

Social Epidemiology of Trauma Among 2 American Indian Reservation Populations

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American Indians live in pervasively adverse social and physical environments that place them at higher risk than many other Americans of exposure to traumatic experiences.^{1,2} Rates of violent victimization of American Indians are more than twice as high as the national average.^{3–6} They also suffer motor vehicle mortalities at a rate 2 to 3 times that among Whites.⁷ Deaths due to hypothermia, drowning, falls, poisoning, and burns are considerably more common among American Indians than among other groups.⁸ However, the available evidence provides little insight into individual experiences of trauma or variations across communities. Understanding such factors is critical to calculating risks of psychiatric disorder and other health consequences and to planning for their prevention as well as treatment.

Our study represented the first systematic assessment of the prevalence of trauma exposure in American Indian communities, specifically tribal members living on or near several large US reservations. Data were collected as part of the American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project (hereafter “the project”), the largest, most comprehensive study of its kind. Our goals were to (1) describe the nature and frequency of trauma in these 2 American Indian communities, (2) examine the demographic correlates of trauma, and (3) place these findings in a larger context via a comparison with the results of the National Comorbidity Survey (NCS), a large psychiatric epidemiological survey of the US population.

METHODS

Samples

Details of the project have been provided elsewhere.⁹ Participants were randomly selected from tribal rolls, which constitute the formal, legal definition of membership in fed-

Objectives. We examined the prevalence of trauma in 2 large American Indian communities in an attempt to describe demographic correlates and to compare findings with a representative sample of the US population.

Methods. We determined differences in exposure to each of 16 types of trauma among 3084 tribal members aged 15 to 57 years through structured interviews. We compared prevalence rates of trauma, by gender, across the 2 tribes and with a sample of the US general population. We used logistic regression analyses to examine the relationships of demographic correlates to trauma exposure.

Results. Lifetime exposure rates to at least 1 trauma (62.4%–67.2% among male participants, 66.2%–69.8% among female participants) fell at the upper limits of the range reported by other researchers. Unlike the US general population, female and male American Indians exhibited equivalent levels of overall trauma exposure. Members of both tribes more often witnessed traumatic events, experienced traumas to loved ones, and were victims of physical attacks than their counterparts in the overall US population.

Conclusions. American Indians live in adverse environments that place them at high risk for exposure to trauma and harmful health sequelae. (*Am J Public Health*. 2005;95:851–859. doi:10.2105/AJPH.2004.054171)

erally recognized tribes. The populations of inference were enrolled members of a southwest tribe and 2 closely related northern plains tribes who lived on or within 20 miles (32 km) of their reservations. (In our work with American Indian groups, maintenance of community confidentiality is as important as individual confidentiality. Therefore, we use general cultural descriptors rather than specific tribal names.^{10,11})

The southwest and northern plains tribes assessed belong to different linguistic families, have different histories of migration, subscribe to different principles for reckoning kinship and residence, and have historically pursued different forms of subsistence. Yet, both tribes have many experiences in common with other American Indian groups. They share histories of colonization, including dramatic military resistance, externally imposed forms of governance, forced dietary changes, mandatory boarding school education, and active missionary movements. Unemployment is widespread. Both tribes also exhibit internal variability in acculturation, education, and income. Their selection provided an opportunity to account simultane-

ously for the diversity and common experiences in a population that is relatively small yet heterogeneous.

A stratified random sample design was used with 8 strata. These strata comprised male and female tribal members in 4 age groups (15–24, 25–34, 35–44, and 45–54 years) at the time of study initiation in 1997. Eligibility for participation was restricted to noninstitutionalized tribal members. A replicate strategy was used in which random groupings of names were drawn from the tribal rolls and released in sequence to allow location of these individuals and, if eligible, their recruitment into the study. An elaborate location procedure involved searches of public records and queries of family members and knowledgeable community “key informants”; study supervisors rather than interviewers made the final location determination.⁹ Overall, 46.5% and 39.5% of southwest and northern plains members were living on or near their respective reservations. Once located and deemed eligible, 73.7% of the southwest tribe and 76.8% of the northern plains tribe agreed to participate. Data collection took place between June 1997 and De-

cember 1999, and the total sample was composed of 3084 participants.

The NCS was based on a multistage area probability sample of noninstitutionalized civilians in the 48 coterminous states. The sample was stratified according to age (15–24, 25–34, 35–44, or 45–54 years) and gender. NCS fieldwork was carried out by the Survey Research Center at the University of Michigan's Institute for Social Research between September 1990 and February 1992. Trained lay interviewers collected the data. The overall response rate was 82.5%, and there were a total of 8098 participants. The NCS has been described in greater detail elsewhere.^{12,13}

Data Collection Procedures

Project staff and lay interviewers in each community were trained to collect the data, aided by laptop computer administration. Extensive quality control procedures verified that all of the location, recruitment, and interview procedures were conducted in a standardized, reliable manner. Further details on project instrumentation can be found at <http://www.uchsc.edu/ai/ncaianmhr/presentresearch/superprj.htm>.

The NCS was similarly rigorous in its implementation. Quality control procedures were exacting, and informed consent was obtained in the same manner as in the present project.

Measures

Respondents were asked about 16 possible traumatic events drawn from other major epidemiological studies. These were designed to include events commonly reported in most populations and to be consistent with stressors identified in the revised third edition and the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R and DSM-IV)*.^{12,13} In the case of each trauma, we determined the frequency of exposure and ages of first, most recent, and worst exposures. Mirroring the literature,¹⁴ these 16 events were then aggregated into 5 categories: (1) *noninterpersonal trauma* (e.g., disaster, life-threatening accident), (2) *interpersonal trauma* (e.g., combat, rape, sexual abuse, physical assault/abuse), (3) *witnessed trauma* (e.g., seeing violence perpetrated upon others, observing a serious accident or disaster that resulted in harm or death to others but not one-

self), (4) *unwitnessed trauma to close other* (e.g., life-threatening illness, rape, suicide of a family member or friend), and (5) *other trauma* (i.e., types of trauma not included in the preceding categories).

