Posttraumatic Stress Disorder and Symptoms among American Indians and Alaska Natives: A Review of the Literature

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Abstract

Purpose: American Indians and Alaska Natives (AI/ANs) experience high rates of trauma and posttraumatic stress disorder (PTSD). We reviewed existing literature to address three interrelated questions: 1) What is the prevalence of PTSD and PTSD symptoms among AI/ANs? 2) What are the inciting events, risk factors, and comorbidities in AI/ANs, and do they differ from those in the general U.S. population? 3) Are studies available to inform clinicians about the course and treatment of PTSD in this population?

Methods: We searched the PubMed and Web of Science databases and a database on AI/AN health, capturing an initial sample of 77 original English-language articles published 1992-2010. After applying exclusion criteria, we retained 37 articles on prevalence of PTSD and related symptoms among AI/AN adults. We abstracted key information and organized it in tabular format.

Results: AI/ANs experience a substantially greater burden of PTSD and related symptoms than U.S. Whites. Combat experience and interpersonal violence were consistently cited as leading causes of PTSD and related symptoms. PTSD was associated with bodily pain, lung disorders, general health problems, substance abuse, and pathological gambling. In general, inciting events, risk factors, and comorbidities appear similar to those in the general U.S. population.

Conclusions: Substantial research indicates a strikingly high incidence of PTSD in AI/AN populations. However, inciting events, risk factors, and comorbidities in AI/ANs, and how they may differ from those in the general population, are poorly understood. Very few studies are available on the clinical course and treatment of PTSD in this vulnerable population.

Keywords

posttraumatic stress disorder; trauma; American Indians; Alaska Natives

Posttraumatic stress disorder (PTSD), while a modern concept, is not a modern phenomenon [1]. Most recently defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV in 1994, PTSD requires an experience of intense fear, helplessness, or horror during a traumatic event that threatened or produced physical injury or death (Criterion A), symptoms of re-experiencing (Criterion B), avoidance or dissociation (Criterion C), and hyperarousal (Criterion D), for a minimum of one month (Criterion E), producing social or

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occupational impairment (Criterion F) [2]. Although the DSM diagnosis has gone through several changes, significant and chronic psychiatric distress (e.g., flashbacks, depression, etc.) following the experience of a traumatic event are features of the disorder that appear to be consistent across time. More common stressors (e.g., divorce, unemployment) have also been linked to PTSD symptoms [3]. Subsyndromal or partial PTSD, characterized by insufficient symptoms to meet the full diagnostic criteria for PTSD, is now recognized as causing disruption on a scale similar to full PTSD [4].

The prevalence of lifetime PTSD in the U.S. general population is 6.6%, with 60% of cases becoming chronic [5, 6]. About 40% of people exposed to a traumatic event will subsequently exhibit PTSD symptoms [7]. The prevalence of PTSD depends greatly on the type of trauma, with conditional probabilities highest for the unexpected death of someone close or the serious injury or illness of someone close [6]. Its incidence also differs by gender. Women with PTSD report sexual assault, intimate partner violence, and the unexpected death of someone close as the worst traumatic experiences. In contrast, men with PTSD report military combat, seeing someone badly injured or dead, and their own serious or life-threatening accidents as the worst traumatic experiences [6]. Although men are more likely to be exposed to traumatic events than women, women are twice as likely to develop PTSD, even after adjusting for trauma type [8]. PTSD is associated with other anxiety disorders, major depressive disorder, chronic pain, and other physical symptoms [9-11]. In terms of risk factors, PTSD has been linked to neuroticism; family history of major depression; family history of substance abuse; personal history of childhood trauma; pre-existing anxiety and depression; previous exposure to trauma; lower levels of education; urban residence, and a family history of substance abuse [12-14]. The construct of psychological resilience appears important in moderating the association between trauma exposure and PTSD [15].

PTSD has been described as one of the most serious mental health problems faced by American Indian/Alaska Native (AI/AN) populations [16]. In the 2010 U.S. Census, 5.2 million Americans self-identified as AI/AN, either alone or in combination with another race, including 2.8 million who self-identified as AI/AN only. Because the census relies solely on self-reported information, the more inclusive definition accurately reflects the great diversity of urban and rural AI/ANs, many of whom have mixed ancestry. Although AI/AN communities have significant intergroup differences (e.g., geography, language, traditional practices) [17-19], in the aggregate they have a higher risk of experiencing traumatic life events than any other ethnic or racial group, and are twice as likely as the general population to develop PTSD [20-22]. Despite a 30-year history of sustained research on PTSD, much remains unclear about how culture and ethnoracial background shape the clinical presentation of PTSD, and accordingly, whether interventions for PTSD need to be culturally tailored to optimize outcomes.

In this article, we review and synthesize the available research on PTSD and trauma-related stress in AI/AN populations. We attempt to answer the following questions: 1) What is the prevalence of PTSD and related symptoms in AI/AN populations? 2) What are the inciting events, risk factors, and comorbidities for PTSD in AI/AN populations, and do they differ between AI/ANs and the general population? 3) Are studies available to inform clinicians about the course and treatment of PTSD in AI/AN populations?

METHODS

Search Strategy and Criteria for Inclusion and Exclusion

Research articles were identified by searching the University of New Mexico Native Health Database, PubMed, and Web of Science. To capture as many publications as possible and

allow observation of trends over time, we did not place any restrictions on publication dates. Search results were systematically assessed by reviewing abstracts and, if necessary, full publications. Strict inclusion and exclusion criteria were applied, as outlined below.

University of New Mexico Native Health Database—Established by grants from the National Library of Medicine, the Indian Health Service, and the U.S. Department of Health and Human Services, this is a regularly updated collection of more than 9,000 articles, reports, surveys, and other documents related to the health and health care of AI/AN people. To identify all relevant entries, we used the broad search string [PTSD OR "posttraumatic stress" OR "post-traumatic stress"], which returned 19 unique entries.

