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# FAS, Intervention, Prevention, and Cultural Implications

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## Abstract

*This paper reviews the effects of Fetal Alcohol Spectrum Disorder specifically in the Northern Plains Native American communities. Fetal Alcohol Spectrum Disorder (i.e., FASD) produces a large range of mild to severe effects on behavioral, cognitive, and social abilities of those diagnosed with FASD. Diagnosis of FASD and the variability of effects contributes to many factors including timing and dosage of alcohol prenatal exposure, absence or presence of physical features, and maternal disclosure of prenatal alcohol consumption. This paper will examine cultural implications of alcohol use in the Northern Plains communities, prevention and education programs for women of child-bearing age and those who are currently pregnant, and inclusion of cultural practices for treatment. Additionally, this paper will examine current intervention treatments for individuals diagnosed with FAS, and the need for continued research of potential intervention treatments.*

***Keywords:*** fetal alcohol spectrum disorder, cultural implications, education, prevention, treatment

The Importance of Prevention and Education Relating to Fetal Alcohol Spectrum Disorder Among the Plains Native American Population and Current Interventions Used in Treatment and Prevention of Fetal Alcohol Spectrum Disorder.

Fetal alcohol spectrum disorders exhibit mild to severe implications in behavioral, social, and cognitive development, and is the most common preventable disorder in the United States. According to Kvigne et al. (2004), the prevalence of FAS was estimated at 8.5 children per 1000 live births among the Northern Plains Native Americans (p. 635). Copeland et al. (2021) suggest an estimated prevalence of FASD in 2-5% of school age children in the United States (p. 41). "The term FASD, or fetal alcohol spectrum disorders, is used to refer to the larger group of patients who are affected by prenatal alcohol exposure and who may or may not meet diagnostic criteria for FAS. Individuals encompassed under this non-diagnostic umbrella term are those with diagnoses of FAS, partial FAS, or alcohol related neurodevelopmental disorder (ARND), as well as individuals affected by prenatal alcohol exposure who may not have any diagnosis" (Mattson et al., 2011, p. 81-82). Khan et al. (2011) describe FAS as, "the term used to describe growth, mental and physical problems that may occur in an infant when a mother consumes alcohol during pregnancy, whereas FASD is the term used to describe the additional direct and indirect social, physical and emotional effects" (p. 147). According to Denny et al. (2017), individuals possessing a diagnosis of FASD are more likely to receive special education services, exhibit unemployment, and receive disability pensions. Prognosis of individuals diagnosed with FASD varies with the degree of impairment, early diagnosis, and intervention assistance in reducing rates of imprisonment and

substance abuse problems (p. 520). "Annual long-term economic and societal costs associated with FAS and FASD are in the billions" (Khan et al. 2018. p. 147). The estimated cost of care for one individual with FAS is estimated at 2 million dollars, constituting FASD as "a serious health problem in the United States and worldwide" (Kodituwakku & Kodituwakku, 2001, p. 205).

**Diagnosis and Impact of Prenatal Alcohol Exposure on Development**

Diagnosis of FASD proves difficult for physicians. Several factors contribute to a diagnosis of FASD which include physical, behavioral, and cognitive features and deficits, mother self-reporting of prenatal alcohol use, although confirmation of prenatal alcohol use is not required if characteristic findings are present, the use of multidisciplinary teaming, and neuropsychological assessment (Denny et al., 2017). Stigmatization for families and children, inconsistencies in the level of knowledge of the condition and how to identify FAS within the medical profession, and guidelines for diagnosis are often neglected; potentially producing poorer long-term effects for the child and reducing opportunities to access support (Chandrasena et al., 2009, p. 163). Mattson et al. (2011) discuss timing of exposure, identifying the dose and pattern of alcohol consumption correlate with the severity of outcomes fetal exposure to alcohol during different times of development influences the patterns and severity of structural and functional abnormalities, but documentation is often difficult (p. 82). "FASD comprises four distinct categories: fetal alcohol syndrome (FAS), partial fetal alcohol syndrome (PFAS), alcohol-related neurodevelopmental disorder (ARND), and alcohol-related birth defects. Each category is distinguished by the presence or absence of characteristic facial dysmorphology, growth retardation, central nervous system dysfunction, and neurobehavioral abilities" (Denny et. al., 2017. p. 517).