Respondents were grouped into the 4 age categories listed earlier. Education was categorized as less than high school, high school or high school equivalency, or some college (among those who had completed at least 1 year of college or vocational school). Poverty status was based on income level, household size, and US federal standards.¹⁵ Employment status was classified as working for pay, not working for pay, or student. Marital status was divided into 3 categories: married or living as married; separated, widowed, or divorced; and never married.

The NCS asked about lifetime occurrences of each of 12 types of trauma. Eleven questions addressed specific events and experiences listed as traumas in *DSM-III-R*. The twelfth question was an open-ended item addressing “any other terrible experience that most people never go through.” For comparative purposes, individual traumas included in the project items were recoded to parallel the broad categories reported in the NCS,^{12,16} resulting in 8 types of trauma: life-threatening accident, natural disaster, trauma to a loved one, physical attack, sexual assault other than rape, rape, combat exposure, and witnessing a traumatic event.

Analyses

SAS¹⁷ and SPSS¹⁸ were used in constructing variables. All inferential analyses were conducted in Stata¹⁹ through the use of sample weights that accounted for differential selection probabilities across all strata and for patterns of nonresponse.²⁰ Gender- and tribe-specific estimates are presented. With Stata's¹⁹ “svytab” procedure, Pearson χ^2 values, corrected for the survey design and converted to F values, were used to determine instances in which significant differences existed across groups. We present post hoc analyses of specific differences in which nonoverlapping confidence intervals were used; as a result of our use of multiple comparisons, we discuss only those comparisons significant at $P < .01$.

We employed similar analytic procedures and assumptions in comparing trauma expo-

sures among the southwest, northern plains, and US populations, with data for the latter derived from the NCS. With Stata's¹⁹ “svylogit” procedure, logistic regression methods were used to investigate the demographic correlates of the trauma categories.

RESULTS

Table 1 depicts the demographic characteristics of the project samples. Substantially more female than male tribal members were interviewed in the southwest tribe, probably reflecting differential migration patterns in which men are more likely to pursue off-reservation employment. Individuals from the northern plains tribe were more likely to live in poverty than were those from the southwest tribe, although rates in both tribes were high. Female members of the southwest tribe were less likely to be separated, widowed, or divorced than their northern plains counterparts.

Table 2 shows prevalence estimates and standard errors of lifetime experiences of the 16 types of traumas as well as the categories created to classify the events. Male northern plains tribal members were most likely to have experienced noninterpersonal trauma, and female southwest tribal members were least likely. Female tribal members were more likely than male tribal members to have experienced interpersonal trauma. Specifically, they were more likely to report physical abuse, particularly by a spouse, which demonstrated the highest prevalence.

Witnessed traumas were common in all groups. Female members of the northern plains tribe were more likely than men of the southwest tribe to have witnessed family violence. A third of the sample reported that someone close to them had experienced a trauma. Finally, lifetime experience of any trauma was high across both populations and genders, ranging from 62.4% for male southwest tribe members to 69.8% for female northern plains tribe members. No post hoc differences were found between tribe or gender groups in the case of any trauma.

Table 3 presents the demographic correlates of trauma categories. Gender, age, educational attainment, poverty, employment, and marital status were significant correlates. After control for other demographic variables,

TABLE 1—Description of Sample: American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project

	Southwest				Northern Plains			
	Male (SM; n = 617)		Female (SF; n = 829)		Male (NM; n = 790)		Female (NF; n = 848)	
	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a
Gender	43.5 (42.6, 44.4)	SF, NM, NF	56.5 (55.6, 57.4)	SM, NM, NF	49.5 (48.8, 50.3)	SM, SF	50.5 (49.7, 51.3)	SM, SF
Age, y								
15–24	25.7 (23.8, 27.8)	NM	23.6 (21.9, 25.4)		22.1 (20.6, 23.6)	SM, NF	26.3 (24.8, 27.8)	NM
25–34	26.2 (23.3, 29.2)		26.6 (24.2, 29.2)		29.6 (27.1, 32.2)		29.0 (26.5, 31.6)	
35–44	25.9 (22.9, 29.1)		29.6 (27.0, 32.3)		29.9 (27.3, 32.6)		25.4 (23.0, 28.0)	
≥ 45	22.2 (20.1, 24.5)	NM	20.2 (18.4, 22.2)		18.4 (16.9, 20.0)	SM	19.3 (17.9, 20.8)	
Education								
Less than 12 y	29.2 (24.7, 34.2)		27.4 (23.5, 31.7)		24.8 (21.1, 28.9)		27.9 (24.1, 32.1)	
High school or equivalent	46.5 (41.2, 51.8)		38.8 (34.5, 43.4)	NM	53.6 (48.9, 58.3)	SF, NF	41.3 (36.8, 46.0)	NM
Some college	24.3 (20.1, 29.1)	SF	33.7 (29.6, 38.2)	SM, NM	21.6 (17.9, 25.8)	SF, NF	30.8 (26.6, 35.3)	NM
Living in poverty	42.9 (37.5, 48.4)	NM, NF	48.6 (43.9, 53.3)	NM, NF	59.0 (53.9, 64.0)	SM, SF	63.9 (59.0, 68.6)	SM, SF
Employment status								
Working for pay	62.5 (57.4, 67.4)	NF	58.9 (54.5, 63.2)		62.6 (57.9, 67.1)	NF	50.0 (45.5, 54.6)	SM, NM
Student	10.5 (7.9, 13.9)		10.7 (8.4, 13.6)		8.3 (6.3, 10.9)	NF	15.0 (12.3, 18.3)	NM
Not working for pay ^b	27.0 (22.6, 31.9)		30.4 (26.3, 34.7)		29.1 (24.9, 33.7)		34.9 (30.6, 40.0)	
Marital status								
Married ^c	57.5 (52.4, 62.4)		62.2 (57.8, 66.4)	NM	49.0 (44.2, 53.8)	SF	53.7 (49.1, 58.2)	
Separated, widowed, divorced	8.9 (6.5, 12.1)	NF	10.9 (8.4, 13.9)	NF	13.9 (10.9, 17.7)		17.8 (14.6, 21.4)	SM, SF
Never married	33.6 (29.2, 38.4)		27.0 (23.4, 30.9)	NM	37.1 (32.8, 41.6)	SF, NF	28.6 (24.9, 32.6)	NM

Note. CI = confidence interval. Sample sizes are unweighted.