PubMed and Web of Science—PubMed and Web of Science searches used more explicit terms, because these databases are larger and not specific to Native populations. The PubMed search [(("American Indian" OR "Native American" OR "Alaska Native") AND (PTSD OR "posttraumatic stress" OR "post-traumatic stress") NOT youth NOT adolescent NOT child* NOT infant)] yielded 25 results, five of which were also identified by the Native Health Database. The Web of Science search topic (("American Indian" OR "Native American" OR "Alaska Native") AND (PTSD OR "posttraumatic stress" OR "post-traumatic stress") NOT youth NOT adolescent NOT child* NOT infant) yielded 47 results, 21 of which were included in the two prior searches.

Other Sources—Cochrane Collaboration Reviews were also searched to verify whether any major systematic review had been published on this topic. The following searches yielded no results: ["American Indian" AND PTSD], ["Alaska Native" AND PTSD], ["Native American" AND PTSD]. In addition, the bibliographies of all non-excluded articles were searched for relevant publications not found through other searches. This process yielded 12 additional original publications.

Inclusion Criteria—Articles included in this review presented original data on PTSD and PTSD symptoms among AI/AN adults. We verified all pertinent publications, regardless of how they were initially identified, by using the PubMed database. Nine publications were discarded when, on full-text assessment, we determined that they did not present original data, leaving a preliminary sample of 60 articles.

Exclusion Criteria—Twenty-four articles were excluded from this preliminary sample because they did not concern PTSD or PTSD symptoms in our population of interest, focused on non-U.S. or non-Native populations, or concerned only AI/AN children and youth under the age of 18. Publications were retained if their study populations included both children and adults, as long as adults comprised the majority of participants. The final sample contained 37 articles.

We then categorized publications into comparison and single-population studies. The first category compared two or more groups, at least one of which was AI/AN, on the basis of PTSD, PTSD symptom rates, or related contextual factors and characteristics. Comparison studies are useful because they can elucidate disparities in PTSD and other features of interest between AI/AN peoples and other groups, or between different AI/AN cohorts. The second category, single-population studies, described PTSD, related symptoms, and pertinent characteristics within a single AI/AN population.

Data Extraction and Synthesis

For each article, we extracted information on first author, publication year, timeframe during which study data were collected, sample size and population, criteria for inclusion,

methodology, inciting events, diagnostic measures, comorbidities, risk factors, and major findings.

RESULTS

Our search strategies identified an initial sample of 77 original publications, from which 40 were discarded after applying our exclusion criteria, leaving 37 relevant studies that we report here. Their publication dates span the period from 1993 to 2012. Of these 37 publications, 16 compared rates among different populations, as shown in Table 1, and 21 described single populations, as shown in Table 2. Descriptive characteristics of each study are reported by population category in Table 3.

Comparison Studies

The 16 comparison studies (Table 1) represented a broad geographic range that included most of the U.S., with nine studies focusing on the Southwest or the Northern Central regions. Eight studies compared one AI/AN population with at least one non-AI/AN population.

Single-Population Studies

The 21 single-population studies (Table 2) represented a broad geographical area covering most of the U.S. Fully eighteen studies, however, focused on the Southwest and/or Northern Central regions.

Prevalence of PTSD

Fifteen of the 37 studies used population-based samples. Six population-based studies compared two or more distinct AI/AN groups, without including any non-AI/AN populations. All six reported high rates of PTSD [20, 23-27]. Two other population-based studies included comparisons between two or more distinct AI/AN groups and the general U.S. population [28, 29]. In all eight of these population-based studies, the AI/AN groups were located either in the Southwest or in the Northern Plains of the U.S. In addition to the total of 15 population-based studies, four of the comparison studies used clinical samples to distinguish AI/ANs from other minority groups.

Although many studies in our review noted that rates of PTSD in AI/ANs are higher than those in other races and ethnicities (Table 2), we did not identify population-level studies capable of defining an overall national estimate of the prevalence of PTSD among AI/ANs. One publication argues that conditional rates of PTSD are likely similar between AI/ANs and the general U.S. population; in other words, after exposure to similar trauma, AI/ANs develop PTSD at rates similar to those of other groups.[27] Their elevated PTSD rates therefore reflect elevated rates of exposure to trauma. A recent population-level study of PTSD, using data from the National Epidemiologic Survey on Alcohol and Related Conditions, found that AI/ANs represented 3.2% of all U.S. patients with full PTSD, as diagnosed by DSM-IV criteria.[6] This proportion is almost twice as high as the AI/AN share of the total U.S. population, which according to the 2010 Census is 1.7% for people who self-identify as AI/AN, either alone or in combination with another race.

Types of Inciting Events

Fifteen of the 37 studies suggested one or more specific inciting events, including military combat, interpersonal violence, childhood sexual abuse, environmental disaster and bereavement, that apparently led to PTSD. The most frequent event was military combat, which appeared in eight studies [16, 22, 28, 30-34]. Interpersonal violence, including rape and physical assault, was the second most frequent inciting event, appearing in four studies

[22, 35-37], while childhood sexual abuse was cited in three studies [25, 36, 38]. Finally, two studies cited an environmental disaster (the Exxon Valdez oil spill) [39, 40], and one cited bereavement as an important factor in a cluster of possible inciting events that included combat experience [32].

Risk Factors and Comorbidities

Risk factors—A majority of the 37 studies reported or implied specific risk factors related to PTSD in AI/AN groups. In the population-based studies, these risk factors included exposure to violence and atrocities [28]; substance use disorders [41]; an existing psychiatric disorder [41]; childhood sexual abuse [42]; adult physical or sexual abuse [25]; parental depression, alcoholism, or violence [25, 43]; education beyond high school [41]; and combat experience [16]. In the community-based studies, risk factors included lifetime nicotine dependence [44], sexual trauma [45], experiencing six or more traumas [45], and (among combat veterans) male gender [34].

