

Neurobiology of Trauma and the Impact on Addiction Among Tribal Populations Part 1: Trauma and the Brain

Catching Up With COSSAP, December 2021

Understanding the impact of trauma on a person's brain and behavior allows us to have a different lens through which we may see the world and through which we see the people we serve—a lens that explains behavior in a way that is less pathologizing than we might otherwise categorize it. Trauma is not always visible, and frequently people are not aware that their symptoms are trauma-related, yet a high percentage of the people that we serve have experienced trauma. It is therefore critical that we be familiar with the definition of trauma, its impact on the brain and behavior, and what we can do about it no matter what role we play. Those are the goals of this article; it will be followed by a second part that describes practical ways to be trauma-informed and trauma-responsive, particularly in serving tribal communities.

Why is understanding trauma important when working with individuals from tribal communities with addiction or who are justice-involved?

While differences between tribes exist, American Indian/Alaska Native (AI/AN) communities have higher rates of substance use disorders (SUDs) than other races. Three times as many AI/ANs are diagnosed with SUDs compared to White Americans.¹ Twice as many require treatment for addiction compared to other racial and ethnic groups, but fewer receive treatment. Tribal communities also have the highest rates of alcohol-related deaths, as well as a higher opioid mortality rate than any other racial and ethnic group.² Further, Native Americans endure trauma symptoms twice as often as any other racial or ethnic group. They are twice as likely to experience psychological distress and have higher rates of suicide, slightly more than twice the national rate. Indeed, trauma/stress-related disorders have been described as one of the most serious mental health problems faced by AI/AN populations.³

Unfortunately, the neurological, emotional, and behavioral impacts of trauma are very similar to the impacts of addiction. Therefore, it makes individuals more vulnerable to addiction when they have experienced trauma; it also

makes the brain more vulnerable to the impacts of trauma if an individual is battling addiction. Further, these impacts are exacerbated by trauma—harder to change—and therefore incredibly important to address if we are to be successful in developing a recovery lifestyle.

Among justice-involved people, we see high rates of trauma; anywhere between 80 to 90 percent of people in the criminal justice system report having experienced some kind of trauma. According to the Bureau of Justice Statistics, Native Americans are incarcerated at a rate that is 38 percent higher than the national average. In 19 states, they are overrepresented in the prison population compared to other ethnic groups. Having family members who are incarcerated or who struggle with addiction or mental health issues greatly contributes to adverse childhood experiences, thus perpetuating the cycle of trauma and resulting in devastating impacts on families and communities. Therefore, understanding what trauma is and how we can be responsive to it and not retraumatize people is imperative. In 2018, the U.S. Commission on Civil Rights reported that—due to factors such as historically discriminatory policies, insufficient resources, and inefficient federal program delivery—Native Americans continue to rank near the bottom among Americans in terms of health, education, and employment. Further, the COVID-19 pandemic has had a disproportionate impact on the health and economies of tribal communities.

What is trauma?

Trauma is what results from an experience of an event, series of events, or set of circumstances that is experienced by an individual as physically or emotionally harmful or threatening and that has lasting adverse effects on an individual's functioning and physical, social, emotional, or spiritual well-being.⁴ It is the feeling of being at the mercy of something out of one's control, wherein life or limb or emotional security is threatened with no ability to stop it. The individual's ability to cope is overwhelmed.

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Trauma results in neurological impacts on the brain. However, it is not just single-event traumas that result in neurological impacts. It can be a series of events, chronic stress, vicarious trauma, or even ongoing psychological or emotional harm experienced by *previous* generations that results in neurological changes.

When we think of trauma, we often think of major events such as sexual abuse, extreme violence, being in a horrific car accident, or losing a loved one. The result of these events is neurological changes that impact an individual's functioning. However, not only major events impact functioning. Trauma responses can occur as a result of the accumulation of multiple smaller trauma events that happen over a period of time. Some examples are being in an abusive or volatile relationship, experiencing emotional abuse, having individual freedom threatened repeatedly, living in a chaotic household, or living in poverty and experiencing food insecurity.

To make matters worse, individuals don't have to have directly experienced a trauma event in order to be impacted. If we listen to other people's trauma stories, or if we read their trauma stories, after a while we are also susceptible to brain changes, whereby there is no difference between our brains and the brain of somebody who has actually experienced the trauma.⁵ This is called vicarious or secondary trauma, and the resulting impact on the brain is as if we had directly experienced the trauma.

Stress is the body's natural response to its environment and how it is perceived. It is often defined by instances when demands of the situation exceed our capacity to handle them effectively. Our perception of the stressor is shaped by past experiences, learned behaviors, environments we have been exposed to, and our genetic makeup passed from our parents and ancestors. While some stress is good, when it continues for long periods of time, it is called chronic stress and has the same impact on the brain as trauma.