^aEntries denote significant pairwise comparisons ($P < .01$).

^bIncludes homemaker, looking for work, unemployed, retired, permanently disabled, and other.

^cIncludes living together as if married.

female tribal members remained more likely than male tribal members to have experienced interpersonal trauma; noninterpersonal trauma more often occurred among male participants. There were differences in the associations between age and traumatic exposures according to tribe: only older northern plains members reported experiencing more noninterpersonal and interpersonal traumas than their younger counterparts.

Greater educational attainment was related to greater trauma exposure, especially among members of the southwest tribe. Similarly, when significant, poverty was associated with less trauma exposure; employment status exhibited little relationship with trauma exposure. In the southwest tribe, participants who were separated, widowed, or divorced had greater odds of experiencing interpersonal traumas than those who were married or who had never married.

Finally, Table 4 depicts gender-specific prevalence rates of trauma exposure for the

southwest, northern plains, and US populations across the 8 categories previously reported in the NCS.^{13,16} Members of the southwest and northern plains tribes consistently reported more often witnessing traumatic events and traumas occurring to loved ones than did their US counterparts.

Also, male and female members of both tribes were more likely than their counterparts in the overall US population to have experienced physical attacks. Whereas no difference was found in the NCS in terms of rates of physical attacks among men and women, the female members of the southwest and northern plains tribes more often reported being victims of physical attacks than did male tribal members. In addition, men of the northern plains tribe and US men more frequently suffered life-threatening accidents than men of the southwest tribe.

Overall, men reported greater involvement in life-threatening accidents than women.

Exposure to natural disasters was similarly high among members of the northern plains and US populations, with no observable gender differences. However, male southwest tribal members reported far less exposure to disasters than either their northern plains or US counterparts; likewise, female southwest tribal members reported significantly less exposure to disasters than male northern plains tribal members or US men and women overall.

Regardless of ethnicity, reports of both sexual assault other than rape and rape itself were consistently higher among women than men. There were no female tribal differences in terms of either form of sexual assault, and there were no population differences among women with respect to rape. However, US women as a whole were more likely than women from either tribe to report sexual assault other than rape.

In addition, combat exposure consistently differed between men and women across the

TABLE 2—Lifetime Prevalence Rates of Traumatic Events, by Region and Gender

	Southwest				Northern Plains			
	Male (SM; n = 574)		Female (SF; n = 775)		Male (NM; n = 756)		Female (NF; n = 824)	
	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a
Noninterpersonal trauma	25.2 (20.7, 30.2)	SF, NM	16.1 (12.9, 19.8)	SM, NM, NF	36.4 (31.8, 41.3)	SM, SF, NF	24.8 (20.9, 29.2)	SF, NM
Victim of disaster (i.e., flood, tornado, fire, drought, explosion)	10.8 (7.9, 14.7)	NM	8.9 (6.6, 12.1)	NM	18.6 (15.1, 22.8)	SM, SF	14.4 (11.3, 18.1)	
Victim of life-threatening accident	18.2 (14.3, 22.8)	SF, NM	9.2 (6.8, 12.3)	SM, NM	27.3 (23.1, 32.0)	SM, SF, NF	15.2 (12.0, 18.9)	NM
Interpersonal trauma	25.5 (21.1, 30.6)	SF, NF	40.2 (35.7, 45.0)	SM, NM	31.0 (26.6, 35.7)	SF, NF	41.9 (37.3, 46.6)	SM, NM
Served in direct combat	3.6 (2.1, 6.1)	SF, NF	0.0 ^b (0.0, 1.9 ^b)	SM, NM	5.4 (3.7, 7.8)	SF, NF	0.2 (0.0, 0.9)	SM, NM
Raped	2.4 (1.2, 4.7)	SF, NF	12.8 (9.8, 16.4)	SM, NM	1.4 (0.6, 3.3)	SF, NF	14.4 (11.4, 18.1)	SM, NM
Molested	2.6 (1.3, 5.1)	SF, NF	8.0 (5.7, 11.0)	SM, NM	1.6 (0.7, 3.7)	SF, NF	7.6 (5.4, 10.6)	SM, NM
Physically abused/hurt by parent/caregiver	6.5 (4.2, 9.8)		7.6 (5.4, 10.7)		6.0 (4.1, 8.7)		10.8 (8.1, 14.1)	
Physically abused/hurt by spouse or boyfriend/girlfriend	3.6 (2.0, 6.4)	SF, NM, NF	28.9 (24.9, 33.4)	SM, NM	9.2 (6.7, 12.5)	SM, SF, NF	31.0 (26.8, 35.6)	SM, NM
Physically abused/hurt by someone other than spouse or boyfriend/girlfriend	4.8 (2.9, 7.8)		8.5 (6.2, 11.7)		7.4 (5.3, 10.4)		8.1 (5.8, 11.3)	
Robbed, mugged, physically attacked (not including sexual attacks)	15.0 (11.5, 19.4)	SF, NF	4.0 (2.5, 6.3)	SM, NM	16.8 (13.4, 20.8)	SF, NF	7.4 (5.2, 10.5)	SM, NM
Witness to trauma	46.7 (41.3, 52.1)		46.3 (41.6, 51.0)		51.9 (47.0, 56.8)		51.7 (46.9, 56.4)	
Witnessed violence between family members	29.5 (24.8, 34.7)	NF	37.8 (33.3, 42.5)		33.3 (28.8, 38.1)		41.7 (37.1, 46.5)	SM
Witnessed others raped, injured, or killed (other than situations already described)	9.6 (6.8, 13.4)		4.7 (3.0, 7.2)	NM	11.5 (8.6, 15.2)	SF	6.1 (4.1, 8.8)	
Witnessed serious accident or disaster where someone was badly hurt or killed	30.8 (26.0, 36.1)	SF	18.4 (15.0, 22.4)	SM, NM	37.1 (32.4, 42.0)	SF, NF	23.9 (20.1, 28.2)	NM
Trauma to someone close	30.3 (25.5, 35.6)		30.6 (26.4, 35.2)		31.0 (26.7, 35.7)		38.5 (34.0, 43.3)	
Someone close in life-threatening situation	17.1 (13.4, 21.7)		13.3 (10.4, 16.9)		18.0 (14.5, 22.1)		16.2 (12.9, 20.0)	
Someone close raped/sexually abused	7.5 (5.1, 11.0)	NF	12.4 (9.5, 15.9)		8.0 (5.7, 11.1)	NF	17.3 (14.0, 21.3)	SM, NM
Family member or someone close committed suicide	12.7 (9.5, 16.8)		14.0 (11.0, 17.6)		15.3 (12.1, 19.3)		18.6 (15.2, 22.5)	
Other traumatic experiences	1.8 (0.8, 4.0)		1.0 (0.4, 2.5)		2.2 (1.1, 4.5)		1.0 (0.4, 2.8)	
Any type of trauma	62.4 (56.9, 67.5)		66.2 (61.7, 70.5)		67.2 (62.4, 71.6)		69.8 (65.3, 73.9)	