In the clinical studies, possible risk factors included minority status [46]; substance use, younger age, unmarried status, and male gender among combat veterans [47]; child abuse and neglect [48]; severe intimate partner violence, a lot of debt, and family history of alcohol use [49]; and interpersonal violence [38].

In the non-randomized studies, possible risk factors included minority status [50]; interpersonal violence [35, 36]; child abuse [32, 36]; family history of alcoholism, combat experience, alcohol dependence, and bereavement [32]; intimate partner violence [37]; and physical assault (for women) and combat experience or having experienced more than 10 traumatic events (for men) [22].

Comorbidities—Seventeen of the 37 studies either identified or suggested conditions comorbid with PTSD in AI/ANs. Population-based studies identified higher cortisol levels in women [51]; cardiovascular disease [52]; nightmares [16]; substance use disorders [41]; and bodily pain [24]. Community-based studies identified depressive symptoms [39]; pathological gambling [34, 53]; lifetime nicotine dependence [34, 44]; and anti-social personality disorders [34]. Clinical studies identified substance abuse [38, 47]; alcohol abuse [47]; and other mental disorders [38]. Non-randomized studies identified depression [35], dysphoria [35], risky sexual behavior [35], and alcohol dependence [32, 33].

Treatment for PTSD

Regarding our third question, which asks whether available literature can inform clinicians about the course and treatment of PTSD in AI/ANs, we found largely negative results. For example, between 1986 and 2005, none of the 10,000 participants in randomized clinical trials for major mental disorders were AI/AN [54]. Likewise, a recent literature search for mental health treatments for AI/ANs yielded 3,500 initial citations, yet only two of them were controlled clinical trials [55].

In the studies examined for the present review, remission from pathological gambling [53], nicotine dependence [34], and substance use [43] was associated with improved PTSD outcomes in AI/ANs. Three studies suggested that traditional Native spiritual practices appear to have a protective effect [32, 56, 57]. One of them found that AI/AN men who had been initiated into the highest order of their tribe's secret religious societies had the lowest PTSD scores PTSD [57]. Another found that lifetime PTSD was less frequent among participants who reported traditional, non-Christian religious practices than among their counterparts with Christian or contemporary Native religious or spiritual practices [56].

A population-based study of two tribes found that seeking traditional healers for treatment of anxiety disorders, including PTSD, was common [23]. Likewise, a small study of urban AI/AN women found that 77% of those who experienced rape sought traditional Native healing afterwards [35]. In one clinical study, nightmares were reported by 97% of AI/AN veterans from five Northern Plains tribes with combat-related PTSD, versus 81% of those with non-combat related PTSD. The authors suggested that the importance of dreams in Native cultures should be considered in treating AI/AN veterans with PTSD and, when appropriate, such veterans should be referred to traditional healers [16].

Some studies demonstrate significant regional differences in response to trauma between tribes in the Southwest and those in the Northern Plains, while others indicate that traditional religious or spiritual practices may be an important protective factor for some AI/AN individuals and groups. These observations underscore the need to develop culturally-tailored interventions.

DISCUSSION

This is the first comprehensive review of the literature on PTSD and related symptoms in AI/ANs. We identified 37 articles to help us answer our three study questions on the nature and extent of PTSD in this population. For our first question, regarding prevalence, the available literature revealed a substantially greater burden of PTSD and PTSD symptoms in AI/ANs than in their White counterparts. For our second question, regarding inciting events, risk factors, and comorbidities, we found a range of information. Combat experience and interpersonal violence were consistently cited as leading causes of PTSD and related symptoms in AI/ANs. In various studies, those related symptoms included bodily pain, lung disorders, general health problems, substance abuse, and pathological gambling. In general, inciting events, risk factors, and comorbidities in AI/ANs appear similar to those in the general population.

Our third question, regarding the literature on PTSD treatment, must be answered in the negative. Very few studies have addressed the clinical course and treatment of PTSD in AI/ANs, so clinicians at present have little evidence on which to base case management.

The changing definitions of PTSD in the DSM-III (1980), DSM-III R (1987), DSM-IV (1994), and forthcoming DSM-V (2013) have implications for our findings. When PTSD was originally introduced in the DSM-III, it required that a single traumatic event (Criterion A) "outside the range of usual human experience" (e.g., war, natural disaster, vehicular crash) precipitate PTSD symptoms. Criterion A was expanded in the DSM-III R to include any life-threatening event, and then expanded again in the DSM-IV to include indirect exposure to a traumatic event (e.g., the death of a family member). At that time, an additional criterion (Criterion A2) was included, requiring the experience of intense fear, helplessness, or horror as a result of the precipitating traumatic event (now identified as Criterion A1). No change in diagnosis appeared in the DSM-IV TR (2000).[58] The forthcoming DSM-V is reported to have removed Criterion A2 from the PTSD diagnosis [59]. Because we used the broad search term of "posttraumatic stress" in our review, we elicited articles that addressed both symptoms and formal diagnosis of PTSD. Thus, our methodology, results, and analysis are not affected by the variations of DSM definitions referred to in the studies examined or future changes to the diagnostic criteria.

Of the 37 articles that we examined, 18 noted which DSM edition was used in the reported diagnoses: 10 with DSM-III R and 8 with DSM IV. Although the inclusion of indirect exposure to traumatic events in the DSM-IV expanded Criterion A, the addition of Criterion A2 introduced a significant limitation that has since been documented in the literature on

PTSD.[58] Specifically, this criterion may not be applicable to special populations who have been trained to manage their response during traumatic events, such as military combatants, police officers, and first responders. Additionally, many people respond to traumatic events with a range of emotions that may not include fear, helplessness, or horror but rather guilt or shame. This perspective is especially important when considering ethnic minority populations, who may react to trauma in culturally specific ways.