Trauma can also be multigenerational. This means that one generation could have experienced ongoing psychological or emotional harm that resulted in certain neurological, emotional, and behavioral symptoms. These symptoms are then experienced by the next generation even without them having experienced the trauma directly. This is also called intergenerational or historical trauma. Having experienced trauma, or the effects of historical trauma, increases vulnerability to addiction, and battling addiction increases susceptibility to the negative neurological impacts of trauma.

Because of the long-lasting neurological impact of trauma and addiction on the developing brain, professionals working in the addiction field need to be trained in trauma-informed care. This does not mean training in trauma resolution. Instead, it means having a lens that views behavior as a trauma response or coping mechanism, rather than one that views behavior as purely problematic. This lens sees problematic behavior not only as something to be corrected but as a symptom of something larger to be understood in order to help people adopt healthier behaviors.

Cultural factors such as socially shared thoughts of historical loss and multigenerational trauma may heighten psychophysiological stress, which in turn increase one's susceptibility to the substance use as a way of reducing such stress.⁶ In several studies examining AI/AN family members involved with the child welfare system due to substance abuse issues, it was found that families are also often challenged by untreated trauma exposure. The link between these conditions and the history of genocidal policies aimed at destroying Native family ties, as well as experiences of ongoing discrimination, raise added dimensions for consideration when providing services to these families.⁷ Research has also found that trauma and substance abuse in current generations are heightened by the intergenerational transmission of historical trauma, by cultural and community traumatic experiences, and by the cumulative effects of harmful and racist policies directed at entire tribes.⁸ Therefore, the combination of multiple current traumatic experiences and group historical trauma can impact the ability of individuals to meet emerging life challenges.

What is the impact of trauma on our brain?

Our brain is fundamentally made up of two components: the limbic system and the frontal cortex. The central part—the emotional brain, also called the limbic system or “lizard brain”—is responsible for high emotions, safety, our fight/flight/freeze responses, fast decision-making, and impulses. The logical brain, also known as the frontal cortex or the “wizard brain,” is responsible for executive thinking, decision-making, and consequential thinking. Ordinarily, we process everything through our limbic system first, and then, if the information is important, it is relayed to the frontal cortex. One of the impacts of trauma is the hijacking of this process and a pattern of getting stuck in the limbic system whereby we end up with an overactive limbic system.

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The second impact of trauma is damage to the pathway between the limbic system and frontal cortex. The third impact of trauma on the brain is that we lose mass in the frontal cortex, meaning the frontal cortex is not as strong and reliable as it used to be before the trauma event.⁹ All of these changes are reversible, meaning we can heal from these impacts, but they cannot be underestimated. It is also important to note that when experiencing both trauma and addiction, the impact on the brain is exacerbated and therefore recovery takes longer and is more complex.

How do these brain changes impact behavior?

The brain changes described above result in several behavioral responses that can be problematic. These behaviors serve as clues that perhaps the person we are working with is suffering from symptoms of trauma and that we might want to pause so we can respond in the most strategic and supportive way. We will focus on responses in the next article. For now, let's examine these behaviors.

One of the behaviors you might notice is *emotional expression*, which may look like hypervigilance or numbness.¹⁰ There might be times when the emotion being expressed does not match the information being shared. The person's expression might even feel manipulative, which may be a protection mechanism. These are strong clues that there has been some impact on the brain. *Reactivity* is another symptom to pay attention to and might look like emotionality, emotions that are bigger than the event requires, or irritability. These emotions can also manifest as *impulsivity*, which might leave the observer wondering why the person is unable to stop and think. The person may also have *difficulty self-regulating*, which means they struggle with tolerating difficult emotions and are unable to return to a state of tolerance (or homeostasis). Essentially, when their lid flips, they are unable to bring it back down quickly. To manage this, one may notice the person engaging in *destructive behavior, including self-harm or substance use*.¹¹

Why is it that two people can experience the same event, but one walks away traumatized and the other does not?

The extent of the neurological impact of trauma depends on the resilience of the brain in the moment, historical factors, and overall levels of stress. Therefore, there are

times when two people can indeed experience the same event, but only one is negatively impacted by it. We used to equate this result to characteristics such as strength, morality, or character. In fact, what we are learning now is that if a person's brain is *entering* the event in a compromised state, he or she is more likely to experience a negative impact. Examples of what can cause the brain to be compromised fall into three categories: genetics, history, and present moment.