Note. CI = confidence interval. Sample sizes are unweighted.

^aEntries denote significant pairwise comparisons ($P < .01$).

^bNo Southwest female tribal members reported combat exposure. As a means of calculating confidence intervals, 1 case was temporarily assigned as having involved combat exposure.

populations. Finally, regardless of type of trauma, US women as a whole significantly less often reported experiencing any trauma than the other female and male groups in these studies.

DISCUSSION

Our study provides the first community-based estimates of trauma exposure among American Indian populations residing in 2 large rural reservations. Lifetime rates of exposure to at least 1 traumatic event ranged from 62.4% to 69.8%. The NCS¹³ estimated

the lifetime prevalence of exposure to any trauma among US men and women at 60.7% and 51.2%, respectively. Its recent international analogue, the Australian National Mental Health Survey,²¹ in which methods akin to the NCS were used to interview more than 10 500 people 18 years or older drawn from a national probability sample of households, reported remarkably similar lifetime rates: 64.6% for men and 49.5% for women. The findings of the present project were comparable for men but vastly different for women, who reported equivalent trauma exposure to men. The only other published

study of prevalence of trauma among American Indians, albeit based on a family linkage design, corroborates our finding.²² Thus, one of the most consistent observations in studies of traumatic exposure, the gender difference in exposure,^{23–28} was not evident here.

Knowledge of ethnic variations in trauma exposure is particularly sketchy and often contradictory. Norris’s study²⁷ of a community-based sample of 1000 adults drawn from the southeastern United States showed that Whites are at higher risk than African Americans for lifetime trauma exposure, notably in regard to robbery, physical assault, tragic

TABLE 3—Results of Multivariate Analysis of Demographic Correlates of Trauma Categories, by Tribe

	Southwest					Northern Plains				
	Any Trauma OR (95% CI)	Noninterpersonal Traumas OR (95% CI)	Interpersonal Traumas OR (95% CI)	Witnessed Traumas OR (95% CI)	Traumas Happened to Someone Close OR (95% CI)	Any Trauma OR (95% CI)	Noninterpersonal Traumas OR (95% CI)	Interpersonal Traumas OR (95% CI)	Witnessed Traumas OR (95% CI)	Traumas Happened to Someone Close OR (95% CI)
Gender										
Male	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.06 (0.83, 1.36)	0.50*** (0.37, 0.67)	1.88*** (1.45, 2.43)	0.91 (0.72, 1.15)	0.90 (0.70, 1.16)	0.98 (0.76, 1.26)	0.46*** (0.35, 0.60)	1.58*** (1.24, 2.01)	0.86 (0.68, 1.09)	1.22 (0.96, 1.56)
Age, y										
15–24	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
25–34	0.84 (0.57, 1.23)	0.95 (0.59, 1.52)	1.26 (0.85, 1.88)	0.96 (0.67, 1.38)	0.83 (0.56, 1.22)	0.79 (0.55, 1.15)	1.54* (1.02, 2.33)	1.46* (1.02, 2.11)	0.93 (0.66, 1.31)	0.93 (0.65, 1.34)
35–44	0.73 (0.49, 1.09)	1.20 (0.75, 1.91)	1.07 (0.72, 1.58)	0.68* (0.47, 1.0)	0.82 (0.55, 1.22)	1.03 (0.68, 1.55)	1.65* (1.07, 2.55)	1.54* (1.04, 2.28)	1.06 (0.73, 1.53)	1.04 (0.71, 1.53)
≥45	0.56** (0.38, 0.84)	1.41 (0.89, 2.26)	0.97 (0.64, 1.47)	0.70 (0.48, 1.03)	0.77 (0.51, 1.17)	0.70 (0.46, 1.07)	1.63* (1.05, 2.55)	1.61* (1.08, 2.40)	0.75 (0.51, 1.10)	0.99 (0.66, 1.47)
Education										
Less than 12 y	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
High school or equivalent	1.75*** (1.29, 2.38)	1.58* (1.05, 2.38)	1.08 (0.78, 1.51)	1.92*** (1.41, 2.62)	1.80*** (1.28, 2.53)	1.02 (0.75, 1.40)	1.14 (0.80, 1.62)	1.30 (0.94, 1.78)	1.20 (0.89, 1.62)	1.09 (0.79, 1.50)
Some college	2.33*** (1.64, 3.33)	2.76*** (1.79, 4.23)	1.81*** (1.27, 2.59)	2.50*** (1.78, 3.53)	2.15*** (1.49, 3.11)	2.15*** (1.45, 3.19)	2.31*** (1.55, 3.43)	2.08*** (1.44, 3.00)	1.83*** (1.29, 2.60)	1.97*** (1.37, 2.84)
Poverty status ^a										
Not living in poverty	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Living in poverty	0.69** (0.53, 0.89)	0.84 (0.62, 1.14)	0.88 (0.68, 1.16)	0.71** (0.55, 0.91)	0.73* (0.56, 0.95)	0.90 (0.68, 1.20)	0.97 (0.73, 1.28)	1.18 (0.90, 1.54)	0.96 (0.74, 1.24)	0.89 (0.68, 1.16)
Employment status										
Employed	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Student	0.97 (0.61, 1.52)	0.92 (0.50, 1.68)	0.68 (0.41, 1.12)	0.94 (0.60, 1.47)	1.56 (0.98, 2.47)	0.88 (0.58, 1.36)	1.42 (0.89, 2.29)	0.94 (0.60, 1.45)	1.08 (0.73, 1.60)	1.17 (0.77, 1.78)
Not working for pay ^b	0.97 (0.73, 1.31)	1.01 (0.71, 1.42)	0.70* (0.52, 0.95)	0.99 (0.75, 1.32)	0.89 (0.66, 1.20)	1.00 (0.75, 1.33)	1.21 (0.91, 1.63)	1.00 (0.76, 1.31)	1.11 (0.86, 1.44)	1.02 (0.78, 1.34)
Mental status										
Married ^c	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Separated, widowed, divorced	1.30 (0.87, 1.96)	1.15 (0.73, 1.81)	1.94*** (1.33, 2.83)	1.25 (0.85, 1.84)	1.05 (0.69, 1.58)	1.10 (0.75, 1.61)	1.03 (0.73, 1.45)	1.48* (1.07, 2.05)	0.99 (0.72, 1.37)	0.85 (0.61, 1.19)
Never married	0.70* (0.51, 0.95)	0.84 (0.59, 1.21)	0.88 (0.63, 1.21)	0.87 (0.65, 1.16)	0.67* (0.49, 0.93)	0.48*** (0.36, 0.64)	0.58*** (0.42, 0.79)	0.85 (0.64, 1.14)	0.57*** (0.43, 0.76)	0.67** (0.50, 0.90)