It is notable that most of the articles examined here (n=27) were based on two geographic areas, the Southwest and the Northern Plains. In fact, 11 out of 37 articles were based on the same dataset, the American Indian Service Utilization, Psychiatric Epidemiology, Risk, and Protective Factors Project (AI-SUPERPFP).[60] This was a large-scale, culturally tailored study of psychiatric epidemiology in two major tribal groups, one in the Northern Plains and the other in the Southwest. It offers one of the most rigorous and valid datasets available to date on AI/AN health. Given the large populations of the tribal groups studied, this body of work is suitable for generalization to the full AI/AN census in each region. These two tribes share important differences as well as similarities that highlight a need for research that addresses AI/AN health in both specific and general terms. For example, in one study of PTSD among the two tribes, authors noted that the two tribes have differences in terms of "linguistic families," migration histories, sociological constructs, and "forms of subsistence" (p. 851). However, they also noted that the two tribes are similar in that 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" (p. 851). These differences and similarities can be applied to AI/AN communities throughout the U.S.

The literature examined here encompasses small clinical samples, convenience samples, and single case studies in addition to large, population-based studies. Each approach has inherent strengths and weaknesses. Although we advocate for cultural, social, and historical specificity in studying AI/AN groups – including specialized ethnographic research – we do not advise a retreat from large-scale population studies. As with other ethnic minority populations, some degree of generalization is necessary in order to yield statistically meaningful epidemiological data on AI/ANs. Moreover, sufficient evidence justifies the widely held belief that AI/ANs are a unified people, notwithstanding variations by culture, tribe, and region. Two areas where this shared sense of identity is most apparent are a historical consciousness of the racist and genocidal policies enacted on AI/AN people over the last 500 years, and the documented preference among AI/ANs for traditional healing based on shared cultural principles, including Medicine Wheel teachings.[61, 62]

Both large-scale studies and smaller, more focused work are warranted to address the gap in our knowledge of PTSD and related health concerns among AI/ANs. Community-based approaches to research with AI/AN populations, whether urban or rural, have proven especially effective [63, 64]. In this approach, research questions are formulated by a partnership that includes community members as well as academic researchers. We especially recommend the approach followed by AI-SUPERPFP, which used diagnostic measures that were culturally tailored for the AI/AN communities in which they were administered. Common sampling problems encountered in Indian Country were solved by sending researchers door to door to reach tribal members residing in remote regions. Additionally, the entire project was undertaken with the active involvement of the host communities [60].

The available research on PTSD in AI/AN populations indicates clearly that AI/ANs, both urban and rural, suffer a higher burden of trauma and PTSD than the general population. It also indicates the potential for significant differences between tribes and geographic regions

in terms of prevalence, concomitant disorders, and type of trauma [63]. Some literature suggests a shared preference for traditional healing methods [62]. These results provide testable hypotheses for comparing AI/AN populations to the general population, as well as for comparing AI/AN subgroups to each other, in future studies. For example, future studies might examine differences between urban and rural populations, such as strength of cultural identity, trauma exposure, and utilization of traditional medicine.

Limitations and Conclusions

This review has several limitations. First, we did not include articles on PTSD and related symptoms in AI/AN children and youth. In light of evidence that childhood traumas may predict PTSD [65], a review of this topic is warranted. Second, 11 of the 37 articles we examined were based on the same dataset, which was derived from studying a small number of AI/AN tribes in defined geographical regions. Although this dataset is the largest population-based sample of AI/AN mental health available, new population-based investigations that evaluate additional AI/AN subgroups are urgently needed. Similarly, 27 of the 37 studies reported on respondents from the same two regions of the U.S., the Southwest and the Northern Plains.

Third, seven articles reported on small and non-representative samples. Although such studies can provide useful insights, they need to be augmented by larger-scale investigations.

Fourth, the funding sources that supported each study reported in the literature we reviewed inevitably affected the nature of the research conducted. For example, authors received funding from such organizations as the National Institute of Mental Health, Veterans Affairs Services Research and Development Services, and the National Institute on Alcohol Abuse and Alcoholism. As a result, the available range of population samples included military veterans and female survivors of domestic violence, for example, and the topics of study included alcohol abuse and sexual abuse, for example. Additionally, authors' institutional affiliations included a range of departments, schools, universities, and centers, which also influenced the nature of their research. Although a complete examination of the effects of funding sources and institutional affiliations was beyond the scope of this study, we recognize that the source of funding (e.g. Veterans Affairs Services Research and Development) has a direct effect on which segment of the population is examined (e.g., veterans) and therefore which instigating factors are identified (e.g., military service).

In summary, our review of the literature on PTSD among AI/AN people documents a far higher burden of PTSD than in the general population. Despite limitations in scope, sample sizes, and methodology in the 37 studies assessed, the inciting events, risk factors, and comorbidities for PTSD in AI/ANs appear similar to those experienced by the majority population. Although available data are very limited in scope, treatment of comorbid psychiatric and addiction behaviors deserve consideration in developing effective psychosocial interventions. Future research should remedy the striking gap in our knowledge of the course of PTSD and related symptoms among AI/AN people and identify effective interventions and treatment.

Growing recognition of the widespread prevalence and adverse impact of trauma has given rise to trauma-informed services for individuals beyond specific, single events such as natural or human-made disasters, military combat, terrorist acts, accidents, rape, and domestic violence. It is well-known that the experience of trauma increases one's vulnerability to other, similar insults and that the consequences are felt throughout the developmental life span in terms of impaired psychological, emotional, and physical health. These victims, in turn, tend to be high service utilizers, including but not limited to

behavioral and physical health care, social services, and related recovery supports. As a result, state and federal agencies now promote reconfiguring systems of care to better detect and manage trauma among their consumers, from early childhood to the elder years.