The ideal age for diagnosis of FASD is between 6 months and 3 years because physical features are most prominent during this time, however, behavioral and developmental delays often present later in life (Chandrasena et al., 2009, p. 163). Denny et al. (2017) describes in depth how each category is examined. Facial dysmorphology includes short palpebral fissures, thin border of the upper lip, smooth philtrum, epicanthal fold, flat nasal bridge, upturned nose, and "railroad track" ears. Growth retardation in the 10th percentile or less based on standard height and weight measurements are common. Central nervous system dysfunction includes deficient brain growth, abnormal structure, or abnormal neurophysiology which are documented as head circumference in the 10th percentile or less, nonfebrile seizures with no identifiable cause, and structural brain abnormalities identified using magnetic resonance imaging. The parts of the brain found most vulnerable to alcohol exposure during prenatal develop are the basal ganglia and the thalamic nuclei affecting planning, response inhibition, working memory, attention, memory, sensation, perception, and motor planning (Mattson et al. 2011. p. 82-83). Neurobehavioral disabilities include behavioral problems, poor self-regulation, deficits in adaptive skills, and global intellectual ability and cognition deficits, which are measured using standardized testing after age three (p. 517). In a study conducted by Kvigne et al. (2004), the most common central nervous system problems were speech, language, and developmental delays, along with behavioral problems which cause problems with school, communities, and the individual's family.

Mattson et al. (2011) state that neurocognitive findings are most common for individuals with FASD and limits intellectual compacity. Mattson et al. elaborates by stating most individuals diagnosed with FAS are not intellectually disabled; however, many individuals exhibit impaired abilities, and children exhibiting full FAS display an estimated IQ around 70, and an average IQ score of 80 for individuals with nondysmorphic characteristics (2011). "Educational difficulties are typically ascribed to deficits in it's functioning in areas such as planning, schedule-adherence, and organization rather than to low IQ scores" (Cleversey, 2018, p. 1157). Additionally, "those with average or above-average IQ are still described by teachers and parents as lacking social and moral skills, and there is an increased possibility of criminality" (Chandrasena et al., 2009, p. 164).

"Alcohol exposed children make more errors and complete fewer categories compared to controls on the Wisconsin Card Sorting Test (WCST), a task that requires abstract reasoning and the ability to shift cognitive strategies in response to feedback" (Mattson et al. 2011. p. 83). Other areas of executive function compromised due to prenatal alcohol exposure are fluency, especially letter fluency, response inhibition, and ability to hold and manipulate information in the working memory (Mattson et al. 2011. p. 83-84). In regards to learning and memory, children with FAS exhibit deficits in learning and recalling of verbal information and exhibit difficulty recalling words on free and recognition recall opportunities during testing. The children recalled more information

than control groups during immediate and delayed recall involving stories, but also recounted more inaccurate information (Mattson et al. 2011. p. 84).

Group studies involving children with FAS reveal deficits in language. Some of these impairments include word comprehension, naming ability, articulation, grammatical and semantic abilities, pragmatics and expressive and receptive skills. Discrepancies in ability are potentially due to varying levels of alcohol exposure during development (Mattson et al. 2011. p. 85-86). In addition to difficulties with reading and spelling tasks, individuals with FASD potentially possess difficulties in mathematics even after controlling for IQ, but little is known about the specific nature of these deficits (Mattson et al. 2011. p. 88). Neuroimaging studies support findings that show abnormalities in the regions of the left and right parietal regions and medial frontal gyrus, which is thought as important for mathematical processing (Mattson et al. 2011. p. 88).

Visual-spatial ability deficits are potentially found with children diagnosed with FASD due to abnormal development of hippocampal structure and functioning due to prenatal alcohol exposure (Mattson et al. 2011. p. 86). Studies conducted found impairments in simple-visual spatial construction requiring individuals to copy a drawing of geometric pictures. While children were able to remember features of a drawing, they were unable to display appropriate spacing and other details while performing spatial construction tasks and exhibit more difficulty with local features compared to global features (Mattson et al. 2011. p. 86). "These observations, combined with reports simple visual-spatial construction deficits suggest that alcohol-exposed individuals may demonstrate a form of constructional apraxia" (Mattson et al. 2011. p. 86). Prenatal alcohol exposure effects the developing brain in the cerebellum and basal ganglia associated with motor functioning and the peripheral motor nerve damage is potentially affected (Mattson et al. 2011. p. 87).

