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## A systematic review of trauma and substance use in American Indian and Alaska Native individuals: Incorporating cultural considerations

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### Abstract

**Introduction:** Disproportionate rates of psychiatric disorders, like substance use and posttraumatic stress disorders, (SUD and PTSD) exist among American Indian and Alaska Native (AI/AN) individuals. This review examines substance use and trauma in existing AI/AN literature and utilizes an AI/AN specific model to culturally inform the relationship between these factors and provide recommendations for future research.

**Methods:** We searched three databases through April 2021 for peer reviewed articles that examined substance use and trauma in AI/AN individuals.

**Results:** The search identified 289 articles and of those, 42 were eligible for inclusion, including 36 quantitative and 6 qualitative studies. Rates of lifetime trauma exposure varied from 21%–98% and were correlated with increased rates of SUDs. A dose response of traumatic events also increased the likelihood of a SUD among reservation-based AI populations. Factors from the Indigenist Stress Coping model included cultural buffers such as traditional healing and cultural identity, which aided in recovery from SUD and trauma, and social stressors like boarding school attendance, discrimination, and historical loss.

**Conclusions:** SUD and trauma are highly correlated among AI/AN individuals though rates of PTSD are lower than might be expected suggesting resilience. However, this pattern may not be consistent across all AI/AN groups and further research is needed to better explain the existing relationship of SUD and PTSD and relevant historical and cultural factors. Further research is needed to culturally tailor, implement, and validate PTSD and SUD assessments and treatments to ameliorate these health inequities.

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## 1. Introduction

For American Indian and Alaska Native (AI/AN) people, a range of historical and political factors related to colonization have had a devastating intergenerational impact on AI/AN communities and have led to significant health disparities for Native people [1], [2]). Disproportionate rates of psychiatric disorders, like substance use disorders (SUD) and posttraumatic stress disorder (PTSD), exist among AI/AN individuals. In a national survey, Emerson and colleagues [3] found that 20.2% of AI/AN adults surveyed had past year alcohol use disorder (AUD) compared to 14.2% of Non-Hispanic White (NHW) adults, while 22.9% of AI/AN adults had lifetime PTSD compared to 11.7 % of NHW adults. In the same study, comorbid AUD and PTSD occurred in 6.5% of AIAN adults and 2.4% of NHW adults. However, while rates of PTSD are higher among AI/AN, an important consideration is the higher rate of trauma exposure experienced across the lifetime for AI/AN people when compared to other racial/ethnic groups in the U.S. population [4]–[6]. Approximately 80% of AI adults in one community had a traumatic exposure, but the prevalence of PTSD was only observed in 21%, a 4:1 ratio that was comparable to non-AI populations [7] Similarly, AI/AN individuals are more likely to experience an Adverse Childhood Experience (ACE) than NHWs [8], [9] and report the greatest number, average, and variety of ACEs than any other racial/group [10]. Addressing these health inequities requires a culturally relevant approach to understanding the context of PTSD and SUD and the relationship between these two disorders among AI/AN people.

Conceptualizations of mental health development are essential for understanding AI/AN culturally specific models of diagnosis and treatment for SUD and PTSD. Among the general population, existing theories in the literature attempt to explain the relationship between SUD and PTSD but may be problematic for AI/AN populations due to their reliance solely on individual factors, rather than contextual, sociocultural, and historical factors. These theories of shared vulnerability, susceptibility, high-risk, and self-medication hypotheses [11]–[15] have largely been developed and tested in NHW populations and therefore may have limited applicability to diverse groups of individuals with trauma and substance use histories.

The Indigenist Stress Coping Model [16] incorporates protective and risk factors specific for AI/AN communities and individuals and recognizes the unique stressors and coping skills applicable within AI/AN cultures. Stressors in the model may include discrimination, historical loss and trauma, and individual trauma factors. Cultural buffers such as community, cultural identity, spirituality, and enculturation are conceptualized as protective against the development of mental health disorders and directly aid in coping with stressors, whether at the individual or community level. The Indigenist Stress Coping Model can provide a framework for conceptualizing protective and risk factors for understanding the relationship between substance use and trauma for AI/AN individuals. The Indigenist Stress Coping Model provides a more holistic approach that may better illuminate culturally relevant treatment recommendations for AI/AN individuals.

### 1.3 Present Review

This systematic review of quantitative and qualitative literature on trauma and substance use in American Indian and Alaska Native (AI/AN) individuals utilized both Western and Indigenous science perspectives. We planned to examine the relationship between trauma exposure or trauma symptoms and substance use in AI/AN samples and assess clinical implications for treating substance misuse and trauma in AI/AN individuals. Additionally, we evaluated the Indigenist Stress Coping model as a model for incorporating AI/AN culturally specific risk and protective factors in the development, diagnosis, and treatment of trauma and substance use. Further, gaps in the current literature and future directions for research are provided.

## 2. Methods

### 2.1 Search Strategy and Study Eligibility

Following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) [17] process, the literature search for articles examining substance use and trauma in AI/AN populations was completed between November 2020 to April 2021. Search terms included the following combinations: ('American Indian' OR 'Alaska Native' OR 'Native American' OR 'Indigenous') AND ('alcohol' OR 'drug use' OR 'substance use') AND ('PTSD' OR 'trauma symptoms' OR 'trauma exposure' OR "posttraumatic stress"). Electronic databases including PubMed, University of New Mexico Native Health Database, and PsychInfo were searched from earliest year available to April 2021. Manual searches of Google Scholar and ResearchGate were completed based on authors of articles identified in the systematic search. Google Scholar citation alerts were used to identify recently published manuscripts that had not yet been assigned search terms, using the key words "American Indian substance use trauma" and "Alaska Native substance use trauma." Additionally, reference lists of relevant publications were reviewed to identify eligible articles not identified in our initial search.

Inclusion criteria included peer-reviewed articles in English, that presented either qualitative or quantitative data assessing substance use and trauma in an AI/AN sample. Exclusion criteria included non-peer reviewed publications, editorials, commentaries, letters to the editor; book chapters; non-AI/AN sample; no report of substance use, SUD, trauma exposure, symptoms or diagnosis of PTSD. Given the immense diversity of Indigenous peoples across the globe, this review is focused specifically on AI/AN populations within the United States.

### 2.2. Methodological Quality

The methodological quality of studies was assessed using the Mixed Methods Appraisal Tool (MMAT)[18].The MMAT includes five categories of study design: qualitative, quantitative randomized controlled trials, quantitative non-randomized trials, quantitative descriptive, and mixed methods resulting in an overall score for each study between 1 and 5. The appraisal criteria include three options: 'Yes' (criterion is met), 'No' (criterion is not met), and 'Can't tell' (not enough information to assess the criterion). While the original

authors discourage a calculation or cutoff score for quality, a score of 1 indicates only one criterion is met and a score of 5 indicates all five quality criteria are met by the study.

### 2.3 Data Extraction

In line with Indigenous research methodologies [19], [20] and previous reviews incorporating Indigenous ways of knowing [21]–[23], data extraction in this review included culturally specific factors framed by the Indigenist Stress Coping Model. This process included using qualitative literature to highlight Indigenous voices without critiquing Indigenous knowledge or cultural ways. This is important because it may be more in line with the AI/AN value of including community knowledge without discrediting differences between Western and Indigenous knowledge. For both article types, this included study details (authors, year, title), sample size, population demographics, clinical implications, and information to assess the methodological rigor. Quantitative study extraction categories were tracked in a spreadsheet and included: substance use assessment, trauma inciting events, trauma assessment, cultural assessment, use of traditional healing, fit to Indigenist Stress Coping model, and relationship between substance use and trauma. Qualitative study extraction categories included: thematic content explaining relationship between substance use and trauma, cultural themes, and use of community engaged research methods.

### 2.4 Definitions

For the purpose of this review the term trauma is conceptualized as exposure to traumatic experiences, trauma symptoms, or posttraumatic stress disorder. This review covered individually experienced trauma of AI/AN individuals, not necessarily collective or racial trauma such as historical trauma, as those were coded as part of the Indigenist Stress Coping Model. Measures for trauma exposure in this study included trauma experience checklists such as: Childhood Trauma Questionnaire [24], Life Events Checklist for DSM-V [25], and self-reported intimate partner violence. One measure was used for assessing trauma symptoms, the Trauma Symptom Inventory (TSI) [26]. Additionally, studies were coded for PTSD using the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V) [27], or earlier versions of the DSM. Substance use in this review included alcohol and other scheduled drugs including xx?. Studies that assessed nicotine or tobacco use were also included.