Our review specific to American Indians underscores their early, broad, and repeated risk of trauma and its sequelae[66]. Relatively minor variations in exposure and in response by age, gender, and culture area suggest the possibility of systemic intervention[67]. But, with rare exception, the Indian Health Service, tribal, and urban (I/T/U) health care system is poorly equipped to address the effects of trauma among its user population. Screening, brief intervention, and referral for treatment of trauma-related problems within I/T/U primary care settings represent an emerging set of promising practices with the potential for large scale adoption [68-70]. A renewed Memorandum of Understanding between the Veterans Health Administration and Indian Health Service (October 1, 2010) builds upon a previous agreement by deploying and coordinating new health information technologies to better meet the growing demand for trauma-informed care among Native people at highest risk of post-traumatic stress disorder. Several innovative approaches along these lines, including real-time interactive videoconferencing and remote monitoring, have proven effective with respect to both clinical as well as cost outcomes in treating American Indians and Alaska Natives who suffer from this chronic, debilitating condition [71-74]. Given such success, the questions now facing us need to be broadened to include how to promote the diffusion, adoption, and sustainability of these services, which lead naturally to understanding the structure, financing, and policies shaping related care.

Acknowledgments

ABBREVIATIONS FOR ALL TABLES

AI/AN	American Indian or Alaska Native
ASPD	anti-social personality disorder
CAN	child abuse and neglect
CD	Childhood Conduct Disorder
CIDI	Composite International Diagnostic Interview for DSM-IV diagnoses
CSA	childhood sexual abuse
CVD	cardiovascular disease
DSM	Diagnostic and Statistical Manual of Mental Disorders
GAD	generalized anxiety disorder
IHS	Indian Health Service
IPV	intimate partner violence
MD	major depression
NHW	non-Hispanic White
PCL	Posttraumatic Checklist

PD	panic disorder
PTSD	posttraumatic stress disorder
SCID	Structured Clinical Interview for DSM-IV Diagnosis

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Table 1

Comparison studies of PTSD among American Indians and Alaska Natives

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
BeAIs 2002[1]	1990	Male AI/AN Vietnam veterans 305 from Northern Plains, 316 from Southwest	Statistical analysis	Combat experience	DSM-III-R	*Risk factor:* exposure to violence and atrocities	AI/AN Vietnam veterans were compared to Vietnam veterans from the general population. Lifetime PTSD diagnosis was highest in Northern Plains (57%) and second highest in Southwest (45%).
BeAIs 2005a[2]	1997 - 2000	1446 Southwest AIs 1638 Northern Plains AIs	Random sample from tribal rolls Statistical analysis		DSM-IV	*Comorbidity:* substance use disorders *Risk factors:* substance use disorders; at least one existing psychiatric disorder; more than high school education	PTSD was most prevalent among women in both tribes; Southwest women had higher risk for depressive and anxiety disorders and lower risk for substance disorders. Poverty, unemployment, and married/single status were not associated with psychiatric disorders.
BeAIs 2005b[3]	1997 - 1999	1446 Southwest AIs 1638 Northern Plains AIs	Random sample from tribal rolls Statistical analysis		DSM-III-R		Compared with U.S. general population in National Comorbidity Survey, lifetime MD episodes were lower in the Northern Plains. Men more likely than general population to seek help for substance abuse. Women less likely to talk to non-specialty providers about emotional problems. Use of traditional healers common in both groups, especially in the Southwest.
BeAIs 2012[4]	1997 - 2000	1967 AIs, including Southwest and Northern Plains	Random sample from tribal rolls Statistical analysis		DSM-IV	*Risk factor:* exposure to traumatic events	Gender differences apparent in reporting of type of trauma. Worst event listed by men: accidents (either experienced or witnessed) Worst event listed by women: spousal abuse, witnessed familial violence, and rape/molestation Both genders in these

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
							populations at greater risk for trauma exposure and subsequent PTSD than other American.
Buchwald 2005[5]	1997 - 2000	1446 Southwest AI/ANs 1638 Northern Plains AI/ANs	Random sample from tribal rolls Descriptive statistics, linear regression		DSM-IV	*Comorbidity:* bodily pain	Women twice as likely as men to have lifetime PTSD. Men and women with lifetime PTSD had more bodily pain than those without.
C'De Baca 2004[6]	1989 - 1992	758 male and 631 female alcohol-impaired offenders (AI/AN, Hispanic, NHW) referred to screening program in New Mexico	Referral to screening program Interviews, statistical analysis		DSM-III-R		AI/AN women had lower prevalence of alcohol dependence, nicotine dependence, and MD than NHW women. AI/AN men had lower prevalence of drug dependence, nicotine dependence, and antisocial personality disorder than NHW men. After adjusting for covariates, AI/ANs and Hispanics had lower prevalence of substance abuse and mental health problems than NHWs. Age-adjusted lifetime prevalence of PTSD for men was highest for AI/AN men (13.2%); for women, the rate was highest for NHWs (29.2%) and second highest for AI/ANs (26.6%).
Libby 2005[7]	1997 - 2000	1446 Southwest AI/ANs 1638 Northern Plains AI/ANs	Random sample from tribal rolls Descriptive statistics, bivariate logistic regression	CSA	DSM-IV	*Risk factors:* CSA, adult physical or sexual abuse, chronic illness, lifetime alcohol or drug disorder, parental depression, alcoholism, or violence.	Prevalence of childhood physical abuse was ~7% for both tribes Southwest tribe had higher prevalence of depressive and anxiety disorders, highest prevalence of PTSD. CSA was significant predictor of all disorders for males in both tribes, except for panic and GAD for Northern Plains. CSA was an independent predictor of PTSD for both tribes after controlling for covariates. Adult physical or sexual