Recent studies suggest heavy levels of alcohol exposure exhibit both fine and gross motor impairment and developmental delays, other findings suggest postural instability, dysfunctional force regulation, atypical gait, weak grasp, poor sensory processing and sensorimotor performance, delayed motor reaction timing, impaired fine motor speed and coordination, increase motor timing variability, poor hand/eye coordination, poor bimanual coordination, atypical trajectories in goal-directed arm movements, and impaired oculomotor control in children with FASD (Mattson et al. 2011. p. 87). Not every child with FASD will exhibit the previous impairments or deficits, environmental factors, dosage and timing of exposure, and early intervention, and growing out of developmental delays potentially impact motor impairments. "Skeletal malformations of the hands and feet and delayed skeletal maturity are evident in these individuals and may contribute to poor performance on motor tasks" (Mattson et al. 2011. p. 87).

Socially, "findings suggest that in social interactions, children with FASD struggle to balance linguistic and social-cognitive task demands in order to produce contextually integrated discourse. They provide insufficient organization and information for listener in narratives and, according to caregiver reports, fail to consider the perspective of the listener during the interaction" (Mattson et al. 2011. p. 86). Mattson et al. (2011) suggest more than 60% of children with FASD exhibit deficits in attention and exhibit higher rates of ADHD and hyperkinetic disorders described by parent and teacher reports (p. 88). One study suggests children with a history of prenatal alcohol exposure exhibited more significantly parent-reported behavioral and emotional disturbances than control groups and score significantly higher on externalizing behavior domains such as social problems, attention problems, and aggressive behaviors, environmental factors potentially contribute to higher levels of behavioral problems (Mattson et al. 2011. p. 88). Another study considered both pre and postnatal factors. The study found higher levels of prenatal alcohol exposure were "related to increase negative affect and depressive symptoms but that this relationship is mediated by mother-child interactions that occur over time, such as lower levels of emotional support and decreased expressions of positive affect from mothers" (Mattson et al. 2011. p. 88). Caregiver perceptions of educational success correlates to positive self-views of success for individuals diagnosed with FASD promoting a decreased risk of dropping out of school or expulsion (Cleversey et al., 2018, p. 1157). Additionally, a positive home environment associates with improved educational persistence, decreased involvement in the court system, abstinence from drugs and alcohol, and a lower risk of developing secondary disabilities for youth with FASD (Cleversey, 2018, p. 1157).

Long-term social implications for individuals with FASD include a higher risk of suicide, trouble with the law, substance abuse problems, adaptive functioning difficulties in the areas of communication, daily living skills, and socialization and fail to improve with age (Mattson et al. 2011. p. 88). Seventy percent of adolescents diagnosed

with FASD encountered disruptions with their education including suspension, expulsion, or dropping out of school suggesting the need to identify effective services and support to exhibit educational success for students (Cleversey et al., 2018, p. 1157).

"Children with full or incomplete FAS have numerous health, learning, and social need. Community program should be expanded or developed to provide services that will benefit the children throughout their lives. Programs also need to evaluate their current protocols and procedures to determine if there is a better way to provide services for these children. The individual and societal costs of FAS are high" (Kvigne et al. 2004. p. 638). Other concerns regarding individuals with FASD include nutritional deficiencies and increased risk of physical and sexual abuse. "One study showed that more than fifty percent of children with FASD do not consume the recommended dietary allowance of fiber, calcium, or vitamins D, E, and K. It is important to regularly assess the child's height, weight, and body mass index and refer for support when nutritional problems are identified" (Denny et al. 2017. p. 520). Denny et al. (2017), states that 61% percent of children with FAS experience physical or sexual abuse, or witness domestic violence (p. 520). In the study conducted by Kvigne et al., children with FASD spent significantly more time in the hospital than control children due to complications such as otitis media, pneumonia, dehydration, anemia, failure to thrive, neglect, feeding problems, and sexual abuse, and therefore, produce increased costs due to medical care (2004).

