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Childhood physical and sexual abuse and subsequent depressive and anxiety disorders for two American Indian tribes

ANNE M. LIBBY*, HEATHER D. ORTON, DOUGLAS K. NOVINS, JANETTE BEALS, SPERO M. MANSON and the AI-SUPERPFP Team†

American Indian and Alaska Native Programs, University of Colorado Health Sciences Center, Aurora, CO, USA

ABSTRACT

Background. This study examined the relationship of childhood abuse, both physical and sexual, with subsequent lifetime depressive and anxiety disorders – depression or dysthymia, post-traumatic stress disorder (PTSD), and panic or generalized anxiety disorder (GAD) – among American Indians (AIs).

Method. Three thousand and eighty-four AIs from two tribes – Southwest and Northern Plains – participated in a large-scale, community-based study. Participants were asked about traumatic events and family history, and were administered standard diagnostic measures of depressive/anxiety disorders.

Results. Prevalence of childhood physical abuse was approximately 7% for both tribes. The Southwest tribe had higher prevalence of depressive and anxiety disorders, with rates of PTSD being the highest. Childhood physical abuse was significant in bivariate models of depressive/anxiety disorders, and remained so in the multivariate models.

Conclusions. Childhood physical abuse was a significant predictor of all disorder groups for males in both tribes except for panic/GAD for the Northern Plains tribe in multivariate models; females showed a more varied pattern. Childhood sexual abuse did not significantly differ for males and females, and was an independent predictor of PTSD for both tribes, controlling for childhood physical abuse and other factors, and was significant for the other disorder groups only in the Southwest. Additional covariates that increased the odds of depressive/anxiety disorders were adult physical or sexual victimization, chronic illness, lifetime alcohol or drug disorder, and parental problems with depression, alcohol, or violence. Results provided empirical evidence of childhood and later life risk factors and expanded the population at risk to include males.

INTRODUCTION

Childhood abuse and psychiatric problems have been clinically and empirically linked, although missing contextual data about the nature of abuse and other life events during childhood and adulthood have prevented a better understanding of the way such trauma may evolve into later illness. This study filled gaps in the existing literature in four ways:

1. Data included measures of psychiatric problems and traumatic events during childhood and adulthood, permitting estimates of the unique contribution of childhood abuse to lifetime disorders in multivariate analyses.

2. The use of standardized diagnostic instruments for alcohol and drug disorders...
(Manson, 2001) facilitated comparison to existing findings for the USA general population.

(3) It drew data from a psychiatric epidemiological study of two American Indian (AI) tribes, and enabled an examination of cultural variation.

(4) Both males and females were represented.

**Childhood abuse**

Childhood abuse refers to inflicted injuries in children, and has also been known as ‘non-accidental’ injuries, or injuries that result from ‘abuse’, ‘neglect’, or ‘maltreatment’ (Libby et al. 2003). Definitions of childhood abuse often vary, limiting comparison of the true prevalence of childhood abuse. Nevertheless, a small number of community-based studies reported on prevalence of abuse and suggested that it is not rare. In the Ontario Health Survey (OHS), MacMillan and colleagues used a standardized ‘maltreatment history self-report’ to measure physical and sexual abuse ‘while growing up’ (MacMillan et al. 2001). Rates of physical abuse were higher for males than for females (30% v. 21%); as expected, rates of sexual abuse were much higher for females than for males (12-4% v. 4-3%). In the National Comorbidity Study (NCS), a community survey designed to be representative of the USA general population, Kessler and colleagues found rates of physical abuse (defined only as ‘physically attacked’) to be 2-2% for females and 4-4% for males before age 16 (Kessler et al. 1997). These low rates were most likely due to the narrow definition of physical abuse. The NCS also reported prevalence of sexual abuse prior to age 16, defined as isolated or repeated experiences of molestation (females, 5-1%; males, 1-3%) or rape (females, 3-4%; males, 0-3%). In summary, existing community studies found physical abuse more common for males and sexual abuse more common for females by orders of magnitude.