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

^aBecause of the categorical nature of the income item, poverty status was indeterminate for some participants; these participants were coded as not living in poverty.

^bIncludes homemaker, looking for work, unemployed, retired, permanently disabled, and other.

^cIncludes living together as if married.

P* < .05; *P* < .01; ****P* < .001.

TABLE 4—Comparison of Trauma Exposure in Samples: American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project and National Comorbidity Survey (NCS)

	Southwest				Northern Plains				NCS			
	Male (SM; n = 574)		Female (SF; n = 775)		Male (NM; n = 756)		Female (NF; n = 824)		Male (UM; n = 2833)		Female (UF; n = 3042)	
	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a	% (99% CI)	Difference ^a
Witnessing a traumatic event	46.7 (41.3, 52.1)	UM, UF	46.3 (41.6, 51.0)	UM, UF	51.9 (47.0, 56.8)	UM, UF	51.7 (46.9, 56.4)	UM, UF	35.7 (32.6, 39.1)	SM, SF, NM, NF, UF	16.0 (13.9, 18.4)	SM, SF, NM, NF, UM
Life-threatening accident	18.2 (14.3, 22.8)	SF, NM, UM	9.2 (6.8, 12.3)	SM, NM, UM	27.3 (23.1, 32.0)	SF, SM, NF, UF	15.2 (12.0, 18.9)	NM, UM	26.1 (23.2, 29.2)	SM, SF, NF, UF	13.6 (11.5, 16.1)	NM, UM
Natural disaster	10.8 (7.9, 14.7)	NM, UM	8.9 (6.6, 12.1)	NM, UM, UF	18.6 (15.1, 22.8)	SM, SF	14.4 (11.3, 18.1)	SM, SF	18.5 (15.9, 21.3)	SM, SF	15.0 (12.8, 17.5)	SF
Trauma occurred to loved one	30.3 (25.5, 35.6)	UM, UF	30.6 (26.4, 35.2)	UM, UF	31.0 (26.7, 35.7)	UM, UF	38.5 (34.0, 43.3)	UM, UF	12.3 (10.2, 14.8)	SM, SF, NM, NF	15.0 (12.9, 17.5)	SM, SF, NM, NF
Physical attack	22.7 (18.5, 27.6)	SF, NF, UM, UF	36.0 (31.6, 40.6)	SM, UM, UF	27.1 (23.0, 31.7)	NF, UM, UF	39.5 (35.0, 44.2)	SM, NM, UM, UF	15.0 (12.7, 17.6)	SM, SF, NM, NF	11.4 (9.6, 13.5)	SM, SF, NM, NF
Sexual assault other than rape	2.6 (1.3, 5.1)	SF, NF, UF	8.0 (5.7, 11.0)	SM, NM, UM, UF	1.6 (0.7, 3.7)	SF, NF, UF	7.6 (5.4, 10.6)	SM, NM, UM, UF	2.8 (2.0, 4.1)	SF, NF, UF	14.0 (11.9, 16.5)	SM, SF, NM, NF, UM
Rape	2.4 (1.2, 4.7)	SF, NF, UF	12.8 (9.8, 16.4)	SM, NM, UM	1.4 (0.6, 3.3)	SF, NF, UF	14.4 (11.4, 18.1)	SM, NM, UM	0.8 (0.4, 1.6)	SF, NF, UF	10.4 (8.5, 12.8)	SM, NM, UM
Combat exposure in war	3.6 (2.1, 6.1)	SF, NF, UF	0.0 ^b (0.0, 1.9 ^b)	SM, NM, UM	5.4 (3.7, 7.8)	SF, NF, UF	0.2 (0.0, 0.9)	SM, NM, UM	6.2 (4.7, 8.2)	SF, NF, UF	0.0 ^c (0.0, 0.1 ^c)	SM, NM, UM
Any type of trauma	62.4 (56.9, 67.5)	UF	66.2 (61.7, 70.5)	UF	67.2 (62.4, 71.6)	UF	69.8 (65.3, 73.9)	UF	63.3 (60.0, 66.5)	UF	53.5 (50.3, 56.7)	SM, SF, NM, NF, UM

Note. CI = confidence interval; UM = US males in NCS; UF = US females in NCS. Sample sizes are unweighted.