Risk and protective factors in the development of mental health diagnoses like substance use and PTSD were coded. As theorized by Walters and colleagues [16], cultural buffers or culturally specific protective factors include identity attitudes, enculturation, spirituality, and traditional healing. Social stressors may include experiencing racism and discrimination, a history of personal or parental attendance at boarding school, and historical or generational trauma. Thus, specific social stressors and cultural buffers were coded to highlight the importance of culturally specific factors in AI/AN presentations of substance use and trauma.

### 3. Results

Results presented cover the description of the types of articles reviewed, measurement of substance use and trauma, risk of bias of the studies reviewed, relationship between substance use and trauma, support for the Indigenist-Stress Coping model, and treatment factors.

#### 3.1 Search Results

Results of the search and reasons for exclusion are presented in Figure 1. The search identified 289 articles from the three databases; after removing duplicates, 275 articles remained. The final 42 articles were separated into quantitative (n=36) and qualitative studies (n=6) for data extraction.

Demographics of quantitative studies are presented in Table 1 and were diverse in type including both reservation and urban based AI/ANs, veteran and civilian populations, as well as AI/AN youth and adults. Urban based AI/AN individuals were included in 22% (n=8) of studies, while reservation or near reservation-based AI/ANs made up 47% (n=17) of included articles. While many studies use the terminology AI/AN, only two articles specifically included Alaska Native individuals. Populations included 9 clinical samples, 5 veteran samples, and 7 articles contained AI/AN youth in the study sample. Of note, one project, the American Indian Service Utilization, Psychiatric Epidemiology, Risk and Protective Factors Project (AI-SUPERPPF), produced the datasets that made up approximately 20% (n=8) of quantitative articles. AI-SUPERPPF was a population-based study of two culturally distinct AI reservation communities (Northern Plains and Southwest tribal communities) [28]. Additionally, two studies came from the HONOR project, a multi-site, cross-sectional study on health among two-spirit AI/AN people [29].

Among the six qualitative studies, all were adult samples, two studies recruited urban AI/ANs, one study recruited AN adults, and three studies recruited reservation-based AI individuals. Three studies used focus groups and three studies used individual interviews to gather data from participants. For five of these articles, substance use was the primary focus of inquiry.

#### 3.2 Measurement of Substance Use

These articles varied in their focus on types of substances and measurement of substance use. Among quantitative articles, ten (27%) focused only on alcohol use and three only addressed tobacco use. Most articles examined any type of substance use, including alcohol, marijuana, sedatives, tranquilizers, stimulants, analgesics, inhalants, cocaine, hallucinogens (inclusive of peyote), and heroin (n=23, 63%). None examined drug use (besides tobacco) only. Over 60% of articles measured substance use by assessing for a substance use disorder (n=22) using various methods to diagnose individuals with either lifetime or past year SUD (see Table 1). Few articles looked at the quantity and frequency of alcohol use, though some included self-reported alcohol use related to heavy drinking (which varied across studies, but generally was 6 or more drinks on one occasion) or number of drinking days. None looked at the quantity or frequency of drug use. No studies commented on the validity or

appropriateness of these substance use measures for use among AI/AN populations. Among qualitative articles, alcohol use was the most discussed substance. However, Skewes & Blume [30], reported that methamphetamine use was the most pressing substance use in their collaborating communities over the last fifteen years, followed by alcohol use.

### 3.3 Measurement of Trauma

Among quantitative articles, various assessments were used to either diagnose PTSD or measure exposure to traumatic events and are reported in Table 1. Nearly 70% of studies (n=25) utilized PTSD diagnosis as a metric of trauma. Individuals from the AI-SUPERPRP data were diagnosed with PTSD using the University of Michigan version of the Composite International Diagnostic Interview (CIDI)[28]. However, the CIDI was modified for the AI-SUPERPRP project with guidance from community informants to increase the cultural acceptability of resulting diagnoses [28]. Cultural adaptations of assessments, like the CIDI, may more accurately diagnose PTSD among AI/AN compared to standard assessments that have not been validated or adapted to the population. Eight other studies used the CIDI to diagnose PTSD (see Table 1). Two studies utilized the Quick Diagnostic Interview Schedule (Q-DIS) to assess for PTSD in AI veteran samples, though the authors noted this measure has not been validated in the population and may be an underestimate of PTSD [31].

Overall, there was variability in PTSD screening tools and assessment measures utilized, and psychometric validation was limited to two studies reporting reliability in the specific samples utilized. Seven studies utilized seven different screening measures to assess for PTSD diagnosis or the presence of subthreshold PTSD symptomology (see Table 1). None of these measures have demonstrated validity in an AI/AN sample. However, the PTSD Symptoms Scale Self-Report Version showed strong reliability in a sample of rural AI/AN women [32] and Bresleau's PTSD Short Screening Scale had good reliability among AI/AN adolescents [33].

To measure childhood experiences of trauma, five studies utilized the Childhood Trauma Questionnaire (CTQ). Two studies utilized items pulled from the Adverse Childhood Experiences (ACEs) survey. The CTQ has not been statistically validated in AI/AN samples, though Koss and colleagues [34] did report good reliability of the measure in the sample of seven different AI tribes across the United States. Brockie et al., [33] reported fair to good reliability of the CTQ among AI/AN adolescents.

### 3.4 Risk of Bias

Quantitative coding results from the MMAT are presented in Table 1 and qualitative coding results are in Table 2. Among the 36 quantitative studies, 31 were classified as descriptive studies, 2 were RCTs, and 3 were non-randomized studies. All studies scored at least 2 out of the 5 criteria for risk of bias, and all but one study scored a 3 or higher. A lower score is indicative of higher risk of bias using the MMAT. The most common items coded as missed criteria were the appropriate measures and risk of nonresponse bias among quantitative descriptive studies. With respect to qualitative studies, 5 of these six met criteria for 4 items. Overall, most studies included in the review were at low risk for bias.



### 3.5 Relationship Between Substance Use and Trauma

Across study types, for AI/AN individuals and their communities, an association between substance use and trauma was evidenced as outlined in the sections below. Overall, these constructs seem to be co-occurring at high rates across AI/AN individuals at the community level and a common co-occurrence for AI/AN people seeking mental health treatment.

**3.5.1 Rates of Trauma & PTSD Across Settings.**—High prevalence of trauma exposure was reported across clinical samples. Among those entering substance use treatment, there were high rates of lifetime trauma, but a smaller portion were diagnosed with PTSD. Rates of trauma exposure varied between 25.9% of men and 74% of women [35], 84% of women [36] in SUD treatment. Another clinical sample study reported 98% of AI youth experienced a criterion A event, yet only 10.3% met criteria for a diagnosis of PTSD and 13.8% met for subthreshold PTSD [37]. Among AN adults in residential SUD treatment, over 75% of those had a traumatic experience in their lifetime[38]. Additionally, trauma exposure occurred in wide ranges among community samples, 21% of AI youth 15 to 24 from the AI-SUPERPPF sample [39], 44% of urban AI/AN women [40], 61% of AI youth in grades 8 to 11 living on a reservation [41], and 92% of men and 94% of women from a large reservation sample [42].

Across clinical samples, alcohol was the most reported substance used, but polysubstance use was also prevalent. Among youth in SUD treatment, the average number of substances used was 5 and over 80% of those had SUD along with an additional mental health diagnosis. Additionally, youth with a diagnosis of PTSD were more likely to have a stimulant use disorder than other types of SUD [37].

**3.5.2 Dose Response.**—Across multiple studies, the number of traumatic events reported by AI/AN individuals was linked to an increased likelihood of a SUD. Among reservation-based AI youth, an increasing number of traumatic events corresponded with an increased risk for having AUD [39]. Utilizing the same sample but only adults, Libby and colleagues [43] observed this dose response across the lifespan, where AI adults who reported childhood abuse and another traumatic event in adulthood were at increased odds of having an SUD compared to other community members who reported a history of childhood abuse. This dose response pattern also emerged using the CTQ, where reservation-based AI youth with a high number (three to six) of ACEs were 4.6 times more likely to use multiple types of substances than peers with less than three ACEs [33].