### *Intervention Techniques and Research*

Individuals diagnosed with FASD possess an increased risk of attention-deficit/hyperactivity disorder, mood disorders, and oppositional defiant disorder (Denny et al. 2017. p. 520). In addition, individuals diagnosed with FASD potentially possess neurological impairments such as epilepsy, motor skills, and hearing loss, and functional impairment deficits including impulse control, social perception, communication, abstraction, cognition, judgment, and decision-making (Cleversey et al., 2018, p. 1156-1157). Research on FASD shows diversity in learning challenges for students with FASD, and found no consistent pattern in learning difficulties exhibited by students with FASD, suggesting the effect on cognitive functioning or learning abilities is dependent on the severity and nature of impairments (Cleversey et al., 2018, p. 1158). "Furthermore, students with FASD are often ineligible for general services targeted at students with special needs due to the fact that, despite their disability, testing may find their intellectual ability to be within the average range" (Cleversey et al., 2018, p. 1158).

Denny et al. (2017), describe potential treatments for individuals diagnosed with FASD:

There is no cure for FASD. There is a lack of evidence on which to base recommendations of optimal management; therefore, much of the management is based on expert opinion. Treatment consists of providing a medical home for the patient and family, managing comorbid conditions, providing nutritional support, addressing behavioral and emotional problems, arranging referrals for habilitative therapies (therapeutic intervention for those who have never developed a specific skill), coordinating care with a multidisciplinary team, and education parents. Early intervention is necessary to optimize health outcomes. (p. 518)

Research conducted on interventions for students with FASD is limited, however, studies examining interventions and instructional practices to promote positive learning experiences for students with FASD display potentially positive effects on student learning and behavior. Child Friendship Training (i.e., CFT) includes instruction for social behavior, modeling, and rehearsal and performance feedback, finding evidence of improved appropriate social behavior maintained 3 months post intervention (Chandrasena et al., 2009, p. 164). Kodituwakku and Kodituwakku (2001) examined interventions targeting students with FASD worldwide. In the area of literacy, effects of training utilizing literacy or language training (i.e., LLT) compared with a control group, found the LLT group showed gains in syllable manipulation, letter sound knowledge, written letters, word reading and non-word reading, and spelling, however, no parallel improvement was identified in general scholastic skills at posttest, suggesting minimal therapeutic gains in literacy (Kodituwakku & Kodituwakku, 2001, p. 206). Math Learning Experience (i.e., MILE) examined intervention treating numerical skill deficits in children with FASD finding children in the training group showed higher gains compared to the standard psychoeducational group on standardized testing, with therapeutic gains maintaining 6 months post intervention (Kodituwakku & Kodituwakku, 2001, p. 209).

Loomes et al. (2008) state children typically develop strategies for learning beginning with non-organizational strategies such as attention allocation, simple rehearsal with clustering, sorting and categorizing developing later during age development due to age-related increases in memory strategy use such as rehearsal (p. 114). "For atypically developing individuals, however, the intellectual level rather than the chronological age, usually determines the onset of rehearsal" (Loomes et al., 2008, p. 115). Loomes et al. (2008) examined the effects of rehearsal training on 33 children with FASD with an average age of 7.6. Results of the study found the experimental group showed a significant increase in digit span score across three sessions compared with the control group (Loomes et al., 2008, p.121). Durability of rehearsal training relies on extensive practice and over-learning the initial training, and target teaching the individual why the strategy works and when the strategy is most effective to promote generalization (Loomes et al., 2008, p. 121). "For maximum effects of rehearsal training, instruction would be comprehensive, combining all aspects known to make long-term, durable and transferable intervention including motivation, meta-memory and feedback so ultimately children with FASD may demonstrate spontaneous and effective rehearsal" (Loomes et al., 2008, p. 121).

One study examined the use of neurocognitive habilitation and components of the Alert Program to teach children with FASD to "recognize individual deficit areas and to develop strategies to compensate for areas of weaknesses, all while building on existing skills and strengths" (Wells et al., 2012, p. 25). The program model integrated techniques and interventions used in therapy for traumatic brain injury, and the premise of neurocognitive habilitation that difficulties with self-regulation contributes to the day-to-day challenges, including executive functioning deficits, experienced by children with FASD (Wells et all, 2012, p. 15). The study, conducted by Wells et al. (2012), examined 78 children with FASD and randomized the children into treatment and control groups utilizing the neurocognitive habilitation curriculum in a group therapy setting for both the children and parents. Wells et al. (2021) describe the program used in the study as teaching children to learn and identify internal indicators of dysregulation and strategies to improve self-regulation and emotional control, and providing the children opportunities to learn and apply skills in a social interactive, dynamic group setting (p. 32). Parents also received training on FAS, self-regulation techniques, and identification of their child's arousal level (Wells et al. 2012). Results of the study showed significant improvements in the executive and emotional functioning when compared to the control group (Wells et al. 2012, p. 31).