Early AI empirical studies focusing on clinical populations (Piasecki et al. 1989; DeBruyan et al. 1992) noted a link between childhood physical abuse and chaotic family environments, including parental substance use problems. Reported cases and clinical prevalence likely underestimated community-level rates of abuse because many cases go unreported to authorities and because clinical prevalence required some degree of contact with health services providers, which most of the population would not have (Novins et al. 2004). Kunitz and colleagues (Kunitz et al. 1998) studied Navajo adults identified through Indian Health Service clinical records and reported that 12.7% of the reservation community sample had experienced childhood physical abuse prior to age 15.

**Psychiatric problems**

State-of-the-art psychiatric epidemiological studies use standardized criteria that produce DSM-based (APA, 1987) diagnoses. The NCS reported DSM-III-R lifetime rates of depression to be 17-1%, dysthymia to be 2-5%, panic disorder 2-3%, and generalized anxiety disorder (GAD) to be 3-1% for the general USA population (Kessler et al. 1994). Although the manuscripts describing the origins, derivations, and justification for the general prevalence of depressive or anxiety disorders for the study from which the current data are derived are under way, calculated rates are presented here.

Standardized diagnostic criteria are known to have unequal relevance for cultural expressions of mood or illness; for example, some individuals who otherwise would meet criteria for a major depressive episode may not acknowledge depressed mood or dysphoria, a necessary symptom for generating an affirmative diagnosis (Manson, 1996). The few estimates of depression prevalence have not had sufficient numbers to reach any conclusions in AI populations (US Department of Health and Human Services, 2001). Two existing studies using non-random samples of different tribes reported lifetime rates of depressive disorder over 25% (Kinzie et al. 1992; Robin et al. 1997). Using methods similar to NCS, rates of lifetime depression for the two tribal populations studied here were one-third of the USA estimates (Beals et al. in press b). DSM-IV rates of depressive disorders were approximately 13% for the Southwest tribe and 9% for the Northern Plains tribe. Differences were suspected to be rooted in cultural and methodological factors. General prevalence rates for anxiety disorders – panic, GAD, and post-traumatic stress disorder (PTSD), were at similar levels to depression (Beals et al. in press a). This study, which indicated disorders that temporally followed an experience of childhood abuse, showed lower
rates of panic disorder and GAD; the Southwest tribe showed higher rates of panic/GAD of 7%, compared with 4% in the Northern Plains tribe. PTSD was higher overall at approximately 18%. For these AIs, rates of lifetime PTSD were at the upper end of the range previously reported for other populations. Although males and females both experienced comparable rates of non-qualifying (for a PTSD diagnosis) lifetime traumas, females were more vulnerable to lifetime PTSD than males (Manson et al., unpublished observations). Prevalence rates reported here were slightly lower than general prevalence estimates because we counted disorders or symptoms that occurred in the same or later years relative to an experience of childhood abuse. To summarize, AI community studies show higher than average rates of substance use disorders, PTSD, and lower than expected rates of depression, compared with USA general populations.

**Childhood physical abuse and problems in adulthood**

Clinical studies have established a link between childhood abuse and adult alcohol, drug, and mental health problems (Brown & Anderson, 1991; Read, 1998). Most community-based studies focused on later psychiatric and medical problems of females who experienced childhood abuse (Jumper, 1995; Kendler et al. 2000). Community samples of females showed that victims of ‘serious physical assault’ had higher rates of depression, PTSD, and substance use (Duncan et al. 1996; Mullen et al. 1996). Kessler and colleague’s work on childhood adversities (1997), using the NCS data, established a link between childhood physical abuse (experienced before age 17 years) and both psychiatric and addictive disorders for adult males and females; they found that the subsequent psychiatric problems were reduced by psychiatric co-morbidity and other childhood adversities. Widom (1999) used a clinical sample of both genders to show an association between childhood abuse and PTSD. The OHS study linked childhood physical and sexual abuse with adult substance use and psychiatric disorders for both genders (MacMillan et al. 2001).