Gender differences in the dose response of trauma were reported by Koss et al. [34] where AI reservation-based men who reported three adverse experiences were 4 times more likely to have AUD and women with four or more adverse experiences were 7 times more likely to have AUD. Evidence supporting the dose response of traumatic events related to SUD appears linked to childhood trauma or childhood trauma in combination with trauma experienced later in life among AI people living on reservations.

In contrast, one study with urban AI gay, lesbian, bisexual, transgender, or two-spirit (GLBTT-S) individuals did not find a dose response of childhood trauma linked to a past year AUD [44]. These findings are inconsistent with other research with AI/ANs

that supports the association of multiple traumatic events and substance use, suggesting differential impact of multiple traumatic events for these multiple minority individuals in urban AI/AN communities.

When compared to a non-AI sample, no disparities emerged between the dose response pattern of ACEs and alcohol misuse among AI and non-AI adults surveyed in South Dakota, despite AI individuals being more likely to report more ACEs than non-AI peers [9]. Higher rates of traumatic experiences, but similar rates of alcohol misuse and other mental health concerns may suggest other unmeasured factors for AI adults may act as a buffer between higher rates of traumatic exposures but comparable rates of substance use and other mental health concerns with non-AI adults.

**3.5.3 Trauma Types Linked to Substance Use and Comorbidity.**—Type of trauma exposure was correlated with increased rates of substance use and sometimes the type of substance used. Brockie and colleagues [33] found that intimate partner violence most strongly increased the odds of polysubstance use in AI/AN youth. Additionally, in a sample of AI/AN youth in SUD treatment, sexual trauma was most predictive of a PTSD diagnosis [37]. Sexual trauma was also the strongest predictor of binge drinking in the last 6 months for urban AI/AN women [40] compared to other types of criterion A events (e.g. natural disaster, physically attacked, witnessed death). However, even though sexual trauma may be a strong predictor of SUD among AI/AN people, these trauma types may not be consistent across community groups or gender. For example, among the AI-SUPERPPF sample, childhood physical sexual abuse increased the likelihood of AUD, but only in the Northern Plain AI individuals and not those from the Southwest [43]. Koss et al. [34] found that combined sexual and physical abuse increased likelihood of AUD for AI men, while the combination of sexual assault history and boarding school attendance increased odds for AUD in AI women. Additionally, AI adults who experienced physical injury or assault were 3.5 times more likely to have AUD and 4 times more likely to have a cannabis or stimulant use disorder [42].

**3.5.4 Substance Use Context of Trauma.**—For AI/AN youth, when traumatic events occurred, substance use was often involved. Traumatic events for participants often occurred at a young age, most commonly when the perpetrator of violence was under the influence of alcohol or other drugs [45]–[47]. The context of parental substance use also appears to increase likelihood of childhood trauma; those who reported a parent used alcohol while growing up were more likely to experience multiple traumas in their lifetime than those whose parents did not use alcohol [39].

**3.5.5 Self-Medication Hypothesis.**—Qualitative findings supported self-medication theory—the use of substances to cope with symptoms from traumatic experiences. Focus group participants endorsed using substances to cope after experiencing physical or sexual abuse in childhood [48], [49]. Additionally, one study found that childhood sexual assault (CSA) moderated the relationship between depression and a history of alcohol treatment, where those with a history of both CSA and alcohol treatment had higher depression scores. Easton and colleagues [50] interpreted this as supportive of the self-medication theory.



The self-medication hypothesis may be relevant for some AI/AN people who are exposed to trauma at a young age prior to initiation of substance use. Whitesell and colleagues [51] found that individuals who had no symptoms of substance use before a traumatic event were more than twice as likely to report substance use symptoms after a trauma than those who did not experience a traumatic event. While this is not evidence of causality, it implies that adversities often precede substance use. Additionally, those who experienced a traumatic event earlier in their lifetime were more likely to initiate substance use at an earlier age [52].

### 3.6 Support for Indigenist Stress Coping Model

The Indigenist Stress Coping Model provided a lens to inform additional culturally specific stressors and buffers that may be relevant to AI/AN individuals with concerns around trauma and substance use.

**3.6.1 Cultural Buffers.**—Among qualitative literature, cultural protective factors, especially spirituality and AI traditional forms of healing, provided healing from traumatic experiences for AI/AN individuals[45]. Cultural and spiritual practices were important in participants' lives and recovery, as individuals reported enhanced cultural identity, feeling buffered against current and historical stressors, and increased wellness [47]. AI mothers reported that cultural involvement was a tool for recovery from their own substance misuse and trauma. Cultural activities and ceremonies (e.g. Canoe Journey) modeled sobriety and wellness and connected young people to Elders and the community broadly [49]. Certain ceremonies and traditional healing also encourage or require sobriety for participation [45], [53]. Additionally, for AN individuals, a traditional lifestyle including involvement in subsistence activity was cited as a protective factor and supportive of leading a sober lifestyle [46].

Cultural buffers were also represented among quantitative literature. As reported by Holm [54], 64% of surveyed AI Vietnam War veterans believed that tribal ceremonies and traditional practices provided healing. Of those who reported recovering from substance use problems associated with PTSD, 41% of AI veterans with alcohol related problems and 83% of those with drug related problems reported attending ceremonies. Additionally, 65.7% of those with sleep disturbance and 78.5% of those experiencing flashbacks reported that attending ceremonies resolved these symptoms related to their PTSD [54]. Further, AI women (32%) and AI men (23% ) in residential SUD treatment utilized traditional healing within the last year [35].

**3.6.2 Social Stressors Specific to AI People.**—Additional social level stressors were found across quantitative studies including historical loss, boarding school attendance, and discrimination and related to poorer mental health. Among those who attended boarding school, AI youth were more likely to experience a traumatic event [39] and AI women, but not men, were more likely to have AUD [34]. Additionally, among urban based two-spirit AI/AN adults, those who attended boarding school were more likely to have AUD, and if they were raised by someone who also attended boarding school, they were more likely to report PTSD symptoms [55]. However, for AI women recruited from primary care, boarding school attendance was not related to PTSD or SUD [56]. For AI adolescents ages

15 to 24, increased historical loss symptoms were related to higher rates of substance use and more PTSD symptoms. In the same sample, those who reported more experiences of discrimination, as assessed by an AI specific discrimination measure [57], were more likely to use substances and have PTSD [33].

**3.6.3 Intergenerational Patterns.**—Multiple studies highlighted the generational patterns of trauma and substance use happening within AI/AN families and communities. Myhra and Wieling [48] found that among families with generational substance use, boarding school attendance in their family was associated with substance use and traumatic experiences. Further, AI women living on a rural reservation noted that their own exposure to violence and substance use was cyclical in nature, both for their own patterns but also passed down through their families [49]. Among AI/AN individuals, parental use of alcohol while growing up was correlated with an increased rate of SUD in two diverse reservation communities [43].

### 3.7 Treatment Factors

**3.7.2 Cultural Assessment and Integration.**—Gathering information about cultural identity during assessment may highlight particular strengths or areas of interest for AI/AN clients entering SUD or PTSD treatment. Commonly reported was the desire for cultural practices and traditional healing to be integrated into treatment options for AI/AN clients (e.g., [45], [48], [49], [53]). Additionally, among AI/AN patients enrolled in aftercare following hospitalization from physical trauma, 33% requested traditional healing while in the hospital and more than half (60%) chose to participate in traditional Native practices following release from the hospital as a way to facilitate the healing process [58].

Beyond individual experiences of trauma, historical trauma was noted as a prevalent factor among AI reservation communities that may hinder healing [30], [45]. Additionally, personal or parental attendance of boarding school predicted substance use outcomes and trauma exposure [34], [39], [55].

**3.7.4 Systemic Barriers.**—Individual level interventions can help identify individual solutions to trauma and substance misuse, but there is a larger system of racism and oppression impacting AI/AN people and communities that hinders recovery and wellness. Under-resourced communities may also need additional infrastructure to support AI/AN youth specifically. Community members noted boredom is often cited as a reason for early experimentation with substances, and there is a need for greater access to prosocial and culturally rich experiences for AI/AN youth and families [48]. Long-lasting and holistic solutions to issues around trauma and substances are needed to improve the health of AI/AN individuals and their communities.