Behavioral interventions such as play therapy, children's friendship training, and specially trained case managers have reasonable evidence of effectiveness, but these resources have variable availability" (Denny et al. 2017, p. 520). Providing support for families with children diagnosed with FASD is important to reduce stress and increase family coherence. Parent-Child Interaction Therapy (i.e., PCIT) potentially assists in reduction of children behavioral problems and parenting stress, however, a study examining PCIT suggests that "PCIT may not be as effective with behavioral problems arising from central nervous system dysfunctions as behavioral problems related to dysfunctional parent-child interaction patterns" (Kodituwakku & Kodituwakku, 2001, p. 211). Kodituwakku and Kodituwakku (2001) examined the Families Moving Forward (i.e., FMF) intervention program, focusing on reducing problem behaviors in children with FASD through attitudes and behaviors of parents through positive support. Kodituwakku and Kodituwakku report the intervention group showed desirable outcomes in the areas of self-efficacy in parents and reduction of problem behaviors in children but did not report lower levels of parenting stress. The FMP programs takes a family systems approach to addressing problem behaviors for children with FASD, and potentially are an essential part of a multi-level intervention program for children with FASD and their families (Kodituwakku & Kodituwakku, 2001, p. 212).

Applied Behavioral Analysis (i.e., ABA) research supports the use of ABA principles such as, self-monitoring, self-recording, noncontingent reinforcement, and functional communication training to reduce various problem behaviors in school and home, reducing stress and improving family functioning (Copeland et al., 2021, p. 42). However, few studies examining ABA-derived interventions include children with FASD but are potentially "important for children with FASD because of their potential to decrease disruptive behaviors and decrease independence on others, which is often a problem for individuals with FASD" (Copeland et al., 2021, p. 42). Copeland et al. (2021) examined self-monitoring intervention effects on task completion behaviors of one child with FASD in a home setting during typical routines, resulting in increased independent completion of chores, homework tasks, and problem behaviors reported by the child's caregiver (p. 49). Implications of the study suggest the use of ABA principles to reduce familial stress within the home, increase independence in activities of daily living, self-monitoring of behaviors, and provide family and educators with effective solutions for managing

problem behaviors in individuals with FASD (Copeland et al., 2021, p. 49). In another study examining self-regulation training through cognitive control therapy (i.e., CCT) facilitating development in cognitive processes from a sensory-motor level to a higher-order control level, found the intervention group in the study showed greater improvements in behavior, but not in cognitive or academic skills, suggesting CCT as a helpful treatment for behavioral issues (Kodituwakku & Kodituwakku, 2001, p. 210).

Regarding the use of pharmacological interventions targeting secondary disabilities such as ADHD suggest "that because individuals with FASD have disturbed brain neurochemistry and alterations in brain structure, namely the corpus callosum, the response to standard psychostimulant medication used for ADHD might be unpredictable" (Chandrasena et al., 2009, p. 164). In a study conducted on children aged 6-11 compared the use of neuroleptics and stimulants paired with Child Friendship Training, reports from parents and teachers stated students using neuroleptics demonstrated improvement on all measures, whereas students prescribed simulants showed no improvement, or worsening outcomes than children not taking stimulation medication (Chandrasena et al., 2009, p. 165). In another study, students with FASD taking methylphenidate for treating ADHA found significant improvements in hyperactivity, but not in daydreaming (Chandrasena et al., 2009, p. 165).

Potential new treatment interventions include the use of choline. Choline "is an essential nutrient present in food products including beef, liver, egg yolks, and soy" (Chandrasena et al., 2009, p. 165). In theory, adding choline to the individual's diet potentially improves learning, memory, cell function, increasing the chemical nerve growth factor, and spatial memory with different timing and dosage, however, reliability of this information remains in question (Chandrasena et al., 2009, p. 165). Data concerning the use of choline remains provisional and needs replication in human studies; as current research examining choline only in animal subjects, with several factors needing assessment prior to human studies and examination of potential adverse effects of choline for use in humans (Chandrasena et al., 2009, p. 165).