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
							abuse, chronic illness, lifetime alcohol or drug disorder, parental problems with depression, and alcohol or violence were risk factors for depressive and anxiety disorders.
Manson 2005[8]	1997 - 2000	1446 Southwest AI/ANs 1638 Northern Plains AI/ANs	Random sample from tribal rolls Statistical analysis				Lifetime prevalence for exposure to 1 trauma were 62.4%-67.2% for men, 66.2%-69.8% for women. Women in both areas were more likely to experience interpersonal violence. AI/ANs were more likely to witness traumatic events, experience trauma to loved ones, and experience physical attacks than general population
Palinkas 1993[9]	1990	599 men and women in Alaska (both AI/AN and White)	Community survey Statistical analysis	Oil spill	DSM-IV	*Comorbidity:* depressive symptoms	Post-spill prevalence for PTSD was 9.4% and GAD was 20.2% for all levels of exposure. Members of high-exposure group were 2.9 times as likely to have PTSD and 3.6 times as likely to have GAD. Women were more vulnerable to PTSD and GAD. AI/ANs were more vulnerable to depressive symptoms.
Palinkas 2004[10]	1990	188 AI/AN Alaska residents 371 White Alaska residents	Community survey Statistical analysis	Oil spill	DSM-IV	*Risk factors:* low family support, participation in clean-up activities, decline in subsistence activities	Both racial groups showed high levels of social disruption due to oil spill. Diagnosis of PTSD must take into consideration local interpretations of symptoms. Risk factors were associated with PTSD in AI/ANs but not in Whites
Ritsher 2002[11]	1996	14,662 U.S. adults	Attendees at 1240 sites for National Anxiety Disorders Screening Day Statistical		DSM-IV	*Risk factor:* minority	PTSD symptoms were more prevalent among Blacks,

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
			analysis			status	Hispanics, and AI/ANs.
Santos 2008[12]		269 injured inpatients at two U.S. Level 1 trauma centers, age 14 or older	Random sample Regression analysis		PCL	*Risk factor:* minority status	Regression analyses adjusted for covariates showed that ethnic minority patients (AI/AN, Black, Hispanic, Asian) had significant elevations in 1 posttraumatic symptom cluster.
Sprague 2010[13]	1997 - 2000	1208 Southwest AIs 1414 Northern Plains AIs	Random sample from tribal rolls Statistical analysis				Prevalence of lung disorders was 17% in Northern Plains and 13% in Southwest. In Northern Plains, men with lung disorders had higher prevalence of PTSD and MD than men without; women with lung disorders had higher prevalence of MD than women without. After controlling for covariates, only the association with MD persisted in both genders. In Southwest, neither PTSD nor MD was associated with lung disorders.
Stephens 2010[14]		623 acutely injured trauma center inpatients	Population-based sample Statistical analysis		PCL		AI/ANs and Blacks reported highest levels of posttraumatic stress and pre-injury cumulative trauma burden.
Walker 1994[15]	1991	3087 AI/AN veterans	Discharge abstracts from Department of Veterans Affairs hospitAIs Statistical analysis			*Comorbidity:* substance abuse, alcohol abuse *Risk factors:* substance use, younger age, unmarried status, male gender	Substance use disorders diagnosed in 46.3% of AI/AN veterans (23.4% all races). More than 97% of AI/AN substance abuse diagnoses were alcohol related. Higher prevalence of PD, depression, and PTSD in AI/ANs with substance use disorders than in AI/ANs without.
Westermeyer 2006[16]		1624 AI/AN and Hispanic veterans	Community-based survey Statistical analysis		DSM-III-R	*Comorbidity:* pathological gambling	Remission from pathological gambling associated with absence of Axis 1 disorder, especially current PTSD.

Table 2

Single-population studies of PTSD among American Indians and Alaska Natives

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
Boyd-Ball 2006[17]	1997 - 2000	423 adolescents and young adults from a Southwest tribe	Enrolled tribal members in SUPERPFP dataset, age 15-24 years. Survey; descriptive statistics and logistic regression	Parental alcohol use	DSM-IV	*Risk factor:* Parental alcohol use	Severe trauma increased odds of alcohol use disorders (direction of association unclear). Severe traumatic events correlated with parental alcohol use. Severe IPV may have stronger association with alcohol use disorders than severe non-interpersonal trauma, witnessed trauma, or traumatic news.
Brinker 2007[18]		255 male AI/AN and Hispanic veterans with lifetime PTSD in Southwest and North Central region	Community-based sample Descriptive statistics and logistic regression	Combat experience	PCL		Veterans with combat-related PTSD had more severe symptoms, were less likely to have remitted in the previous year, and were less likely to have sought mental health treatment after military duty.
Csordas 2008[19]		84 Navajo adults in the Southwest	Past patients of Navajo Healing Project (10-year ethnographic study of therapeutic process) Ethnography and descriptive statistical analysis of interview data		SCID		Of 78 patients meeting DSM-IV SCID criteria, 7.7% had subthreshold lifetime MD, 29.5% had lifetime MD, 11.5% had subthreshold lifetime PTSD, 23.1% had lifetime PTSD, 5.1% had current PTSD, 5.1% had current other anxiety disorder, 20.5% had lifetime other anxiety disorder, 34.6% had lifetime alcohol use dependence, 9% had lifetime alcohol use abuse.