When interviewing tribal members in Montana, Skewes & Blume [30] found that healing or recovery requires intervention on multiple levels; specifically, healing and recovery requires intervention at individual, community, family, socioeconomic, and systems levels. Findings also highlighted that provider availability in AI/AN communities, many of which are in underserved or rural locations, may be an additional barrier to care for AI/AN individuals with comorbid SUD and PTSD. Legha et al. [38] reported the use of telepsychiatry

to increase provider availability at a tribally operated, urban based residential SUD treatment clinic serving AN adults with complex treatment needs, particularly medication management.

**3.7.5 Existing Treatments for Trauma and Substance Use.**—One existing evidence-based treatment, Cognitive Processing Therapy (CPT), was culturally adapted and tested by Pearson and colleagues [32] to target PTSD symptoms, substance use, and HIV sexual risk behaviors in AI women. The culturally adapted CPT included removal of the trauma narrative from CPT, tailoring concepts and handouts to include culturally specific examples and content. Results of the randomized controlled trial found that CPT was effective at reducing alcohol use and PTSD symptoms. While just one example of a treatment for comorbid trauma and substance use concerns, there are substantive takeaways from this work. In particular, the culturally adapted CPT showed promise for use with rural dwelling AI/AN women presenting to treatment exhibiting PTSD symptoms and wanting to reduce alcohol use. However, only 30% of participants completed the treatment, and 20% dropped out after baseline without receiving any treatment. Strategies to improve treatment engagement for AI/AN clients are warranted given high rates of attrition in treatment.

## 4. Discussion

### 4.1 Indigenous Framework to Contextualize Main Findings

Contextualizing the main findings of this review utilizing an Indigenous methodological framework included the use of a culturally specific model to guide findings, the Indigenist Stress Coping model [16], and honoring the personal and experiential aspects of Indigenous traditional knowledge [19]–[21] by including both quantitative and qualitative literature. Utilizing this lens to examine the relationship between trauma and substance use brings light to often overlooked cultural and community factors that may be important for AI/AN individuals with co-occurring trauma and substance use.

**4.1.1 Relationship Between Trauma and Substance Use.**—Qualitative and quantitative findings each supported connections between trauma and substance use but in different ways. Across qualitative literature included in this review, AI/AN community members highlighted that the relationship between trauma and substance use was cyclical, where substance use led to traumatic events and trauma led to substance use among AI/AN individuals. A positive correlation was seen across cross-sectional data that pointed to a dose response of traumatic events that increased the likelihood for SUDs among reservation-based AI individuals [34], [39], [43], but not in a sample of urban based AI/ANs [44]. In fact, most of AI/AN individuals who presented to SUD treatment had a trauma history, though a smaller proportion met criteria for PTSD. Further, those with a history of childhood trauma and revictimization as an adult were at an increased risk for SUD [43]. Presentation to specialty SUD treatment may be more common for AI/AN individuals, given that no studies included clinical PTSD treatment alone. Additionally, some studies supported the self-medication hypothesis to explain the relationship between traumatic events and substance use in some AI individuals. Given the high rates of trauma across the lifespan and high rates of multiple traumatic events, these studies highlight the importance of treatment

options that can address multiple lifetime traumatic events rather than just one traumatic event. Overall, the present review highlighted that the context of traumatic events and substance use are intertwined for many AI/AN individuals, at the community level and at clinical levels.

**4.1.2 Indigenist Stress Coping Model.**—Evidence to support the Indigenist Stress Coping Model was limited by the sparse measurement of culturally specific buffers and stressors in existing quantitative data. However, qualitative literature indicated that cultural buffers like spirituality, cultural involvement, and access to traditional healing provided support for those moving towards recovery from trauma and substance use related distress. Qualitative research also supported the model in that additional stressors increase the likelihood of negative mental health outcomes (like PTSD and SUD) including proximal factors like discrimination and distal factors such as historical and cultural loss tied to boarding schools and colonialism broadly. From quantitative literature, boarding school attendance impacted both alcohol use disorders and PTSD. However, only one study demonstrated a statistical relationship between historical loss and higher PTSD symptoms and SUD [39]. This same pattern also emerged among those who endorsed higher rates of discrimination. Generally, qualitative literature provided more context for the applicability of the Indigenist Stress Coping model to trauma and substance use. However, quantitative work shows some growing evidence to support additional stressors such as historical trauma and discrimination, that illuminate additional risk to the relationship between substance use and trauma for AI/AN individuals and their communities.

**4.1.3 Cultural Considerations in Diagnosis & Treatment.**—The use of culturally relevant and appropriate instruments to measure trauma and comorbidity is essential for research and treatment with AI/AN individuals. This is particularly relevant for diagnosing PTSD, given that Manson and colleagues [59] found that twice the rate of PTSD was diagnosed by using culturally appropriate instruments compared to national estimates at the time for PTSD in AI/AN people aged 15 to 54. From this review, the Composite International Diagnostic Interview [28] emerged as the only culturally validated measure utilized to diagnose PTSD and SUD. When tailoring the CIDI, Beals and colleagues [28] utilized community stakeholders to provide feedback. They reported changes to screening language like adding cultural idioms of distress and breaking down questions into simpler language. Additionally, assessment of culturally specific stressors may contribute to case conceptualization when working with AI/AN clients [60]. Cultural considerations in measurement are vital for more holistic models that can elucidate understanding of risk and protective factors regarding high rates of trauma and substance use among AI/AN communities.

Furthermore, ongoing systemic stressors and historical stressors were notable in the literature for impacting diagnosis, treatment, and traditional healing for AI/AN individuals across studies. Cultural stressors measured among studies in this review included personal and parental boarding school attendance, discrimination, historical loss and trauma, and intergenerational patterns of trauma and substance use. Relevant protective factors included traditional healing and access to cultural knowledge and spirituality. While these factors

may aid the healing process for AI/AN with trauma and substance use concerns, these types of cultural support should come from community not from non-Native providers or organizations. Additionally, not all AI/AN individuals may come from backgrounds where these types of traditions and cultural ceremonies or activities are accessible or appropriate. This accentuates the importance that cultural identity or acculturation be assessed, and client's desire or willingness to engage or re-engage in culturally specific traditions of healing.

## 4.2 Limitations of the Research

Studies included in this review are primarily from American Indian samples. Given the lack of representation in the literature and the immense diversity of tribes nationally and in Alaska alone, Alaska Native (AN) people and communities, while grouped together racially with AIs, may have a different presentation. Culturally and historically, AI tribes and AN tribes vary widely, and patterns and observations made in research with AI communities may have limited applicability to AN people and communities. Additionally, individual studies often come from one or a few tribal communities and findings may not be generalizable given the immense diversity of AI/AN tribes and communities.

Some literature examining substance use and trauma are found within the context of articles where the primary aim is often another construct or diagnosis, like conduct disorder [61], depression [50] mood disorders [62], HIV risk [63], [64] or a combination of multiple different diagnoses [33], [65], [66]. In addition, the search terms required both substance use and trauma, so we cannot speak to individuals who have only one or the other. While this provides valuable information on contextual factors that play a role in the relationship between substance use and trauma, these findings limit the generalizability of these patterns beyond these specific diagnoses.

Methodological problems involving design and measurement hampered confidence in results. Most studies in this review were cross-sectional, limiting interpretation of these findings about the relationship between trauma and substance use in AI/AN people. Given the cross-sectional nature of these quantitative data, no conclusions can be made about a causal relationship between trauma and substance use. The estimates informing this relationship also may not represent a true prevalence of the extent of substance use and trauma in AI/AN communities. Importantly, few articles reported the reliability of trauma or substance use assessments in studies and none tested their validity, so it is unclear how well diagnostic measures performed in the AI/AN samples represented in this review. Psychometric testing of assessment measures are needed to help ensure accurate measurement and interpretation among AI/AN people. Given the stigma around constructs like substance misuse and trauma, these constructs are potentially underestimated in AI/AN individuals and their communities.

## 4.3 Future Directions

**4.3.1 Community Engaged Research.**—Given the sensitive and potentially stigmatizing nature of substance use and trauma research topics, utilizing community-based approaches, like Indigenous research methods [19], [20] or Community Based Participatory

Research [67] may increase community buy in and individual willingness to participate in research on these health inequities, as well as help ensure appropriate questions, methods, and conclusions. In this review, Skewes & Blume [30], noted that AI community members prefaced knowledge transmission with history and context of their community to researchers to better inform current situations related to trauma and substance use. Research methodologies that utilize community knowledge and build on these resources may better inform culturally relevant constructs in co-occurring PTSD and SUD and illuminate potential treatment targets. Additionally, research with communities should be inclusive of rural, reservation, and urban communities, given that each of these communities have differential access to resources (whether considering healthcare, economic, cultural, or other sources) and thus have different needs when it comes to SUD and PTSD prevention and treatment options. Most research has been focused on AI peoples and reservation-based communities, and additional research is needed on AN and urban communities given the immense diversity of tribes and rurality.