In clinical AI samples, childhood abuse (experienced at ages younger than 21 years) has been linked to familial alcohol abuse, psychiatric symptoms and drug use (Lujan et al. 1989; Piasecki et al. 1989; DeBruyan et al. 1992), while physical abuse has been found to be associated with depression among older AIs seen in a large, urban primary care program (Buchwald et al. 2000). A recent study involving a community sample of AI females in Montana investigated the link between childhood physical-emotional abuse and childhood sexual abuse, later psychological well-being (depressive mood and anger), and risky sexual behavior (AIDS risk) (Hobfoll et al. 2002). Participants who experienced childhood physical abuse had a greater likelihood of all the negative outcomes measured, even more so than victims of childhood sexual abuse. Kunitz and colleagues concluded that, among the Navajo, childhood physical and sexual abuse experienced prior to age 15 were risk factors for alcohol dependence, controlling for conduct disorder (Kunitz et al. 2000). Regarding childhood sexual abuse, Robin et al. (1997), in their family linkage study of alcoholism among three large pedigrees in a Southwestern tribe, surveyed 582 community participants regarding childhood history of sexual abuse. They reported more common experiences of sexual abuse among females (49%) than males (14%) before the age of 16, and victims of sexual abuse were significantly more likely to develop lifetime psychiatric disorders (Robin et al. 1997). Another study of AI females showed a significant increase in anger and depressed mood among those (42%) who had been victims of childhood sexual abuse ‘while growing up’ (Hobfoll et al. 2002). Using data from the two tribes in the present effort, effects of childhood physical and sexual abuse on later substance use disorders were studied (Libby et al. 2004). That work showed that, controlling for other child and adult experiences, childhood physical abuse has a stronger effect than childhood sexual abuse on lifetime substance dependence. In contrast, childhood sexual abuse was more associated with lifetime substance abuse. Elevated rates of childhood abuse and PTSD, low rates of depressive disorders and GAD, and the ability to account for many of the contextual factors in these relationships such as other disorders and childhood and adult experiences, motivated the present research with these two AI tribes.
METHOD

Study design and sample

The primary objective of the American Indian Service Utilization and Psychiatric Epidemiology Risk and Protective Factors Project (AI-SUPERPFP) was to estimate the prevalence of psychiatric disorders and health service utilization in two AI reservation populations. Of the 552 federally recognized tribes in the USA, 99 of them numbered 1000 or more members; the tribal communities in this study are among the largest of these tribes. Community confidentiality is as important as that of individual confidentiality for AIs (Norton & Manson, 1996) so general cultural descriptors are used instead of specific tribal names.

The AI-SUPERPFP worked with one Southwest and two closely affiliated Northern Plains tribes (combined into one Northern Plains population). These tribes differed in linguistic family, in history of migration and principles for kinship and residence, and in historical forms of subsistence. Both tribes shared histories of colonization, including dramatic military resistance; externally imposed forms of governance; forced dietary changes; mandatory boarding school education; and active missionary movements. These tribes represent considerable variability in acculturation, education, and income. Previous research has indicated that the Northern Plains population consistently appears to be at the highest risk for the development of substance use and associated problems, while the Southwest population has been at the lowest risk (Novins & Mitchell, 1998; Mitchell et al. 1999; Spicer et al. in press). Thus, selection of these two tribes provided an opportunity to account simultaneously for both the diversity and common experiences (Beals et al. 2003).

The AIs studied were enrolled members of these tribes aged 15–54 years at the time of sampling (1997) and who lived on or within 20 miles of their reservations. Using stratified random sampling procedures (Cochran, 1977) with tribal rolls, each population was stratified by age and gender. Computer-assisted in-person interviews were used to collect data from July 1997 to December 1999. A replicate strategy was used in which random groupings of names were released in sequence for location until the target sample size was reached. Overall 39.5% and 46.5% of the Southwest and Northern Plains tribal members were found to be living on or near their respective reservations. Once located and found to be eligible, 73.7% and 76.8% participated from the Southwest (n = 1446) and Northern Plains (n = 1638) tribes, respectively. Complex survey weights (Kish, 1965) accounted for differential probabilities of selection and non-response within strata. The AI-SUPERPFP methods are described in greater detail elsewhere (Manson, 2001; Beals et al. 2003); the study website (see AIANP, 2004) provides additional detail including copies of the interview and the training manual.