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
							Lifetime PTSD was 25% for participants affiliated with Native American Church, 19.3% for Traditional, and 25.9% for Christian. 23.1% were free from any lifetime psychiatric stress. 16.1% of men and 23.4% of women reported full PTSD. Lifetime PTSD was 23.5% among married, 9.1% among widowed/separated/divorced (but 45.5% of this group reported subthreshold PTSD), and 31.3% among single.
Dickerson 2000[20]	1999 - 2001	480 AI/AN male veterans from the North Central region of U.S.	AIAN male veterans in a community-based sample Cross-tabulations and odds ratios, logistic regression		Quick-Diagnostic Interview Schedule to determine DSM-III-R diagnosis	*Comorbidity:* Lifetime nicotine dependence *Risk factor:* Lifetime nicotine dependence	Lifetime prevalence of PTSD was 11.9% The highest prevalence of lifetime nicotine dependence was found in those with a lifetime history of affective disorders (61.9%), followed by PTSD (52.6%) Odds of lifetime PTSD were higher among those with lifetime nicotine dependence than among those without.
Dillard 2007[21]	1993 - 1994	591 AI male veterans in the Southwest	AIAN male Vietnam veterans identified through tribal rolls (AIVVP dataset) Retrospective analysis of survey data using descriptive statistics		Mississippi Scale for Combat-Related PTSD and DSM-III-R		CD not associated with increased odds of high war zone stress. CD associated with higher combat-related PTSD symptoms among veterans independent of war zone stress level.

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
			and linear regression				
Ducci 2008[22]		291 AI women in the Southwest	Recruited from a Southwest tribe, age 21. Descriptive statistics and frequencies.		DSM-III-R	*Risk factor:* Low activity allele in the MAOA locus; CSA	Women who had experienced CSA and were homozygous for the low activity allele in the MAOA locus had higher prevalence of alcoholism and ASPD, and more ASPD symptoms, than abused women homozygous for the high activity allele. No relationship between alcoholism and ASPD and MAOA-LRP genotype in non-abused women.
Duran 2004[23]	1999	234 AI/AN women, Albuquerque, NM	Between 18 and 45 years, received medical care from IHS facilities Statistical analysis of interview data		CIDI	*Risk factor:* Child abuse and neglect	76.5% reported some type of CAN; more than 40% reported severe CAN. Severity of CAN was associated with lifetime diagnosis of psychiatric disorders. Severe CAN was most strongly associated with lifetime PTSD. Lifetime PTSD prevalence was 3.9.
Duran 2009[24]	1999	234 AI women, Albuquerque, NM	Between 18 and 45 years, received medical care from IHS facilities; fluent in English Statistical analysis of interview data		CIDI	*Comorbidities:* Severe IPV, high debt *Risk factors:* Severe IPV, high debt, family history of alcohol use	Unadjusted prevalence ratios for severe physical and sexual abuse were significant for anxiety, PTSD, mood, and any mental disorder. Women with severe IPV were five times more likely to have PTSD than women without IPV .

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
Evans-Campbell 2006[25]	2000 - 2003	112 adult AI/AN women, New York City	Enrolled tribal member living in NYC from an AI/AN community center, then random sample. Survey, descriptive statistics and logistic regression	IPV		*Comorbidities:* Depression, dysphoria, risky sexual behaviors *Risk factors:* Interpersonal violence	Over 65% experienced IPV (28% childhood physical abuse, 48% rape, 40% domestic violence, 40% multiple victimization). History of IPV associated with depression, dysphoria, help-seeking, and high HIV risk sexual behaviors.
Gnanadesikan 2005[26]	1997 - 1999	349 young AI adults in the Northern Plains	Ages 15-24, members of a Northern Plains tribe, previous participation in a community-based study Logistic regression		CIDI	*Risk factors:* Sexual trauma; experiencing 6 or more traumas	42 (12% of those who experienced a traumatic event) met criteria for lifetime PTSD.
Kramer 2009[27]	2002 - 2003	Nationwide sample: 4338 female AI/AN veterans; 1518 female AI/AN nonveterans	Women among all IHS beneficiaries who were veterans or used VHA for health care Secondary data analysis; descriptive	Combat experience			Medical needs of female AI/AN veterans were similar to other veterans. Most frequent diagnoses for outpatient were similar to general population of female vets: hypertension, depression, and PTSD. 82 of 804 veteran dual users receiving attention for PTSD; 26 of 1518 nonveteran dual users.
Laudenslager 2009[28]		66 AI/AN men and women in the Southwest	Drawn from previous large-scale study Descriptive statistics		CIDI	*Comorbidity:* Higher cortisol levels	Women with lifetime PTSD had sig higher mean cortisol levels throughout the day than women without PTSD. No significant association in men. No influence from alcohol use.

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
Manson 1996[29]		One 45-year-old AI man in Arizona	Case study	Combat experience, bereavement after death of father	Medical diagnosis	*Comorbidity:* Alcohol dependence *Risk factors:* Perhaps family history of alcoholism, combat-related trauma, alcohol dependence, history of childhood physical abuse, and bereavement.	In interviewee's view, his combat experience in Vietnam and his failure to participate in the cultural grieving process after his father's death upset his physical, mental, emotional, and spiritual health. Identifying with his culture and participating in tribal ceremonies and Native veteran support group and Native American Church improved his outcome.
Robin 1997[30]	1991 - 1995	247 AI/AN adults	Age 21 years, eligible for enrollment in a Southwestern tribe Descriptive statistics and logistic regression	Physical assault, combat experience, multiple traumatic events	SCID and DSM-III-R	*Risk factors:* For lifetime PTSD, women: physical assault; men: history of combat, more than 10 traumatic events	Prevalence of lifetime PTSD was 21.9% 81.4% had experienced at least one traumatic event. Prevalence of lifetime PTSD and exposure to traumatic events was higher than in general U.S. population.
Robin 1998[31]		104 members of a Southwestern tribe	Age 21 years, eligible for enrollment in a Southwestern tribe Bivariate analysis; logistic regression	For women: forced sex	DSM-III-R	*Risk factors:* IPV for both genders and forced sex for women	Men and women reported high prevalence of lifetime (91%) and recent (31%) IPV. For women, forced sex was only significant predictor of lifetime affective disorders and lifetime PTSD.
Saylors 2006[32]	1999 -2002	283 AI/AN women in Oakland and San Francisco, CA	Native women receiving residential and outpatient services for substance abuse and mental illness	Possibly CSA		*Comorbidities:* Perhaps substance abuse; other mental health disorders *Risk factors:* Perhaps CSA;	89% had been emotionally abused in their lifetime. 84% had been physically abused in lifetime. 67% had been sexually abused in their lifetime. 39% had