Genetics play an interesting role in individuals' susceptibility to the neurological impact of trauma. This field of epigenetics, which is the study of how our behaviors and environment can cause changes that affect our genetic expression, is relatively new, but what we are learning is that historical trauma, chaotic households, or lack of a nurturing upbringing can create epigenetic changes. These changes are reversible; they do not change our actual DNA, but they can change how our body reads a DNA sequence and expresses itself. We can therefore be more sensitive to stress and to the brain changes that result from traumatic events. The issue of genetics is further complicated when we look at historical trauma. Trauma changes the way our genes are expressed, and these epigenetic changes can be passed down across several generations. This does not mean that our genetic code changes, but rather how our genetic code is expressed; that is, what turns it on and off. For example, as a result of historical trauma leading to epigenetic changes, subsequent generations of individuals be more susceptible to stress, be more likely to get addicted to substances, have bigger limbic systems and smaller frontal cortices, and be more reactive and impulsive.

Our *history* impacts how our brain develops. For example, adverse childhood experiences or early onset substance use can create an overdeveloped limbic system and an underdeveloped frontal cortex.¹² Thus, when we experience a traumatic event, these brain changes are more likely to be exacerbated.

Lastly, what is happening in the *present* can also impact how susceptible our brain is to trauma. Factors such as current levels of stress, rest, and exercise impact the resilience with which our brain responds to trauma.¹³ Further, what happens immediately after the traumatic experience matters. People who receive immediate support seem to have fewer lasting impacts from trauma than those who do not. There are several things we can do to increase the resilience of our brain.¹⁴ We will discuss them in the next article.

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Conclusion

This is part one in a two-part article on the neurobiology of trauma and what we can do to be trauma-informed and trauma-responsive when serving tribal populations or communities and clients struggling with addiction. In this article, we focused on the neurological and behavioral impacts of trauma. Understanding those impacts allows us to see potentially problematic behaviors through a different lens. Rather than seeing these behaviors as something to change and punish, we should see them as ways to cope with symptoms that can inform our intervention strategy. In the next article, we will dive deeper into how we respond to people with trauma. We will define trauma-informed care and cover specific trauma-informed strategies. We will also discuss how to take care of yourself and prevent vicarious trauma.

Endnotes

1. Rieckmann, T., Moore, L., Croy, C., Aarons, G. A., & Novins, D. K. (2017). National overview of medication-assisted treatment for American Indians and Alaska Natives with substance use disorders. *Psychiatric Services, 68*(11), 1136–1143.
2. Whitbeck, L. B., Walls, M. L., & Welch, M. L. (2012). Substance abuse prevention in American Indian and Alaska Native communities. *The American Journal of Drug and Alcohol Abuse, 38*(5), 428–435.
3. Bassett, D., Buchwald, D., & Manson, S. (2014). Posttraumatic stress disorder and symptoms among American Indians and Alaska Natives: a review of the literature. *Social psychiatry and psychiatric epidemiology, 49*(3), 417–433. <https://doi.org/10.1007/s00127-013-0759-y>.
4. SAMHSA Treatment Improvement Protocol (2014). Trauma-informed care in behavioral health services. *Rockville, USA: Substance Abuse and Mental Health Services Administration*.
5. Cohen, K., & Collens, P. (2013). The impact of trauma work on trauma workers: A metasynthesis on vicarious trauma and vicarious posttraumatic growth. *Psychological Trauma: Theory, Research, Practice, and Policy, 5*(6), 570.
6. Hilton, B. T., Betancourt, H., Morrell, H. E., Lee, H., & Doegey, J. A. (2018). Substance abuse among American Indians and Alaska Natives: An integrative cultural framework for advancing research. *International Journal of Mental Health and Addiction, 16*(2), 507–523.
7. Lucero, N. M., & Bussey, M. (2015). Practice-informed approaches to addressing substance abuse and trauma exposure in urban native families involved with child welfare. *Child Welfare, 94*(4), 97–117.
8. *Ibid.*
9. Dowd, D. A., & Jocelyn Proulx, R. (2012). Neurology and trauma: Impact and implications. In *Manitoba. RESOLVE University of Manitoba Press*.
10. Van der Kolk, B. A. (2003). *Psychological trauma*. American Psychiatric Pub.
11. SAMHSA Treatment Improvement Protocol (2014). Trauma-informed care in behavioral health services. *Rockville, USA: Substance Abuse and Mental Health Services Administration*.
12. Creeden, K. (2009). How trauma and attachment can impact neurodevelopment: Informing our understanding and treatment of sexual behaviour problems. *Journal of Sexual Aggression, 15*(3), 261–273.
13. Keynejad, R. C., Frodl, T., Kanaan, R., Pariante, C., Reuber, M., & Nicholson, T. R. (2019). Stress and functional neurological disorders: mechanistic insights. *Journal of Neurology, Neurosurgery & Psychiatry, 90*(7), 813–821.
14. Smith-Osborne, A., Wilder, A., & Reep, E. (2013). A review of reviews examining neurological processes relevant to impact of parental PTSD on military children: Implications for supporting resilience. *Journal of Aggression, Maltreatment & Trauma, 22*(5), 461–481.