Written informed consent was obtained from all respondents; for minors, parental/guardian permission was first acquired before adolescent assent was obtained. The modified version of the Composite International Diagnostic Interview (WHO-CIDI, Version 1) (WHO, 1990) used in the NCS (Kessler et al. 1994) was used to generate DSM-III-R and -IV diagnoses (APA, 1994). The AI-SUPERPFP included items necessary to assess these disorders, although it preceded the release of the WHO-CIDI-2.1 designed to assess DSM-IV.

Measures

Dependent variables

DSM-IV (APA, 1994) criteria were used to create diagnoses of lifetime major depression, dysthymia, PTSD, panic disorder, and GAD. Major depression and dysthymia were combined into a diagnostic group of depressive disorders. Panic disorder and GAD were also combined. PTSD was analyzed separately because childhood abuse would qualify as a traumatic event for this DSM-IV diagnosis.

In order to identify disorders that were subsequent to the first episode of childhood abuse, the age of onset of the symptoms associated with the disorder was compared with the age of first abuse. Only those with an onset age temporally following their first reported experience of abuse were considered to have a subsequent disorder. Very few respondents indicated that the onset of their disorder was earlier than the first time they were abused, most likely because they indicated that the problems had been happening ‘all of their life’ or ‘since they were very young.’
Independent variables

Childhood abuse. Physical abuse was defined by two items: ‘Were you ever physically abused or hurt by your parent or caregiver?’ and ‘Were you ever physically abused or hurt by someone else you knew?’ Sexual abuse was defined by two items: ‘Were you ever raped, or did you ever have sex when you didn’t want to because someone forced you in some way, or threatened to harm you if you didn’t?’ and ‘Were you ever touched or made to touch someone else in a sexual way because they forced you in some way, or threatened to harm you if you didn’t?’ Childhood abuse represented an experience that occurred before the respondent was 13 years of age, as reported in previous work (Libby et al. 2004). Abuse during adolescence was not included.

Parental problems. AI-SUPERPFP asked about problems that family members experienced while the respondent was growing up, defined as before 18 years of age. Natural father/mother, stepfather/mother, and other father/mother substitutes were all included when assessing paternal or maternal problems as dichotomous outcomes: father/mother drank so much that it became a problem; father/mother suffered from depression; and father/mother had a problem with violent behavior.

The respondent was asked if his/her family ever had a hard time making ends meet while growing up, approximating financial strain or childhood socio-economic status.

Individual adult factors. Respondents were qualified for a chronic illness via diagnosis by a doctor for at least one of the following: lung problems, arthritis, diabetes, high blood pressure, heart disease, stroke, liver problems, serious hearing problems and serious vision problems.

Adult physical and sexual victimization were assessed for experiences that occurred for the first time after the respondent was 18 years of age. Being physically abused or attacked as an adult included the two traumas described above for childhood physical abuse plus: ‘Were you ever physically abused or hurt by a spouse or girlfriend/boyfriend?’ and ‘Were you ever robbed, mugged or physically attacked?’ Adult sexual victimization included the same two traumas for childhood sexual abuse, simply assessed at older ages.

Substance use disorders. DSM-IV criteria were also used to create diagnoses of lifetime abuse and dependence for both alcohol and drugs. Drugs included marijuana, sedatives (including tranquilizers), stimulants, analgesics, inhalants, cocaine, hallucinogens (including peyote), and heroin. A combined diagnosis of lifetime substance use disorder was created and included substance abuse or dependence. Similar steps, described above, counted substance use disorders subsequent to childhood abuse.

Control variables. Respondent age, gender and education level completed at the time of the interview were included in all models as demographic control variables. Age was logarithm-transformed owing to a non-linear relationship with the outcome variables. Education was categorized as less than high-school education, high-school graduate [included graduate equivalency diploma (GED)], and some college [included vocational training]. Males and less than high-school education were referent groups.