**4.3.2 Prevention.**—Efforts to prevent or intervene with AI/AN youth was a strong theme across qualitative studies given the report of childhood trauma as a factor in substance misuse and trauma later in life ([46], [49], [53]). Justifications included youth as an impressionable time, especially because age of onset for substance use is younger among AI/AN youth than for youth of other racial/ethnic groups [68], [69]. Additionally, given that parental substance use was associated with trauma exposure, treatment of SUD for parents may be protective for children and future generations. More longitudinal research is needed to better understand predictors and directionality or circularity of trauma and substance misuse. In addition, research on early intervention following traumatic events in childhood is needed to help reduce these substantive health inequities. Screening and education are vital to addressing these traumas that may be occurring in childhood for AI/AN communities and prevention of further trauma or the development of negative health outcomes like SUDs. The role of cultural protective factors revealed among qualitative literature and in community knowledge should also be further developed in research. Including cultural variables as outcomes, mediators, and moderators in quantitative research, not just as covariates, may help illuminate the relevance of these constructs.

**4.3.3. Intervention Development.**—Among AI/AN communities, there is an immense need for culturally relevant and efficacious treatment to address health inequities, including SUD and PTSD. Interventions that target multiple traumatic events and diagnoses may be particularly relevant. Given high levels of trauma exposure from a young age, focusing on coping skills to deal effectively with trauma may be particularly beneficial. Additionally, cultural tailoring of existing treatment modules such as cognitive restructuring and distress tolerance may improve acceptability, engagement, and outcomes. Examples from the literature include cognitive behavior therapy that has been culturally adapted for AI/AN children exposed to trauma [70], dialectical behavior therapy that has been tailored for AI/AN youth with SUD [71], and motivational interviewing and community reinforcement approach with AI adults [72]. Further, in addition to traditional healing, culturally grounded interventions should be developed to demonstrate cultural and community strengths in processes of healing and broaden accessibility of treatment options for individuals.



Individual level interventions are needed for AI/AN people and should include attention to social and cultural factors. Furthermore, the intergenerational patterns of substance misuse and collective trauma may also require broader community level interventions to promote healing and wellness. Finally, efforts to implement tailored evidenced-based treatments in AI/AN community settings are necessary to ameliorate mental health inequities for AI/AN people.

## 5. Conclusion

For AI/AN individuals, there is a significant association between trauma exposure early in life and even more if additionally in later life and higher rates of SUDs. However, this pattern may not be consistent across reservation and urban-based AI/AN people. Further research is needed to better explain the existing association of SUD and PTSD. Utilizing the Indigenist Stress Coping model to incorporate culturally specific risk and protective factors in this relationship found that boarding school attendance, discrimination, and historical loss increased risk while cultural involvement and access to traditional healing buffered the risk and aided in recovery. Further research is needed to validate, culturally tailor, and implement PTSD and SUD assessment tools and treatments to more effectively address these health inequities.

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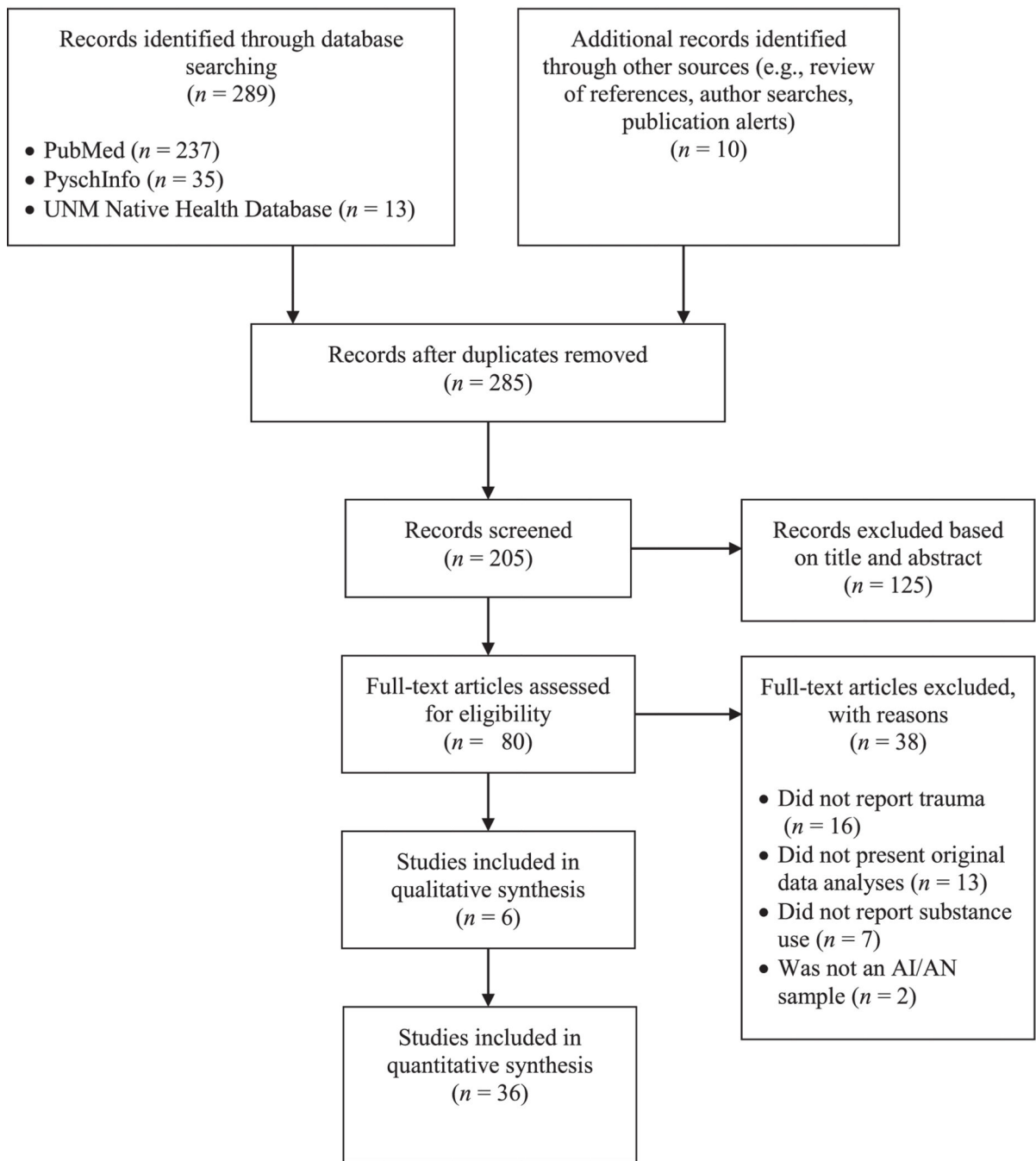
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**Figure 1.**  
Flow diagram of records identified, screened, and included.

Characteristics of quantitative studies included in the present review

Table 1.