"Accordingly, research into services for students with FASD should focus not only on programs targeted at overcoming specific challenges and deficits, but also aim to develop more general services that can address the needs of this student population at large" (Cleversey et al., 2018, p. 1158). Educators of students with FASD must develop new strategies that respond to the learning abilities of individual students, as behavior modifications techniques used by most educators are often not effective for students with FASD in classroom environments (Cleversey et al., 2018, p. 1158). "In order to create suitable management plans, mental health staff need to develop individual profiles or each patient that highlight areas of strength and need, while avoiding a 'one size fits all' approach" (Chandrasena et al., 2009, p. 164).

Adding to the challenges of appropriate and effective interventions for student with FASD, "there has been little progress in service implementation and systematic training of educators targeted at improving educational outcomes for students with FASD" (Cleversey et al., 2018, p. 1158). Educators potentially contribute to the educational success of students diagnosed with FASD through conducting a comprehensive individual learning assessment to gain information needed for delivery of teaching strategies targeted at the specific needs of an individual student, providing a structured and predictable learning environment using visual, environmental, and task structure to facilitate learning experiences for students with FASD, and engaging in professional development opportunities to learn about FASD and educational challenges accompanying the disability (Cleversey et al., 2018, p. 1159-1160). Kodituwakku and Kodituwakku (2011) suggest teachers present information at a slower rate, use concrete examples, employ repetition of information, and breaking down problems with grading difficulty, and teaching each part of a lesson with systematic integration (p. 218).
Kodituwakku and Kodituwakku (2011), provide their suggestion for a comprehensive program for students with FASD:

Understanding individual differences is critically important for evaluation of treatments effects. Therefore, we propose that combining parent support and direct interventions with children constitutes the core of an intervention program developed for this group. Addition of pharmacological agent for controlling mood disturbances or behavioral problems may be necessary in most cases. Dietary supplements and cognition-enhancing agents may also prove to be useful elements in future intervention programs. (p. 218).

**Prevention and Education for Mothers**

Women with children diagnosed with FAS are at a greater risk of raising more children with FAS, and children born later exhibit more profound effects of FAS (Parker et al., 2010, p. 22). "A study involving children of other cultures found that over 40% of children diagnosed with FASD had one or more siblings who also carried a FAS diagnosis" (Parker et al., 2010, p. 22). In a study involving American Indian women in the northern plains region of the United States, prenatal exposure to alcohol is a risk factor for sudden infant death syndrome (i.e., SIDS) (Duncan et al. 2008, p. 22). The study "reported a 6.2-fold increase in SIDS for infants whose mothers drank 3 months prior to and after conception, and an 8.2-fold increase in infants whose mothers binge drank during the first trimester" (Duncan et al. 2008, p. 22).

According to Khan et al. (2013), during the years of 2001-2005, women ages 35-44 and with college degrees possessed the highest percentages of pregnant women reporting any alcohol use despite increase education and delays in age of conception (p. 148). "Although many women abstain from alcohol when they learn they are pregnant, some consume alcohol before they find out. Contraception is an important option offered to women of childbearing age who drink; if they desire pregnancy, abstinence from alcohol should be recommended" (Denny et al. 2017. p. 512). In the study conducted by Khan et al. (2013), self-reported alcohol use appeared higher among Alaskan Native/American Indian women. Drinking was limited to pre-conception and the first trimester, with a decrease in drinking later in pregnancy. Contraception use among the women participating in the study was less than fifty percent. Researchers found significant pre-conception binge drinking is associated with binge drinking during the first trimester, which potentially impacts fetal brain development (p. 149).

**Denny et al. (2017) describes interventions to assist women who become pregnant to abstain from alcohol:**

If alcohol use in pregnancy is identified, physicians should recommend cessation and offer group-based interventions such as alcoholics anonymous and alcohol rehabilitation centers. Brief interventions that include the patient's partner improve FASD-related birth outcomes and should include assessing maternal understanding of healthy pregnancy behaviors, assisting the mother in setting the goal of abstinence from alcohol, planning alternative behaviors for when the temptation to drink arises, and inviting the partner to find methods to support the mother's abstinence from alcohol. (p. 521)

In a study conducted by Parker et al. (2010), American Indians exhibited the highest levels of psychological distress (i.e., PD) compared to other cultural backgrounds contributing to increased mortality rates, considerable emotional suffering and role impairments, increased somatization, and increased and heavy alcohol use (p. 22). Psychological distress is associated with heavy alcohol consumption among women of childbearing age and an increase risk for birth of child with FASD due to unresolved psychological stress potentially contributed by higher rates of female-headed household, large families, lower high school graduation rates, higher instances of living below poverty levels, fair or poor health statuses, and elevated risk of traumatic interpersonal violence among American Indian women (Parker et al., 2010, p. 23).