Analyses

Variable construction was completed using the SPSS (Norusis, 2001) and SAS statistical packages (SAS Institute Inc., 2001). All descriptive and inferential analyses were conducted in STATA (StataCorp, 2001) using sample and non-response weights (SVY procedures). Because the two tribal groups were sampled as separate populations, analyses were stratified by tribe.

Using existing theories about the relationships between childhood abuse and mental health disorders, the above variables were identified as possible covariates for final multivariate models predicting subsequent mental health disorders. Bivariate logistic regressions were run for each variable with each mental health outcome by tribe. A combination of sequential modeling and forward statistical selection was used to build the multivariate logistic regression models. In the first sequential step, variables representing childhood physical and sexual abuse and the control variables were entered into the model and retained regardless of the statistical significance. The next step used
a manual forward selection process with the remaining covariates, keeping variables that significantly improved the model fit based on \( \chi^2 \) tests of differences between log-likelihoods of nested models.

Approximately 150 respondents from each tribe with missing values for model variables were excluded from the multivariate models. Respondents excluded from the models were older and had less education, but did not differ from those included in the models with respect to any dependent variables or key covariates.

RESULTS

Table 1 presents descriptive statistics by tribe and gender. Prevalence of depression/dysthymia ranged from 7% among Northern Plains males to 13% among Southwest females. PTSD was the most prevalent of the three disorders (14% in the Northern Plains and 16% in the Southwest) while panic/GAD was the least prevalent (4% among the Northern Plains and 7% among the Southwest). All disorders were more prevalent among females and among the Southwest.

The prevalence of childhood physical abuse was similar across the different tribes and genders (approximately 7%). Northern Plains females had the highest prevalence (9%). The NCS reported prevalence of childhood physical abuse for the USA general population, although evaluated for youth under the age of 16 years. When recalculated to include these older ages, tribal prevalence was still higher than reported by NCS. Eight and 10% of the Southwest and Northern Plains tribes, respectively, experienced physical abuse prior to age 16, compared with 3.3% for the USA general population (Kessler et al. 1997). The prevalence of childhood sexual abuse, however, was similar to the USA general population estimates. There were definitional

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**Table 1. Descriptive statistics on model variables**

<table>
<thead>
<tr>
<th></th>
<th>Southwest</th>
<th>Northern Plains</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male ((n = 617))</td>
<td>Female ((n = 829))</td>
</tr>
<tr>
<td></td>
<td>% (S.E.)</td>
<td>% (S.E.)</td>
</tr>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression/dysthymia</td>
<td>8.72 (1.18)</td>
<td>12.70 (1.20)</td>
</tr>
<tr>
<td>PTSD</td>
<td>11.65 (1.36)</td>
<td>19.32 (1.48)</td>
</tr>
<tr>
<td>Panic/GAD</td>
<td>5.59 (0.92)</td>
<td>7.88 (0.96)</td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childhood physical abuse</td>
<td>6.73 (1.06)</td>
<td>7.19 (1.08)</td>
</tr>
<tr>
<td>Childhood sexual abuse</td>
<td>2.32 (0.65)</td>
<td>7.64 (1.01)</td>
</tr>
<tr>
<td><strong>Covariates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father: alcohol problem</td>
<td>26.97 (1.83)</td>
<td>26.94 (1.60)</td>
</tr>
<tr>
<td>Mother: alcohol problem</td>
<td>7.28 (1.08)</td>
<td>8.75 (1.01)</td>
</tr>
<tr>
<td>Father: depression problem</td>
<td>3.64 (0.75)</td>
<td>3.76 (0.69)</td>
</tr>
<tr>
<td>Mother: depression problem</td>
<td>9.79 (1.24)</td>
<td>12.48 (1.21)</td>
</tr>
<tr>
<td>Father: violence problem</td>
<td>9.83 (1.24)</td>
<td>13.36 (1.22)</td>
</tr>
<tr>
<td>Mother: violence problem</td>
<td>2.72 (0.68)</td>
<td>3.72 (0.69)</td>
</tr>
<tr>
<td>Adult victim of physical abuse/attack</td>
<td>12.22 (1.39)</td>
<td>24.62 (1.56)</td>
</tr>
<tr>
<td>Adult victim of sexual abuse</td>
<td>0.52 (0.30)</td>
<td>3.13 (0.66)</td>
</tr>
<tr>
<td>Childhood financial strain</td>
<td>28.79 (1.87)</td>
<td>31.66 (1.64)</td>
</tr>
<tr>
<td>Diagnosed chronic illness</td>
<td>36.91 (1.95)</td>
<td>41.68 (1.74)</td>
</tr>
<tr>
<td>Lifetime alcohol/drug disorder†</td>
<td>42.74 (2.08)</td>
<td>14.73 (1.30)</td>
</tr>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at interview (mean)</td>
<td>34.23 (0.14)</td>
<td>34.34 (0.12)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>29.20 (1.86)</td>
<td>27.43 (1.59)</td>
</tr>
<tr>
<td>High-school graduate</td>
<td>46.47 (2.95)</td>
<td>38.83 (1.74)</td>
</tr>
<tr>
<td>Some college +</td>
<td>24.33 (1.74)</td>
<td>33.74 (1.68)</td>
</tr>
</tbody>
</table>