^aEntries denote significant pairwise comparisons ($P < .01$).

^bNo SW females reported combat exposure. As a means of calculating confidence intervals, one case was temporarily assigned as having involved combat exposure.

^cOne NCS female reported combat exposure (weighted prevalence of 0.0082%); therefore, no adjustments were necessary to calculate confidence intervals.

death, and natural disaster. In the 1996 Detroit Area Survey of Trauma (DAST), non-Whites exhibited a 2-fold higher risk than Whites for lifetime exposure to assaultive violence.²⁶ Participants in the present project—both male and female members of the southwest and northern plains—much more frequently witnessed a traumatic event, experienced trauma to loved ones, and were victims of physical attacks than their US counterparts in the NCS.

The reasons for such differences may reside in the argument that aggressive acts become more serious and more often result in injury when assailants have been drinking than when they are sober. Analyses of 1992–1993 National Crime Victimization Survey data²⁹ have revealed that alcohol escalates the likelihood of physical assault and injury during interpersonal conflict. An equally provocative possibility follows from the thesis that cultural norms that legitimize fighting among group members who drink heavily contribute to higher levels of violence.³⁰ Both observations are important in light of the widespread presence of alcohol in many American Indian communities, the associated consumption patterns, and the violent consequences that often ensue.³¹ Analyses are under way with project data that will allow us to examine the potential association between trauma exposure—specifically assaultive violence—and alcohol use, abuse, and dependence.

Age, educational level, and poverty have been implicated in increased risks of exposure to traumatic experiences.^{23,24} Norris²⁷ observed that physical attacks and sexual assaults decreased with age. Breslau et al.²⁶ found that exposure to all forms of trauma peaked between the ages of 16 and 20 years but noted important variations in the experience of specific types of trauma across the life span. For example, assaultive violence declined markedly after the age of 20 years and continued to do so in subsequent periods. Other types of trauma, notably, the sudden, unexpected death of a loved one, remained a frequent experience, peaking near 45 years of age.

With respect to trauma in general, neither project tribe evidenced a peak in exposure according to age; no differences emerged until the 45- to 54-year age period, when lifetime

prevalence of trauma declined only among older southwest members. In the southwest tribe, age was unrelated to any specific type of trauma with 1 exception: those 35 to 44 years old were less likely to witness traumas. Among northern plains members, age was related to increased odds of noninterpersonal as well as interpersonal traumas; odds were higher among individuals 25 years or older.

The DAST revealed that lifetime prevalence of assaultive violence, equivalent here to interpersonal trauma, was associated with education level (less than college) and income level (lower income groups). In sharp contrast, among the present participants, college education was consistently related to increased exposure to each form of trauma as well as to the experience of any trauma. Furthermore, a high school education or equivalent was associated with increased exposure to all types of trauma with the exception of interpersonal traumas among southwest tribal members.

Employment status was not related to prevalence of trauma in general among the northern plains and southwest tribes or to specific types of trauma among members of the former. However, in the southwest community, those not working for pay experienced fewer interpersonal traumas. Surprisingly, poverty status also differed in its association with trauma exposure from that found in the DAST. Among the present respondents, poverty either bore no relationship to trauma prevalence rates or was associated with less frequent exposure.

Finally, marital status, which has not been previously examined in the literature with respect to trauma exposure, exhibited similar associations in both tribes. Individuals who were separated, widowed, or divorced were more likely to be exposed to interpersonal trauma. Tribal members who had never married were far less likely to have experienced any trauma; in particular, they reported less frequent exposure to noninterpersonal trauma (northern plains members only) and to traumas affecting loved ones (both tribes). Non-married members of the northern plains tribe also witnessed far fewer events than their married or separated/widowed counterparts.

Our findings in regard to education, employment, and poverty were unexpected be-

cause of their departure from those of the DAST, as well as previous studies conducted among American Indians. In her study of homicide among American Indians, Bachman⁴ found that both social disorganization and economic deprivation contributed to high levels of lethal violence in reservation communities. This same set of associations has been noted in regard to other problems among American Indians, such as suicide^{32–34} and alcohol abuse.³¹ Hence, we anticipated that, in this study, impoverishment and lower levels of education and employment would be linked to greater trauma exposure. That they were not is puzzling and deserves further consideration.

It may be that educational attainment, for example, introduces greater mobility, broadening one's participation in social worlds beyond reservation life and thereby increasing the probability of exposure to adverse events. Then again, to the extent that one's educational status is discordant from that of peers—and, in this case, a college education is an exception in these communities—it may focus frustration and interpersonal tensions, fostering the likelihood of conflict. Being unemployed and poor in tribal communities may limit the breadth of social interactions in which one engages outside of kith and kin, with a concomitant decrease in exposure to conflict likely to escalate to assaultive violence.

Our findings with respect to marital status are consistent with observations that separation is related to domestic discord³⁵ and that widowhood is related to loss,³⁶ increasing exposure to trauma in both cases. It is also clear that unmarried individuals, by virtue of their smaller interpersonal networks and reduced social obligations, are much less likely to experience adverse events than their married counterparts.³⁷

In conclusion, in these 2 American Indian communities, rates of exposure to at least 1 trauma fell at the upper end of the wide range previously reported among other populations. Yet, in contrast to the general US population, female American Indians experienced a level of exposure equivalent to their male counterparts. In regard to specific traumas such as sexual assault and rape among women and combat among men, long-observed gender differences held true. Inter-

tribal differences also emerged, notably with respect to life-threatening accidents and natural disasters among male northern plains tribal members in contrast to southwest tribal members. Both populations witnessed traumatic events, experienced traumas involving loved ones, and were victims of physical attacks more often than the US population as a whole.

Finally, other demographic factors such as education and poverty did not exhibit the same associations with trauma exposure among American Indians as those suggested for other populations. New insights also emerged regarding the relationships of employment and marital status to prevalence rates of trauma both in terms of specific events and in general; such relationships have not been examined previously in the broader literature.

Given our interest in possible tribe-specific variations in trauma, we conducted this work with tribally defined populations. The decision to focus on reservation-based populations was also driven by both substantive and practical considerations. Including urban/suburban tribal members in the project sample was well beyond the study's resources. Thus, our populations of inference are clear, although circumscribed.