Reference	Sample Size	Sex/Gender	Age, M=Mean (SD)	Population	How Substance Use Measured	How Trauma Measured	Relationship Between Trauma and Substance Use	MMAT Score
Boyd-Ball et al., 2006 [39]	432	46% Male	M=20 (2), range = 15–24	From AI-SUPERPPF, community sample, AI youth living on or within 20 miles of 2 Northern Plains tribal communities or 1 Southwest tribe	DSM-IV diagnosis criteria of alcohol abuse or dependence using Composite International Diagnostic Interview (CIDI)	Trauma exposure & PTSD diagnosis assessed by Composite International Diagnostic Interview (CIDI)	Cross-sectional; AI youth exposed to traumatic events are more likely to have AUD. Those with multiple exposures are at increased risk, indicating a dose response effect of traumatic events.	5 *****
Brockie et al., 2015 [33]	288	51% Female	M=19.25 (2.9), range = 15–19	Community sample, AI tribal members, primarily from a Plain reservation, living within 1 hour of IHS service unit	Alcohol, marijuana, inhalants, methamphetamine, and prescription drugs, questions adapted from Youth Risk Behavior Survey	Adverse Childhood Experiences measured by Childhood Trauma Questionnaire; PTSD symptoms measured by Breslau's 7 item PTSD Short Screening Scale for DSM-IV PTSD	Cross-sectional; intimate partner violence most strongly increased odds of PTSD symptoms and polysubstance use. Those with higher ACE score were 4.17 times more likely to engage in polysubstance use.	5 *****
De Ravello et al., 2008 [73]	36	100% female	M=36, range = 20–60	AI/AN women, incarcerated in NM state prison	Self-reported alcohol or other drug use including, age of first use, daily use, under the influence at time of offense	Trauma exposure, modified measure of Adverse Childhood Experiences	Cross-sectional; no statistically significant relationship between ACE scores and first drinking or using drugs before age 15, no other substance use measures reported in relationship with ACE score	3 ***
Deters et al., 2006 [37]	89	Male = 58 (65%)	M=15.6, range = 13–18	Clinical sample, AI/AN youth at tribally operated residential substance use treatment program	DSM-IV-TR diagnoses using the Substance Abuse Module of the Composite International Diagnostic Interview	DSM-IV-TR diagnosis of PTSD assessed using Diagnostic Interview Schedule for Children, Youth Version	Cross-sectional; AI youth in SUD treatment with a diagnosis of PTSD were more likely to have a stimulant use disorder	5 *****
Dickerson et al., 2009 [31]	480	100% male	M=47.6 (12.6)	AI veterans, living in North Central U.S.	DSM-IV lifetime and past year diagnosis of nicotine dependence, assessed by Quick-Diagnostic Interview Schedule (Q-DIS)	DSM-IV lifetime PTSD diagnosis assessed by Q-DIS	Cross-sectional; AI Veterans with lifetime PTSD were 4.68 times more likely to have lifetime nicotine dependence. No significant relationship between nicotine dependence in the last year and lifetime PTSD.	5 *****
Duran et al., 2004 [56]	234	100% Female	M=29.8, range = 18–45	AI women receiving services at Indian Health Service in Albuquerque, NM	DSM-IV diagnosis criteria of substance abuse or dependence, assessed by CIDI	PTSD diagnosis, assessed by CIDI; Childhood maltreatment assessed by CTQ	Cross-sectional; women who experienced childhood severe maltreatment were 2.3x more likely to have SUD, and 3.9x more likely to have PTSD. Women who experience childhood low to	4 ****

Reference	Sample Size	Sex/Gender	Age, M=Mean (SD)	Population	How Substance Use Measured	How Trauma Measured	Relationship Between Trauma and Substance Use	MMAT Score
Easton et al., 2019 [50]	479	39.9% male	M = 47.39 (13.54)	Community sample, AI adults in the Midwest, project examined cancer screening literacy	Alcohol use, self-reported history of alcohol treatment in lifetime	Single item, self-reported childhood sexual abuse	moderate maltreatment were 1.9x more likely to have SUD Cross-sectional, childhood sexual assault moderated the relationship between depression and alcohol treatment history, where those with a history of CSA and alcohol treatment had higher depression	2 **
Ehlers et al., 2013 [42]	309	Female = 174, Male = 135	M=32.24 (14.81)	AI adults, recruited from 7 reservations, community sample	Alcohol, nicotine, stimulant, and marijuana dependence assessed by SemiStructured Assessment for the Genetics of Alcoholism (SSAGA)	PTSD diagnosis, assessed by the stressful life events and response to stressful-life-events scale	Cross-sectional; all four substance dependence types (alcohol, nicotine, marijuana, stimulants) were significantly comorbid with PTSD. Trauma, PTSD diagnosis, and substance dependence reportedly emerged together in early adulthood. Assaultive trauma mediated relationship between substance dependence and PTSD diagnosis.	4 ****
Emerson et al., 2017 [3]	511 AI/AN, compared to 19, 194 NHW Pe	AI/AN (301 CO OO\ 58.9%) women = 10639 55.4%)	AI/AN median age = 46, NHW median age = 49	National wide adult community sample, NERSARC-III	Alcohol use, measured by Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-5)	PTSD diagnosis measured by AUDADIS-5	Cross-sectional; comorbid lifetime PTSD and past year AUD was 6.5% for AIAN vs 2.4% for NHW; AIANs with AUD are more likely to have PTSD than those who do not have AUD.	4 ****
Evans-Campbell et al., 2012 [55]	447	227 males (50.8%), 185 females (41.4%), 35 transgender (7.8%)	M=39 (11)	From HONOR, AI/AN adults, community sample, self-identified as gay, lesbian, bisexual, transgender, or two-spirit (GLBTTS) or engaged in same-sex sexual behaviors in the past 12 months, living in one of 7 urban areas	Alcohol, cocaine, club drugs, marijuana, methamphetamine, or narcotics use, substance use dependence assessed by the MINI	PTSD diagnosis, assessed by Posttraumatic Diagnostic Scale (PDS), PTSD symptoms determined by endorsing 1 or more symptoms on PSD but did not meet diagnostic criteria	Cross-sectional; those who attended boarding school were more likely to have AUD, average age sent to boarding school was age 10	5 ****
Gutierrez et al., 1994 [35]	58	Female = 28	Female M = 28.6, male M = 2.4	Clinical sample, residential SUD treatment	Self-reported alcohol and other drug use	Self-reported lifetime physical, emotional, or sexual abuse	Cross-sectional; 74.1% of AI females in residential SUD treatment reported a lifetime history of physical abuse compared to 25.9% of AI males. 51.9% of AI females reported lifetime sexual abuse compared to 3.9% of AI men. 100% of people used alcohol, 100% of men reported both alcohol and marijuana use.	3 ****
Holm, 1994 [54]	170	100% male	Most were born between 1946 and 1954,	AI veterans who served in the Vietnam War, 57% were born on a reservation.	Self-reported alcohol or other drug use	Self-reported PTSD	Cross-sectional; 81.2% reported having alcohol problems associated with their PTSD, 31.8% reported having drug problems associated with their PTSD	2 **

Reference	Sample Size	Sex/Gender	Age, M=Mean (SD)	Population	How Substance Use Measured	How Trauma Measured	Relationship Between Trauma and Substance Use	MMAT Score
Howard et al., 1996 [74]	AI/AN N = 2883	98% male	For non-SUD M = 59.5 (13.98), for SUD M = 47.7 (12.6)	42% currently reported living in urban area Clinical sample, AI/AN veterans discharged from VA hospitals nationally in fiscal year 1993	Substance dependence or abuse, ICD 9 codes pulled from medical records	PTSD diagnosis, icd-9 codes pulled from medical records	Higher prevalence of PTSD among AI/AN veterans with a substance use diagnosis than those who do not have a SUD (10.6% vs 3.9%). Higher prevalence of AUD than other types of diagnosis	4 ****
Jones et al., 1997 [41]	109	Female = 54	M = 15.6 (1.1)	Community sample, AI youth in grades 8 to 11 going to school on a Plains reservation	DSM-III diagnosis of substance abuse or dependence, using DISC-2	DSM-III diagnosis of PTSD, using DISC-2	Cross-sectional, AI youth who experienced traumatic events had higher rates of SUD (24% compared to 9%). Of AI youth who were exposed to trauma, those reporting PTSD symptoms were more likely to have SID (33% compared to 9% - only 2 people though so this finding should be interpreted with caution).	3 ***
Koss et al., 2003 [34]	1660	59% female, 41% male	For men, M=40.5, range, 20 to 81. For women, M = 39.5, range, 20 to 88.	Community sample, AI participants came from 7 tribes across the U.S.	DSM-IV diagnosis of alcohol abuse or dependence, assessed by the Alcohol Use Disorders and Associated Disabilities Interview Schedule (AUDADIS)	Childhood Trauma Questionnaire	Combined physical and sexual abuse significantly increased the odds of alcohol dependence for men, whereas sexual abuse and boarding school attendance were significant for women. Dose response of trauma showed that men who reported 3 categories of adverse experiences were 4 times more likely to develop AUD and women with four or more adverse experiences were 7 times more likely to have alcohol dependence.	4 ****
Kunitz et al., 1998 [61]	1,086 total, 352 cases, 732 controls	total 32.3% female, cases 42.0% female	Range = 21 – 65	Reservation clinical sample, compared to community sample. Clinical sample from an alcohol treatment program	DSM-III diagnosis of substance abuse or dependence, using Diagnostic Interview Schedule	Reported childhood abuse in clinical interview	Cross-sectional; AI adults, both community and clinical samples, were more likely to have alcohol dependence with a history of physical or sexual abuse before age 15.	2 **
Laudenslager et al., 2009 [75]	59	71% Female	Mean = 44 (10), range = 22 to 61	Subset of AI-SUPERPPF, from Northern Plains reservation communities, those with lifetime PTSD age and gender matched with someone without PTSD	Alcohol use, self-reported number of drinking days and number of drinks per drinking day	PTSD diagnosis, assessed by CIDI	Cross-sectional, alcohol consumption did not differ by PTSD diagnosis	3 ***
Legha et al., 2020 [38]	206	58% female	Case group M = 38.6 (11.5); Control group	Urban based AN adults, clinical sample of patients in	Substance use diagnoses, DSM-IV criteria, obtained from medical record	PTSD diagnosis obtained from medical record, trauma history	Cross sectional, comparison; among those in residential substance use treatment, patients receiving tele psychiatric services at a tribally	5 *****