† Onset of diagnosis after first occurrence of childhood abuse.

S.E., standard error; PTSD, post-traumatic stress disorder; GAD, generalized anxiety disorder.
differences, but on individual types of sexual abuse, i.e. raped or molested, tribal prevalence was about the same as the USA population. Childhood sexual abuse was more than twice as prevalent among females as in males in each tribe.

Paternal alcohol problems were reported by a quarter to one-third of respondents. Maternal alcohol problems varied by tribe, and ranged from 16 to 20% in the Northern Plains tribe, as compared with around 8% in the Southwest tribe; this pattern is consistent with the prevalence of DSM-III-R alcohol dependence in these populations (Spicer et al. 2003). Respondents more often reported maternal, rather than paternal, depression problems and the converse for problems with violence.

Within each tribe, females reported more physical attacks and sexual abuse as adults (older than 18 years) than did males. Adult sexual abuse was less prevalent than adult physical attacks for each gender and within each tribe. Chronic illnesses diagnosed by physicians were reported at high rates, with the prevalence among females in the Northern Plains tribe reaching 50%. Lifetime substance use disorders were also common, with rates higher among males and in the Northern Plains.

Childhood financial strain was common across tribes, nearly 40% in the Northern Plains. The high prevalence was mirrored in the education level of the respondents at the time of the interview, with fewer respondents in the Northern Plains having completed at least some college.

Table 2 presents bivariate logistic regression models predicting subsequent disorders by tribe. Childhood physical abuse had a statistically significant relationship with each disorder within each tribe, increasing the likelihood of each disorder later in life. The strongest relationship was with PTSD in the Northern Plains \( \text{OR (S.E.)} 9.16 (1.91)**\). Odds ratios for the other disorders ranged from 3 to 5 \( p < 0.01 \).

Childhood sexual abuse was also a strong bivariate predictor of all disorders except panic/GAD in the Northern Plains tribe. Adult physical and sexual victimization were sometimes stronger bivariate predictors than were...
childhood physical and sexual abuse. Among the Northern Plains, the effect of adult sexual abuse was stronger than was childhood sexual abuse for depression/dysthymia and PTSD. In the Southwest, adult physical abuse was a stronger predictor of PTSD than was childhood physical abuse. Gender was a significant predictor of depression/dysthymia and PTSD, with females being more likely than males to have the mental health disorder later in life. Other covariates showed consistently strong significant relationships in raising the likelihood of subsequent depressive/anxiety disorders.

Table 3 presents results from multivariate logistic regression models using childhood physical and sexual abuse, and other control variables, to predict subsequent disorders. Owing to the variation in the prevalence of the mental health disorders and childhood abuse among males and females, interactions between gender and each of the two childhood abuse variables were considered. Although the interaction between gender and childhood sexual abuse was never statistically significant, the interaction between gender and childhood physical abuse was statistically significant in several of the multivariate models. Therefore, this interaction was included in each model and results for the effect of childhood physical abuse were reported for each gender.