This study of American Indians living on or near their reservations is the first, to our knowledge, to involve the use of a methodology shared with broader epidemiological studies to estimate prevalence rates of trauma and psychiatric problems. However, we aggregated the 16 traumatic events into the same 8 categories used by Kessler and colleagues.^{13,16} By querying participants about the occurrence of an increased number of traumatic events, we may have altered the demand set of the interview, thereby encouraging reports of more such events. However, given the variation in trauma prevalence rates among the southwest, northern plains, and US respondents, this possibility seems unlikely. Also, by forcing the income and household composition information into a single dichotomous variable, we may have obscured the relationships with trauma observed in previous studies suggesting that individuals in the lowest income groups are most exposed,^{24,26} rather than the reverse.

Much more remains to be discovered with respect to trauma and its potential contributions to the well-documented disparities in health status and care among American Indians. For example, alterations in central and autonomic nervous system function and hormonal dysregulation are associated with trauma,^{38,39} and these changes, in turn, increase the risk for cardiovascular disease.^{40–43} It may be that high rates of trauma exposure contribute to the increasing prevalence of cardiovascular disease among American Indian men and women, the leading cause of death among this population.^{44,45}

Similarly, trauma is closely linked to pain,^{46–52} a relationship verified in our own work among native peoples.⁵³ Pain affects help-seeking behavior, adherence to treatment recommendations, and speed of surgical recovery, all often compromised in American Indians. Then, too, the nature and frequency of trauma are strongly related to the risk of posttraumatic stress disorder, and this chronic and debilitating mental illness has widespread ramifications in regard to health and social functioning in American Indian communities.^{54,55} Clearly, trauma and its sequelae must figure more importantly in our efforts to understand and ameliorate the health disparities that plague this special population. ■

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Contributors

S.M. Manson and J. Beals conceived the study and supervised its implementation. S.M. Manson led the writing; J. Beals supervised the data analysis. S.A. Klein contributed to field work coordination, data entry, and analyses. C.D. Croy provided statistical support. All of the authors contributed to interpretation of the data and writing of the article.

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References

1. Manson SM. Mental health services for American Indians: need, use, and barriers to effective care. *Can J Psychiatry*. 2000;45:617–626.
2. Jervis LL, Klein SA, Beals J, et al. Historical consciousness among two American Indian tribes. *Am Behav Scientist*. In press.
3. *American Indians and Crime*. Washington, DC: US Dept of Justice, Bureau of Justice Statistics; 1999. NCJ publication 3386.
4. Bachman R. An analysis of American Indian homicide: a test of social disorganization and economic

deprivation at the reservation county level. *J Res Crime Delinquency*. 1991;28:456–471.

5. Tjaden P, Thoennes N. Prevalence and consequences of male-to-female and female-to-male intimate partner violence as measured by the National Violence Against Women Survey. *Violence Women*. 2000;6:142–161.
6. Buchwald DS, Tomita S, Ashton S, Furman R, Manson SM. Physical abuse of urban Native Americans. *J Gen Intern Med*. 2000;15:562–564.
7. Schiff M, Becker T. Trends in motor vehicle traffic fatalities among Hispanics, non-Hispanic Whites, and American Indians in New Mexico, 1958–1990. *Ethn Health*. 1996;1:283–291.
8. Gallaher MM, Fleming DW, Berger LR, Sewell CM. Pedestrian and hypothermia deaths among Native Americans in New Mexico: between bar and home. *JAMA*. 1992;267:1345–1348.
9. Beals J, Manson SM, Mitchell CM, et al. Cultural specificity and comparison in psychiatric epidemiology: walking the tightrope in American Indian research. *Cult Med Psychiatry*. 2003;27:249–257.
10. Norton IM, Manson SM. Research in American Indian and Alaska Native communities: navigating the cultural universe of values and process. *J Consult Clin Psychol*. 1996;64:856–860.
11. Manson SM, Garrouette EM, Goins RT, Nez Henderson P. Access, relevance and control in the research process: lessons from Indian country. *J Aging Health*. 2004;16:58S–77S.
12. Kessler RC, McGonagle KA, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R disorders in the United States. *Arch Gen Psychiatry*. 1994;51:8–19.
13. Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the National Comorbidity Study. *Arch Gen Psychiatry*. 1995;52:1048–1060.
14. Breslau N. The epidemiology of posttraumatic stress disorder: what is the extent of the problem? *J Clin Psychol*. 2000;62(suppl 17):16–22.
15. US Bureau of the Census. How the Census Bureau measures poverty. Available at: <http://www.census.gov/hhes/poverty/povdef.html>. Accessed November 10, 2004.
16. Kessler RC. Posttraumatic stress disorder: the burden to the individual and to society. *J Clin Psychol*. 2000;61(suppl 5):4–14.
17. *SAS Language: Version 8.2* [computer program]. Cary, NC: SAS Institute; 2001.
18. *SPSS 11.5* [computer program]. Chicago, Ill: SPSS Inc; 2002.
19. *Stata, Version 8.0* [computer program]. College Station, Tex: Stata Corp; 2003.
20. Kish L. *Survey Sampling*. New York, NY: John Wiley & Sons Inc; 1965.
21. Andrews G, Henderson S, Hall W. Prevalence, comorbidity, disability and service utilization. *Br J Psychol*. 2001;178:145–153.
22. Robin RW, Chester B, Rasmussen JK, Jaranson JM, Goldman D. Prevalence and characteristics of trauma and posttraumatic stress disorder in a southwestern