Reference	Sample Size	Sex/Gender	Age, M=Mean (SD)	Population	How Substance Use Measured	How Trauma Measured	Relationship Between Trauma and Substance Use	MMAT Score
Libby et al., 2004 [43]	3084	54% female	M = 38.7 (10.9) Range = 15 – 54	residential alcohol treatment Community sample, AI community members from Northern Plains and the Southwest reservations, AI-SUPERPPF	DSM-IV criteria for lifetime substance abuse or dependence	defined by history of verbal, physical or sexual trauma/abuse Childhood physical or sexual abuse before age of 13, adult victimization	operated facility were more likely to have comorbid PTSD. Tele psychiatric patients typically in need of a higher level of care, specifically medication management Cross-sectional; AI people with childhood abuse history and being revictimized as an adult increased the likelihood of developing SUD. Childhood physical and sexual abuse increased odds of alcohol use in NP community members but not in SW.	4 ****
Libby et al., 2005 [62]	3084	54% female	Range = 15 – 54	Community sample, AI community members from Northern Plains and the Southwest reservations, AI-SUPERPPF	DSM-IV criteria for lifetime substance abuse or dependence	PTSD diagnosis, assessed by CIDI	Cross-sectional; those with lifetime alcohol or drug disorder were more likely to have PTSD. There were gender differences in women more likely to have PTSD. There were also cultural differences, where the odds ratio was stronger for those from the Northern Plains than those from the SW	4 ****
Mylant & Mann, 2008 [76]	43	100% female	M = 17.5	AI females, teen mothers, recruited from northern plains, getting services at IHS or tribal women's health program	Substance use assessed by Adolescent Substance Abuse Subtle Screening InventoryDA2 (SASSI)	Intimate partner violence, current sexual trauma, maternal trauma symptoms assessed by Trauma Symptom Inventory (TSI), Abuse	Cross-sectional; after services for teen pregnancy, AI teens with trauma symptoms were more likely to be at risk for substance use Assessment Screening (AAS)	4 ****
Pearson et al., 2015 [63]	129	100% female	Range = 15 – 35	Community sample, AI women from a rural reservation who participated in survey on women's wellness, sexually active in last month	Alcohol use, self-reported binge drinking in last 12 months	PTSD or threshold PTSD assessed by 17-item PTSD Symptom Severity Interview (PSS-I)	Cross-sectional; no statistically significant relationship between binge drinking and PTSD.PTSD moderated relationship between binge drinking and HIV risk behavior, where women with PTSD who binge drink have more unprotected sex than women who do not have PTSD and binge drink.	4 ****
Pearson et al., 2019 [32]	73	100% female	21.9% were 18-29, 28.8% were 30 to 39, 31.5% were 40 to 49, 17.8% were 50 to 60	AI women recruited from a rural reservation, with PTSD symptoms, alcohol or drug use in last year, self-reported sexual activity in last 12 months	Alcohol and illicit drug use, assessed by frequency of use, Alcohol Short Inventory of Problems, DSM-IV substance abuse or dependence diagnosis assessed	PTSD diagnosis and subthreshold PTSD symptoms, assessed by 17-item PTSD Symptom Scale Self-Report version	Culturally adapted CPT was effective at reducing PTSD symptoms and frequency of alcohol use. Between CPT and waitlist control, no significant differences in alcohol related consequences or illicit drug use frequency. Treatment dose was significant, where each additional CPT session associated with a reduction in PTSD symptoms and reduction in alcohol related problems.	3 ***

Reference	Sample Size	Sex/Gender	Age, M=Mean (SD)	Population	How Substance Use Measured	How Trauma Measured	Relationship Between Trauma and Substance Use	MMAT Score
Robin et al., 1997 [7]	582	56.5% female	M = 36.6, range = 21 – 91	Community sample, AI adults from a Southwestern reservation	Substance use disorder assessed by SCID	Traumatic Events booklet, PTSD diagnosis assessed by SCID	Cross-sectional; AI women with PTSD were 2.84 times more likely to have a drug use disorder than AI women without PTSD. No significant relationship between SUD and PTSD for AI men.	5 *****
Sawchuk et al., 2012 [65]	2774	Not reported	Not reported	Community sample, AI community members from Northern Plains and the Southwest reservations, AI-SUPERPPF	Self-reported lifetime smokeless tobacco use	PTSD diagnosis measured by CIDI	Cross-sectional; AI adults with PTSD from the Northern Plains were more likely to use smokeless tobacco than those without PTSD. However, relationship not significant after controlling for alcohol use disorder. No significant relationship between PTSD and smokeless tobacco use for AI adults from the Southwest.	5 *****
Sawchuk et al., 2016 [66]	2774	Not reported	Not reported	Community sample, AI community members from Northern Plains and the Southwest reservations, AI-SUPER-PPF	Self-reported lifetime cigarette use, smoking at least 100 cigarettes/20 packs in lifetime	PTSD diagnosis measured by CIDI	Cross-sectional; AI adults from the Southwest with PTSD were 1.7 times more likely to smoke cigarettes than those without PTSD. No significant relationship between smoking and PTSD for AI adults from the Northern Plains. Smoking was not associated with any psychiatric diagnosis in either tribe after controlling for AUD.	5 *****
Saylor & Daliparthi, 2006 [36]	334	100% women	not reported	Clinical Sample, urban AI/AN operated residential and outpatient SUD treatment	Self-reported alcohol use, lifetime and 30 day, not analyzed in relation to trauma exposure	Self-reported physical, emotional, and sexual abuse	Cross-sectional; 89% of women entering substance use treatment reported being emotionally abused in lifetime, 84% reported lifetime physical abuse, 67% reported lifetime sexual abuse. Of clients who reported childhood physical abuse, 22% reported alcohol or drugs were involved when violence occurred.	3 ***
Simoni et al., 2004 [64]	155	100% female	Median = 44, SD = 13.32, range – 18 to 87	Community sample, urban, AI women members of AI community center in New York City	Self-reported alcohol and other drug use, any alcohol or other drug use in last 12 months. Binge drinking considered 6 or more drinks on any one occasion.	Self-reported lifetime trauma including sexual assault by partner or non-partner, physical trauma by partner or non-partner	All four lifetime trauma indicators were associated with greater lifetime rates of injection drug use. Women who were sexually assaulted by a non-partner had higher rates of binge drinking in last year. Injection drug use mediated the relationship between non-partner sexual assault and high-risk sex.	4 ****
Tsosie et al., 2011 [58]	30	73.3% male	M = 42.4 (14.8)	AI/AN physically injured patients admitted to level 1 trauma center	Alcohol misuse assessed by Alcohol Use Disorders Identification Test (AUDIT-C)	Post-Traumatic Stress Disorder Checklist-Civilian Version (PCL-C)	Among patients discharged from a trauma center, 20% had PTSD, and 60% scored above a 3 on the AUDIT-C indicative of problematic alcohol use. Among patients in the intervention group of	3 ***



