 0.05$  and thus, not included in multivariate regression model.

CI, confidence interval.

### Cultural and Tribal Influences on Alcohol Dependence

Men reported higher scores on Language Value and Knowledge and Tribal Identity than women. (A table providing descriptive data on the cultural factors is available from the authors.) There was significant intertribal variability for all four cultural factors ( $p < 0.001$ ) for men and women. Using logistic regressions, the relationships between cultural factors and alcohol dependence were not significant among men. For women, risks increased with Language Knowledge and decreased with Geography.

Additional analyses tested the effects of tribal community and geographic region. When tribal community was entered in the model, tribe accounted for significant variance in alcohol dependence over and above the cultural factors. When IHS region was entered in a separate model, IHS region accounted for significant variance in alcohol dependence over and above the cultural factors for men, but not women. When tribal

community was added last in the model, tribe significantly predicted alcohol dependence over and above the cultural factors and IHS region among men and women.

### Discussion

Lifetime prevalence of alcohol dependence was high among all (21%–56% among men, 17%–30% among women) but one tribe (1% among men, 2% among women). These findings were generally lower compared to other research. Robin et al.<sup>28</sup> found that 83.4% of men and 50.5% of women were diagnosed with alcohol dependence. This difference might reflect the use of different measurement tools. Researchers<sup>28</sup> previously made modifications to limit cultural biases, whereas the present study did not. Lifetime prevalence of adverse childhood experiences was higher among this Native American sample compared to the general population. Felitti et al.<sup>8</sup> found that 52% participants reported one or more categories of adverse childhood experiences and 6.2% reported four or more categories. In the current study, 86% participants experienced one or more categories of exposure and 33% reported four or more categories. The findings suggest that public health concerns related to multiple negative childhood exposures are highly relevant to Native American communities.

Some, but not all, types of childhood exposures were significantly associated with alcohol dependence. Combined physical and sexual abuse significantly increased the odds of alcohol dependence for men, whereas sexual abuse and boarding school attendance were significant for women. The strong relationship between childhood sexual abuse and subsequent drinking problems among the general population<sup>4,5,6</sup> appears to be similar among Native Americans. Using a large sample and standardized assessment of abuse, this study resolved some of the previous inconsistencies in the literature. The boarding school findings suggest that the removal from home for educational purposes has an independent negative consequence above that of maltreatment for women, but not for men.

**Table 5.** Percentage of categories of childhood exposures and adjusted odds ratios (OR)<sup>a</sup> of alcohol dependence

Number of exposures	Men			Women		
	Prevalence	OR	95% CI	Prevalence	OR	95% CI
0 <sup>b,c</sup>	16	1.0	Reference	12	1.0	Reference
1 <sup>c</sup>	21	2.12	1.11–4.05	22	2.04	0.78–5.32
2 <sup>c</sup>	18	3.80	1.94–7.46	17	4.77	1.88–12.11
3 <sup>c</sup>	16	4.77	2.38–9.57	14	5.33	2.07–13.68
4+ <sup>b,c</sup>	29	3.20	1.73–5.93	35	7.34	3.07–17.58

<sup>a</sup>OR adjusted for age and tribal community.

<sup>b</sup>Varied significantly by gender ( $p < 0.05$ ).

<sup>c</sup>Varied significantly by tribal community ( $p < 0.05$ ).

CI, confidence interval.

Separate patterns of dose–response effects were found for men and women. Risks because of multiple categories of exposures approximated a concave curve for men, whereas the risks approximated a straight line for women. The findings for men suggest a threshold effect.<sup>29</sup> The possibility that this effect was influenced by the inclusion of an exposure that was not traumatic to men (i.e., adolescent sexual experiences involving women  $\geq 5$  years older; 14%) was tested and lacked significance. Perhaps men who report several adverse experiences engage in alternative coping responses and behaviors not assessed in this study. Women appear to experience heightened distress with each additional category, resulting in increased reliance on alcohol as a coping strategy. Similar to other populations,<sup>30</sup> Native Americans seem to find the physiologic effects of alcohol effective in alleviating childhood-related distress, resulting in chronic misuse, and alcohol-related health problems.

There were significant inter-tribal differences in prevalence of alcohol dependence and childhood exposures, except adoption. The cultural factors assessed in this study, however, did not significantly predict inter-tribal variability in alcohol dependence among men. Women who had greater knowledge of their tribal languages had higher risks of alcohol dependence. Because of a lack of temporal information, it remains unclear whether women gained this knowledge before or following their alcohol problems. Perhaps, they obtained an increased awareness of their language as a result of treatment or increased tribal involvement following identification of drinking problems. Proximity to tribal community appeared to have a protective influence among women. Methodologic improvements are needed to improve our understanding of tribal characteristics that influence the association between childhood exposures and subsequent alcohol dependence. Future investigations should expand measurement of tribal characteristics to include measures of tribal integration, degree of ancestry, lifestyle characteristics, gender roles and values, attitudes, and expectations about alcohol.

The study had several limitations. One limitation was an underestimation of the prevalence rates of alcohol dependence and childhood exposures as a result of reporting bias. Tribes who used their own tribal members as interviewers, as opposed to Native Americans from other tribes, reported significantly lower rates of alcohol dependence and most categories of exposures. Another limitation was the cross-sectional design of the study and possibility of correlations between exposure variables and unmeasured variables. It is inappropriate to infer causality from these results, but it was determined that the first evidence of alcoholism appeared after the age of 17 years in 77% of the participants, whereas the recall period for childhood exposures was before aged 18 years. Prospective studies would more

precisely define the relationships between negative childhood experiences and future alcohol problems; however, ethical and legal obligations to intervene in known abuse preclude longitudinal designs in this area.

Despite these limitations, the present study contributes to an area of research that remains overlooked in preventive medicine. This is the only study that was conducted with more than three tribes. Evidence of inter-tribal variability points to the perils of presenting data that lumps Native Americans together irrespective of tribe. Another strength was the use of well-validated instruments of alcohol disorders and childhood maltreatment. In addition, this study collaborated with tribal leaders to include out-of-home placement experiences as a potential source of long-term distress among tribal members.

Given the potent associations with adulthood problem drinking, further resources need to be directed toward implementing existing guidelines regarding standardized violence screening in medical settings.<sup>31,32</sup> The present results sharpen the aim of primary prevention programs, highlighting the need to develop social programs for families on reservations to mitigate the effects of extensive exposure to adult drinking. For example, organized activities on holidays and weekends might provide healthy alternatives and role models for children. Likewise, more intensive preventive education regarding child sexual abuse merits consideration, including programs for primary caregivers on how to educate children about abuse, reduce the likelihood of its occurrence, and watch for warning signs of distress. Equally important is education for children to help them identify and report incidents of sexual abuse. Future research, training, and programming efforts promise to decrease the rates of alcohol-related illnesses and other life-threatening consequences that disproportionately undermine the health of Native Americans.

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