Both childhood physical and sexual abuse doubled the likelihood of depressive disorders in the Southwest ($p < 0.05$), with the interaction between gender and childhood physical abuse being non-significant. The following also significantly increased the odds of depressive disorders in the Southwest: adult physical victimization, chronic illness, having grown up with a mother with depression, having grown up with a violent father, and lifetime substance use disorder. In the Northern Plains, there was a clear gender difference in the effect of childhood physical abuse, while the effect of childhood sexual abuse was non-significant. Males who experienced childhood physical abuse were five times more likely to have a depressive disorder ($p < 0.01$) while the effect was non-significant for females. Compared with the results for the Southwest, adult sexual victimization was a significant predictor, rather than adult physical victimization. Also, maternal alcohol problems significantly increased the odds of a subsequent depressive disorder, rather than maternal depression and paternal violence.
Both childhood physical and sexual abuse significantly increased the odds of PTSD in each tribe, except for childhood physical abuse for females in the Southwest. In the Southwest, childhood physical abuse nearly tripled the likelihood of PTSD for males ($p < 0.01$) while the effect was non-significant for females. For the Northern Plains, females were much more likely to be affected by childhood physical abuse, with ORs of 6.8 for females ($p < 0.01$) and 2.5 for males ($p < 0.05$). The effect of childhood sexual abuse was much stronger in the Southwest (OR 5.3, $p < 0.01$) than in the Northern Plains (OR 2.8, $p < 0.01$). Parental problems, varying by type of parental problem by tribe, and adult victimization also significantly increased the likelihood of PTSD.

For panic/GAD, the effect of childhood physical abuse was statistically significant only for males in the Southwest (OR 2.7, $p < 0.05$). Childhood sexual abuse was also significantly associated with subsequent panic/GAD for the Southwest tribe (OR 2.3, $p < 0.05$). Adult victimization, childhood financial strain, and having a substance use disorder were notable factors in the panic/GAD models.

**DISCUSSION**

Childhood physical abuse was significantly associated with each disorder in each tribe, in general more so for males, except for Northern Plains females. In contrast, childhood sexual abuse was only significantly associated with PTSD for both tribes, and depression and panic/GAD for the Southwest tribe. This is consistent with Kessler and colleagues’ (1997) notion that adverse childhood traumas often occur in ‘clusters’ and omitting other childhood traumas incorrectly attributes explanatory power to the one included. With respect to co-morbidity, substance use disorders were a significant risk factor for all disorders except panic/GAD in the Northern Plains. This supports a multi-dimensional approach to understanding adult outcomes of childhood trauma as well as the ‘multiple adversity’ notion that omitting other key factors that describe the familial context upward biases the childhood abuse factor in relation to outcomes.

The significance of other covariates, such as adult victimization or problems experienced while growing up, along with the effects of childhood abuse being smaller, indicated that the relationships between childhood abuse and depressive/anxiety disorders could be partially or completely mediated by these other factors. Subsequent analyses that specifically test for mediating effects, not conducted in this study, could separate the direct and indirect effects of childhood abuse on subsequent mental health disorders. Also, further analyses using dating of the onset of symptomatology in these samples may help us to better disentangle cause and effect, again following the lead of Kessler et al. (1997). Inclusion of potentially important covariates is a contribution of this paper in addressing gaps in existing literature.

In addition, this study included both genders and accounted for the interaction between gender and childhood physical abuse. For females in the Northern Plains, the effect of childhood physical abuse on a subsequent diagnosis of PTSD was nearly double that of males. This is consistent with a broader study of trauma among these tribes that found females more frequently endorsed traumas that qualified for a PTSD diagnosis compared with males (Manson et al., unpublished observations). In contrast, the effect of childhood physical abuse on both depression/dysthymia and panic/GAD was stronger for males. Interestingly, the interaction between gender and childhood sexual abuse was not statistically significant in any of the multivariate models, suggesting that the relationship between sexual abuse and disorder did not differ significantly between genders, although many more females were victims of sexual abuse.