Reference	Sample Size	Sex/Gender	Age, M±Mean (SD)	Population	How Substance Use Measured	How Trauma Measured	Relationship Between Trauma and Substance Use	MMAT Score
Walker et al., 1994 [77]	3087	98.4% male	M = 47.1 (12.2)	Clinical sample, AI veterans discharged from VA hospitals in 1991	Alcohol and other drug dependence diagnosis, ICD-9 codes, pulled from medical records	PTSD diagnosis, ICD-9 codes pulled from medical records	posttrauma collaborative care model, no significant reductions in PTSD or alcohol use were observed compared to control group. AI veterans with a substance use disorder had higher rates of PTSD than AI veterans without a SUD (6.6% vs 2.8%).	5 *****
Walters & Simoni, 1999 [40]	68	100% female	M = 37.29 (13.19), range = 18 – 75	Urban community sample, AI women living in New York	Self-reported alcohol, cocaine powder, crack cocaine, marijuana, inhalants, amphetamines, heroin, ecstasy, hallucinogens, sedatives, and injection drug use in last 6 months	Self-reported lifetime physical or sexual assault	Cross-sectional, AI women who were sexually assaulted by a non-partner was associated with alcohol and other drug use. Substance use mediated the relationship between non-partner sexual assault and HIV	3 ***
Wame et al., 2017 [9]	AI = 516, non-AI = 7078	AI female = 62.84%, non-AI female = 56.92%	AI 18–34 36.63%, AI 35–64 57.62%, AI 65+ = 5.75%; non-AI 18–34 = 29.69%, non-AI 35–64 = 49.94%, AI 65+ = 20.37%	Community sample, AI and non-AI adults living in South Dakota	Alcohol misuse, assessed by Alcohol Use Disorders Identification Test (AUDIT-C), current cigarette smoking, single item self-report	Adverse Childhood Experiences, PTSD diagnosis with the Primary Care PTSD Screen (PC-PTSD)	Those with 6 or more ACEs were more likely than those with no ACEs to have severe alcohol misuse, as measured by the AUDIT-C. They were also more likely to be a current cigarette smoker. There were no significant differences between AI and non-AI in the relationship between ACEs and alcohol misuse and cigarette use.	3 ***
Westermeyer & Cative, 2013 [78]	252	Not reported	Not reported	AI veterans, living in North Central U.S.	Substance use disorder diagnosis based on DSM-III-R criteria	Lifetime DSM-III-R PTSD diagnosis, using Quick Diagnostic Interview Schedule (Q-DIS)	Cross-sectional; AI veterans with PTSD had a lower rate of SUD compared to non-PTSD group.	4 *****
Whitesell et al., 2007 [51]	3084	54.3% female	Range = 15 – 54	Community sample, AI community members from Northern Plains and the Southwest reservations, AI-SUPERPPF	SUD symptom onset, DSM-IV criteria for lifetime substance abuse or dependence	PTSD diagnosis measured by CIDI	Prior experiences of trauma associated with risk of onset of substance use. Those who reported proximal adversity were more than twice as likely to experience the onset of substance use as were those who did not report proximal adversity at the same age.	4 *****
Whitesell et al., 2009 [52]	2924	54.6% female	Range = 18 – 54	Community sample, AI adults from Northern Plains and the Southwest reservations, AI-SUPERPPF (adult sample only)	DSM-IV criteria for lifetime substance abuse or dependence, age of first use of substances	PTSD diagnosis measured by CIDI	Childhood trauma increased odds of both early substance use initiations and SUD. Adults with three types of childhood traumatic events were at greater risk for SUD than those with one type of childhood trauma.	4 *****

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Reference	Sample Size	Sex/Gender	Age, M=Mean (SD)	Population	How Substance Use Measured	How Trauma Measured	Relationship Between Trauma and Substance Use	MMAT Score
Yuan et al., 2014 [44]	294	Male = 177 (60.2%)	For men, M=37.97 (10.54), range = 20 to 63	From HONOR- AI/AN adults, community sample, self-identified as gay, lesbian, bisexual, transgender, or two-spirit (GLBTTS) or engaged in same-sex sexual behaviors in the past 12 months, living in one of 7 urban areas	Alcohol use, measured by MINI, AUDIT, or single item binge drinking question within last 12 months	Childhood Trauma Questionnaire, Short Form	Cross-sectional: for AI GLBTTS women, experiencing childhood physical neglect and emotional abuse was associated with higher rates of past year binge drinking. No dose response effect between number of childhood exposures and alcohol dependence	4 *****

Table 2.

Characteristics of qualitative studies included the present review.

Reference	Sample Size, Interview Type	Age	Population	Thematic Content on Relationship Between Trauma and Substance Use	Indigenist Stress Coping Model	Representative quotes from participants	MMAT Score
Jervis, 2009 [45]	44, individual interviews	M=38, range=19 to 55	AI adults living on or within 20 miles of the reservation in the Northern Plains, subset of AI-SUPERPPF	Alcohol is a contributor to traumatic experiences as well as cultural loss. Alcohol contributed to physical violence experienced by participants.	Cultural involvement, or reclamation of one's culture can help with coping with traumatic events. Access to cultural healing (though difficult to access due to colonialism) is important to overcoming trauma.	"I do believe that there's people actually getting high and then going in the sweats and staff, man, but that's bad medicine on themselves and their family. You ain't supposed to. You're supposed to have a clear mind, clear conscience, positive thinking. That's the religion."	2 **
Mohatt et al., 2004 [46]	101, individual life history interviews	Not reported	AN adults with a history of AUD or never had a drinking problem	Communities and familial relationships decrease the likelihood of alcohol-related trauma exposure. Half of AN participants who never had a drinking problem reported experiencing significant childhood trauma.	Cultural practices are incongruent with substance use. Community support is facilitated by the collectivistic nature of AN cultures that encourage connectedness to others in the community and supporting others.	"Ellangneq is a Yup'ik concept... Ellangneq is this culturally valued awareness of the consequences of one's individual actions upon the whole. This type of awareness is incompatible with intoxication. Intoxication only reduces awareness and the ability to control oneself and one's own life, thereby engendering potentially negative reciprocal effects on family, community, and others."	5 *****
Myhra, 2011 [53]	13, small focus groups	Range = 23-64	AI people living in Twin Cities, all from tribes in the upper Midwest, all identified with intergenerational transmission of historical trauma	Intergenerational cycle of substance use and trauma, between interviewed grandparents, parents, and children. Participants linked the impact of elders' stories of historical trauma and loss of boarding schools and their own traumatic experiences.	Pride in strength of culture and Elders in the community who have overcome many traumas in lifetime. Spirituality and reconnection to culture and language important in recovery.	"I'm trying to be more traditional than before, now that I'm sober, because I know that traditional ways can't be practiced while you're using; you know it's very disrespectful"	4 *****
Myhra & Wieling, 2014 [48]	20, small focus groups	M, parents = 60, M, adult children = 31	AI/AN adults, living in urban area, at least one family member willing to participate, history of substance use issues	Traumatic events occurred at a young age, often when the perpetrator of violence was under the influence of alcohol. Onset of substance use linked to trauma, drinking in response to sexual assault.	Cultural and spiritual practices buffered experiences of trauma, help with dealing with substance use recovery.	"A lot of these events are what... the secrets are what keeps you sick. Early on when I was a teenager, men taking advantage of me when drunk, just the feeling of it that would make me feel like I wanted to use all the time to not even think about that stuff."	4 *****
Schultz et al., 2018 [49]	32 total, 20 individual interviews, 1 focus group with 12 women	Range = 18-44	AI women living on or near rural reservation, women for whom substance use prevention efforts were a concern	Trauma was the root cause of women's substance use, using to mask the pain of childhood physical and sexual abuse. Reported a cyclical nature to violence and substance use in themselves and in their families or	Traditional healing and cultural involvement is a form of healing. Integration of culture into existing treatment options was a desire of participants.	"I used drugs to mask that pain, because I was so mad. I was so angry." "A lot of the substance abuse comes from... boarding schools... my mother was a boarding school participant. And she didn't learn how to be [a good] mother."	5 *****

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Reference	Sample Size, Interview Type	Age	Population	Thematic Content on Relationship Between Trauma and Substance Use	Indigenist Stress Coping Model	Representative quotes from participants	MMAT Score
Skewes & Blume, 2019 [30]	25, individual interviews	M = 51.68 (14.54), range = 28-79	AI adults, enrolled tribal members from tribes in Montana	Substance use linked to both individual experiences and broader community problems including discrimination, poverty, homelessness, domestic violence, and childhood abuse.	Culture plays a role in identity and healing from SUD and racial trauma, especially spirituality. Substance use is symptomatic of underlying collective trauma stemming from colonialism and racism and perpetuated by ongoing oppression.	<i>"Oppression is the overarching umbrella for all of sickness with drugs and alcohol."</i>	5 *****