- American Indian community. *Am J Psychiatry*. 1997; 154:1582–1588.
23. Hidalgo RB, Davidson JRT. Posttraumatic stress disorder: epidemiology and health-related considerations. *J Clin Psychol*. 2000;61(suppl 7):5–13.
24. Bromet E, Sonnega A, Kessler RC. Risk factors for DSM-III-R posttraumatic stress disorder: findings from the National Comorbidity Survey. *Am J Epidemiol*. 1998;147:353–361.
25. Breslau N, Chilcoat HD, Kessler RC, Peterson EL, Lucia VC. Vulnerability to assaultive violence: further specification of the sex difference in post-traumatic stress disorder. *Psychol Med*. 1999;29:813–821.
26. Breslau N, Kessler RC, Chilcoat HD, Schultz LR, Davis GC, Andreski P. Trauma and posttraumatic stress disorder in the community: the 1995 Detroit Area Survey of Trauma. *Arch Gen Psychiatry*. 1998;55:626–670.
27. Norris FH. Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *J Consult Clin Psychol*. 1992;60:409–418.
28. Creamer M, Burgess P, McFarlane AC. Post-traumatic stress disorder: findings from the Australian National Survey of Mental Health and Well-Being. *Psychol Med*. 2001;31:1237–1247.
29. Martin SE, Bachman R. The relationship of alcohol to injury in assault cases. In: Galanter M, ed. *Recent Developments in Alcoholism, Volume 13. Alcohol and Violence: Epidemiology, Neurobiology, Psychology, and Family Issues*. New York, NY: Plenum; 1997:41–56.
30. Linsky AS, Bachman R, Straus MA. *Stress, Culture, and Aggression*. New Haven, Conn: Yale University Press; 1995.
31. May PA, Gossage P. New data on the epidemiology of adult drinking and substance use among American Indians of the northern states: male and female data on prevalence, patterns, and consequences. *Am Indian Alsk Native Ment Health Res* [serial online]. 2001;10(2):1–26.
32. May PA, Van Winkle NW, Williams MB, McFeeley PJ, DeBruyn LM, Serna P. Alcohol and suicide death among American Indians of New Mexico: 1980–1998. *Suicide Life Threat Behav*. 2002;32:240–255.
33. May PA, Van Winkle N. Indian adolescent suicide: the epidemiologic picture in New Mexico. *Am Indian Alsk Native Ment Health Res*. 1994;4:2–23.
34. Van Winkle NW, May PA. An update on American Indian suicide in New Mexico, 1980–1987. *Hum Organ*. 1993;52:304–315.
35. Aseltine RH Jr, Kessler RC. Marital disruption and depression in a community sample. *J Health Soc Behav*. 1993;34:237–251.
36. Umberson D, Wortman CB, Kessler RC. Widowhood and depression: explaining long-term gender differences in vulnerability. *J Health Soc Behav*. 1992;33:10–24.
37. Schuster TL, Kessler RC, Aseltine RH Jr. Supportive interactions, negative interactions, and depressed mood. *Am J Community Psychol*. 1990;18:423–438.
38. Bremner JD. Alterations in brain structure and function associated with posttraumatic stress disorder. *Semin Clin Neuropsychol*. 1999;4:249–255.
39. Bremner JD. Neuroimaging studies in post-traumatic stress disorder. *Curr Psychol Rep*. 2002;4: 254–263.
40. Kawachi I, Sparrow D, Vokonas PS, Weiss ST. Symptoms of anxiety and risk of coronary heart disease: the Normative Aging Study. *Circulation*. 1994;90: 2225–2229.
41. Kubzansky LD, Kawachi I. Going to the heart of the matter: do negative emotions cause coronary heart disease? *J Psychosom Res*. 2000;48:323–337.
42. Kubzansky LD, Kawachi I, Spiro A, Weiss ST, Vokonas PS, Sparrow D. Is worrying bad for the heart? A prospective study of worry and coronary heart disease in the Normative Aging Study. *Circulation*. 1997; 95:818–824.
43. Kubzansky LD, Kawachi I, Weiss S, Sparrow D. Anxiety and coronary heart disease: a synthesis of epidemiological, psychological, and experimental evidence. *Ann Behav Med*. 1998;20:47–58.
44. Lee ET, Welty TK, Fabsitz R, et al. The Strong Heart Study: a study of cardiovascular disease in American Indians: design and methods. *Am J Epidemiol*. 1990;132:1141–1155.
45. Lee ET, Cowan LD, Welty TK, et al. All-cause mortality and cardiovascular disease mortality in three American Indian populations, aged 45–74 years, 1984–1988: the Strong Heart Study. *Am J Epidemiol*. 1998;147:1009–1010.
46. Dobie DJ, Kivlahan DR, Maynard C, Bush KR, Davis TM, Bradley KA. Posttraumatic stress disorder in female veterans: association with self-reported health problems and functional impairment. *Arch Intern Med*. 2004;164:394–400.
47. Raphael KG, Janal MN, Nayak S. Comorbidity of fibromyalgia and posttraumatic stress disorder symptoms in a community sample of women. *Pain Med*. 2004;5:33–41.
48. Amir M, Kaplan Z, Neumann L, Sharabani R, Shani N, Buskila D. Posttraumatic stress disorder, tenderness and fibromyalgia. *J Psychosom Res*. 1997;42: 607–613.
49. Roy-Byrne P, Smith WR, Goldberg J, Afari N, Buchwald D. Post-traumatic stress disorder among patients with chronic pain and chronic fatigue. *Psychol Med*. 2004;34:363–368.
50. Sharp TJ. The prevalence of post-traumatic stress disorder in chronic pain patients. *Curr Pain Headache Rep*. 2004;8:111–115.
51. Otis JD, Keane TM, Kerns RD. An examination of the relationship between chronic pain and post-traumatic stress disorder. *J Rehabil Res Dev*. 2003;40:397–405.
52. Chibnall JT, Duckro PN. Post-traumatic stress disorder in chronic post-traumatic headache patients. *Headache*. 1994;34:357–361.
53. Buchwald D, Goldberg J, Noonan C, Beals J, Manson SM. Relationship between posttraumatic stress disorder and pain in two American Indian tribes. *Pain Med*. In press.
54. Beals J, Manson SM, Whitesell NR, et al. Prevalence of DSM-IV disorders and attendant help-seeking in two American Indian reservation populations. *Arch Gen Psychiatry*. 2005;62:99–108.
55. Manson SM. The wounded spirit: a cultural formulation of post-traumatic stress disorder. *Cult Med Psychiatry*. 1996;20:489–498.