Treatment, intervention, and prevention programs must tailor to the individual needs of the women. Montag et al. (2012) provide the following suggestions for creating an effective program within Native American communities: Women in different situations will require different approaches. One group of women may be expected to benefit simply from education about the risks of drinking and less effective contraception. Another group, already involved in risky drinking, may respond to motivational interviewing or more intense case management. Very high-risk women may need medical services, counseling, social services, and pharmacological treatment. Comprehensive programs are preferred but may not be possible due to financial constraints. The high loss to follow-up experiences in many of these studies may be ameliorated by addressing the logistic challenges of the participants: transportation, childcare, and so on; community ownership of the project; and increased community awareness and acceptance of the project.

Parker et al. (2010) suggests routine screenings conducted by health professionals for women of childbearing age to identify psychological distress with alcohol and the potential need for active monitoring before and during pregnancy. While it is not fully understood why some women continue to drink during pregnancy, continued studies are needed to assess mothers of children with FASD, or at risk for birthing children with FASD, to create appropriate prevention measures (Lewis et al., 2011, p. 16-17).

### *Historical and Cultural Influences*

Commonalities are shared among Native Americans and other ethnicities regarding alcohol use; however, the uniqueness in terms of history, culture, and societal positions in Native Americans' result in a unique set of circumstances different from any other ethnicity (Szlemko et al., 2006, p. 435). Each of the 500 federally recognized tribes in the United States exhibit unique cultural, historical, and traditional differences, and identification of the prevalence of alcohol use proves difficult to determine (Szlemko et al., 2006, p. 435).

Historical context and trauma potentially impacted the Native American culture throughout previous centuries. An estimated 4.4 to 12.5 million indigenous people lived in the United States before Columbus arrived, and by 1900 only 250,000 indigenous peoples remained (Szlemko et al. 2006, p. 439). Szlemko et al. (2006) report that the Native population recovered to an estimated 4.1 million peoples by the time of the research study. The historical trauma Native populations faced, also known as a soul wound, "reflects a multitude of actions and policies of both the U.S. government and individuals that contributed to the massive decline in the number of Native Americans and the extreme contraction of native lands" (Szlemko et al., 2006, p. 439). Other historical traumas such as forced removals and relocations, mandatory boarding schools, legislating representing transmission of Native American values and cultural knowledge to American cultural values, forced assimilation to European American mainstream culture, and the 1887 Allotment Act potentially contribute to intergenerational trauma and a primary cause of alcoholism that needs continued research (Szlemko et al., 2006, p. 441).

Native Americans exhibit a greater percentage of alcohol-related deaths compared to the general population with 26.5% of Native American male deaths appearing as alcohol related, and 13.2% alcohol related deaths in women (Szlemko et al., 2006, p. 436). Other health issues associated with drinking include a higher risk of hypertension, comorbidity with anxiety and depression disorders, victimization, and sexually transmitted diseases (Szlemko et al., 2006, p. 438). "Acculturation, or the degree to which a Native American identifies with his or her tribal culture compared with Western society, is also related to alcohol use" (Szlemko et al. 2006, p. 443). Tribal elders view many of today's problems due to a loss of traditional beliefs and values, and ethnic shame leads to increased risk of drug abuse with centuries of forced assimilation contributing to a sense of acculturation stress leading to alcohol abuse (Szlemko et al., 2006, p. 444). community, unique in that it is a tribally-run program, and the success shows the potential to be used in other interested populations to target risky behavior related to AEP by reducing alcohol consumption, or increasing women's contraception use to prevent alcohol exposed births (Hanson and Pourier, 2016, p. 7).

In conclusion, while FASD is the leading preventable disability, the amount of research on prevention, education, and intervention within the Native American communities is limited. A need for continued research to better understand historical trauma, why mothers continue to drink during pregnancy, appropriate health care assistance, and education to prevent FASD in Native communities. An emphasis on educating school personnel about FASD, treatments, and understanding of the diversity of the disorder, assist in favorable outcomes for children with FASD, along with continued research on effective intervention for academic, social, and behavioral deficits to adequately support children with FASD. Educational resources and training for medical care staff is needed to properly identify children with FASD to enable proper services and supports to promote better long-term outcomes for children with FASD.

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