Tribal differences between the effects of childhood abuse on the likelihood of developing later depressive and anxiety disorders implied cultural differences, although the study that provided these data was not designed to explain the source or nature of these differences. It has been argued that tribes with more informal social organization, as in the Northern Plains, will show higher levels of social problems than societies which show higher degrees of social integration and control, like those of the Southwest (Levy & Kunitz, 1974; May, 1982). Childhood physical abuse and many of the more negative experiences with respect to health and family experience were worse for the Northern Plains, but in fact there were several similar attributes that
were higher in the Southwest, notably childhood sexual abuse. Significant relationships between childhood abuse and disorders more frequently remained in the Southwest compared with the Northern Plains after controlling for other influences. These theories had limited utility for these relationships.

Our findings emphasize the variability in characteristics and functioning of AI tribes. Although AIs are often considered a homogeneous group (Trimble, 1988) and share many characteristics across tribes, important differences exist. While these analyses refer to a community-based sample of AI men and women with a clear population of inference, the results cannot be generalized to other Native communities or to AIs in urban settings.

This study shared a weakness with many other studies of the relationship between childhood abuse and long-term sequelae in that child abuse was not the focus of this effort; better understanding of psychiatric epidemiology and access to care were the major goals. Thus, measures of child abuse were limited to fairly general items about experiences of abuse. This could potentially have biased the reports of abuse, but the direction of the bias would be unclear. This would be considered misclassification error, perhaps most likely in the direction of false negatives (those who were abused would not be counted as such) or in false positives associated with events remembered as traumatic or "abusive" (those who had not been abused actually were recorded as having been abused). Both types of misclassification error tend to decrease the power of statistical comparisons and would bias the analysis toward a finding of no differences even when such differences exist (Redelmeier et al. 1998). The similarity of the items to those used in the NCS provided some basis for comparison, however, whatever the bias could have been. Possible biases of using standardized criteria in AI communities were described when that information existed. The result of this type of error is unknown, since they most likely would not uniformly affect responses for the same individuals (e.g. under-reported abuse and under-reported depression). These data addressed the relationship between childhood physical abuse and depressive/anxiety disorders in adulthood, however, both bivariately and after adjusting for other related factors such as parental substance and emotional problems, traumatic adult events and demographic variables, and in doing so responded to a gap in existing literature.

Future work could benefit from yet more complex approaches to these questions. For example, tests of mediation could prove helpful in understanding the causal pathways from early trauma that may lead only some to disorder. Elaborating and testing protective factors would be of interest as well, since many attributes considered helpful are in fact measured in the parent study, such as coping, social support, ethnic identity, and spirituality.

This study offered a number of observations that could be helpful when developing interventions. From the perspective of providers of clinical services for children who have experienced abuse, there is support for an elevated risk of adult depressive/anxiety disorders and the importance of monitoring into adulthood. Conversely, histories of traumatic childhood events should be elicited from people who are in treatment for depressive/anxiety disorders since they are likely to have co-morbidities that require additional clinical attention. Although there is scant empirical evidence for the direct and indirect costs of child abuse, associated problems in adulthood imply ongoing costs in mental and physical health, lost productivity, and even reduced life satisfaction. Adults can advocate for themselves and obtain treatment for childhood traumas that adversely affect their health and happiness. Many of the variables that describe the context of childhood for AIs are ongoing problems: poverty, and parental depression, alcohol and violence problems. This suggests a preventive focus on the predicaments of current children, even as adults seek their own healing from childhood traumas.

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DECLARATION OF INTEREST

None.

APPENDIX. The AI-SUPERPFP Team

In addition to the authors of this paper, the AI-SUPERPFP Team includes: Cecelia Big Crow, Janette Beals, Buck Chambers, Michelle Christensen, Denise Dillard, Karen DUBray, Paula Espinoza, Candace Fleming, Ann Frederick, Joseph Gone, Diana Gurley, Lori Jervis, Shirlene Jim, Carol Kaufman, Ellen Keane, Suzell Klein, Denise Lee, Monica McNulty, Denise Middlebrook, Christina Mitchell, Tilda Nez, Ilena Norton, Theresa O’Nell, Carlette Randall, Angela Sam, James Shore, Sylvia Simpson, and Lorette Yazzie.

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