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
			Descriptive analysis of structured interviews in three stages over one year			physical abuse, sexual abuse, forced sex, alcohol abuse	experienced forced sex. 96.7% who were sexually abused were AIso physically abused. 78.4% who were physically abused reported being AIso sexually abused. 94.7% of those who were physically abused were AIso emotionally abused. 95.8% of those who were sexually abused were AIso emotionally abused. 55.6% reported CSA. 75% reported adult violence. 84% of those who were sexually abused sought mental health services; 56% sought substance abuse services. Any type of abuse, 40% had dual mental health and substance abuse diagnosis. 88.3% used alcohol to intoxication during their lifetime. 78% said Native identity was important to them; 100% at 12-month follow-up.
Sawchuck 2005[33]		1414 AI adults in the Northern Plains	Northern Plains AIs living on or within 20 miles of their reservation; ages 18-57 years Descriptive statistics and logistic regression			*Comorbidity:* CVD	Prevalence of lifetime PTSD was 15%. CVD was more commonly reported by those with PTSD than those without (12% v. 5%). PTSD was significantly associated with CVD after controlling for traditional CVD

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
							risk factors and MD.
Shore 2004[34]		One AI man in the Southwest Case study		Combat experience	Medical diagnosis	*Comorbidities:* PTSD, Alcohol dependence	Drinking, contradictory views about PTSD, stigma related to PTSD, and limited access to resources impeded treatment. Telehealth clinic helped facilitate treatment, course, and outcome.
Shore 2009[35]	1993 - 1994	305 male Vietnam veterans from a Northern Plains tribe	Population-based sample, then clinical interview of subsample from larger survey Chi-square tests; presentation of qualitative materiAIs	Combat experience	Mississippi Scale for Combat-Related PTSD	*Comorbiditiy:* Nightmares *Risk factors:* Combat experience	Combat-related PTSD group had a mean PTSD symptom count of 12.5, higher than the mean symptom count for the non-combat related PTSD group (9.3), and higher than the trauma/no PTSD group. 100% of those who reported experiencing violence reported experiencing nightmares.
Villanueva 2003[36]	1994 - 1996	Nearly 70% of Hopi Vietnam veterans living on the Hopi reservation during study period.	Vietnam veteran living on Hopi reservation during study period Ethnography and survey		Mississippi Scale for Combat-Related PTSD; Minnesota Multiphasic Personality Inventory -PK Scale; SCID		Hopi veterans had PTSD prevalence nearly triple any other tribal or ethnic group. Hopi men who had been initiated into the highest order of Hopi secret religious societies had the lowest scores on any measure of PTSD. Suggests that variables such as levels of spirituality may be more important when predicting PTSD than race or ethnicity.

Author-Year	Time Frame	Sample Size & Population	Criteria & Methods	Inciting Events	Diagnostic measure	Comorbidities & Risk Factors	Major Findings
Westermeyer 2009[37]	1991 - 2001	Male and female AI/AN veterans in Albuquerque, NM, and Minneapolis, MN	AI veterans in Albuquerque and Minneapolis using 1990 census. Chi-square tests and binary logistic regression.	Combat experience	PCL; DSM-III-R	*Comorbidities:* Tobacco dependence, antisocial personality disorders, pathological gambling. *Risk factor:* Male gender	Women were younger, had more education, than men. Men were more likely to be in combat than women, but no difference for lifetime exposure to criterion A trauma. No difference between genders in alcohol use. Men more likely to use drugs (i.e., cannabis). No gender differences for comorbidities. Men had more PTSD symptoms than women.

Table 3

Descriptive characteristics of studies by sample type

	Population-based (*n = 15*)	Community-based (*n = 7*)	Clinic-based (*n = 8*)	Convenience (*n = 7*)
Risk factors for PTSD	Exposure to violence and atrocities, combat experience, substance abuse, existing psychiatric disorder, CSA, adult physical or sexual abuse; parental depression, alcoholism, or violence; education beyond high school	Lifetime nicotine dependence, sexual trauma, experiencing 6 or more traumas, combat experience (for men), low family support, participation in clean-up activities, and a decline in subsistence activities after the 1989 Exxon Valdez oil spill	Minority status, substance abuse, younger age, unmarried status, combat experience (for men), CAN, severe IPV, high debt, family history of alcohol abuse, interpersonal violence.	Minority status, interpersonal violence, child abuse, family history of alcoholism, combat experience, alcohol dependence, bereavement, IPV and physical assault (for women), having experienced more than 10 traumatic events (for men).
Conditions comorbid with PTSD	Higher cortisol levels in women, cardiovascular disease, nightmares, substance abuse, bodily pain	Depressive symptoms, pathological gambling, lifetime nicotine dependence, ASPD	Substance abuse, alcohol abuse, other mental health disorders	Depression, dysphoria, risky sexual behavior, alcohol dependence, general health problems
Treatment for PTSD	Remission from nicotine dependence, remission from substance abuse, traditional Native spiritual practices, traditional Native healers	Remission from pathological gambling	Use of traditional healers recommended for some cases	Traditional Native spiritual practices, traditional Native healers