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The impact of trauma on the brain and body: Alternative approaches to treatment

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The Impact of Trauma on the Brain and Body:
Alternative Approaches to Treatment

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Table of Contents

Abstract

This project will explore the impact of trauma on the body and mind of an individual, as well as offer alternative approaches to treatment that mental health professionals can integrate into their work with clients. The experience of one or multiple traumatic events can lead to devastating psychological and physiological impairment in a person, and the complexity of trauma can make the symptoms difficult to treat. Many clinicians have found that using traditional approaches as their sole method of treatment may not be enough to create long-lasting, sustainable change. Integrating treatment approaches that address mind, body, and spirit has proven to be beneficial for trauma survivors. Research on the effects of trauma will be reviewed, as well as descriptions of alternative approaches that can be integrated into a holistic, well-rounded treatment plan. Finally, recommendations for professionals working with trauma are offered.

Introduction

Trauma, derived from the Greek word meaning "wound," is a life-threatening event that overwhelms a person's ability to cope and can lead to significant physical, psychological, or emotional impairment (American Psychiatric Association, 2013). A traumatic event can be brought about by another human(s), such as violence, acts of terror, war, or abuse; or it can be a naturally occurring event, such as a landslide, hurricane, or tsunami. While certain groups of people are more at-risk for experiencing a traumatic event, no one is immune: an estimated 70% of adults in the United States have experienced a traumatic event at least once in their lives, and up to 20% of these people go on to develop post-traumatic stress disorder (PTSD) (Sidran Institute, n.d.). Approximately one in 13 adults will develop PTSD during their lifetime (Sidran Institute, n.d.). Traumatic reactions vary greatly from person to person, and a singular traumatic event will have a different impact on a person than the experience of multiple traumatic events over time. Individual characteristics, characteristics of the traumatic event, cultural factors, social support, and developmental characteristics can all influence a person's experience of and reaction to trauma (US Department of Health and Human Services, 2014). Traumatized individuals are more at risk for developing comorbid disorders, such as mood disorders, anxiety disorders, substance abuse and dependence disorders, eating disorders, somatoform disorders, and medically unexplained symptoms (Ogden, Pain & Fisher, 2006). It is important to note that a person can experience symptoms of post-traumatic stress even if they don't meet all of the criteria for a PTSD diagnosis. Common symptoms of traumatic stress include flashbacks and intrusive thoughts, avoidance behavior, hyperarousal, sleep disturbance, and distorted feelings of guilt or shame (Bremner, 2006). These symptoms offer only a small glimpse into the complex internal world of trauma survivor.

Our understanding of trauma has evolved significantly in the past hundred years or so.

The term *trauma,* which had typically only been used in hospital and surgical settings, was introduced into psychiatry in the late 1800's (Ray, 2008). The psychological movement and the somatic movement merged together in the 1890's to form the diagnosis of *hysteria,* which would eventually evolve into what is now known as PTSD *(*Echterling, Field, & Stewart, 2015). During World War I, psychiatrists observed soldiers experiencing uncontrollable weeping and screaming, memory loss, physical paralysis, and lack of responsiveness; the term *shell shock* was subsequently coined (van der Kolk, 2015). In 1980, PTSD was added as a diagnosis to the DSM, and mental health professionals worked to increase the public's awareness of trauma (Ringel & Brandell, 2011). Since then, our understanding of trauma's impact on the brain and body has only grown. New studies have shed light on how chronic trauma can disrupt various systems within the body, "freezing" the body in time to feel like the trauma is still occurring, even long after the event has taken place. Trauma, in essence, is “imprinted” in the body. Months or even years after a trauma, survivors can still experience strong feelings of helplessness, terror, or rage, but find these feelings impossible to name or describe. Small reminders can trigger powerful physiological responses in survivors that mimic the responses of someone who is actively experiencing a trauma. The fight-or-flight response becomes highly reactive, set off by even mildly stressful events.

While traditional psychotherapy is an important piece of the healing process for survivors, it does not address the visceral aspect of trauma– the changes that are deeply embedded within the body. It is key for mental health clinicians to understand the biology of trauma in order to effectively help their clients and tailor their treatment approaches. The next few sections will explore research on how trauma can bring about profound and long-lasting impairment to the mind and body.

Impact of Trauma on the Brain

The main areas of focus for this section will be the limbic system (known as the "emotional brain"), and the neocortex (known as the "rational brain"). The primary function of the amygdala, a small almond-shaped structure within the limbic system, is to detect stimuli from the environment that might be a threat to survival. When the amygdala senses danger, it immediately sends messages to the brainstem and the autonomic nervous system (ANS), which subsequently triggers the fight-or-flight response and release of the stress hormones cortisol and adrenaline. The body is then mobilized to effectively respond to the danger, and is able to return to equilibrium once the danger has passed. If the danger is inescapable, as is often the case in trauma, the body stays in a perpetual state of fight-or-flight and the amygdala is at risk for interpreting harmless events as a threat to the system, triggering a full-body response (Bloom, 1999). The inability to appropriately respond to daily stressors and challenges from the environment can make day-to-day living for a trauma survivor extremely difficult. A faulty danger detection system can interfere with a survivor's ability to foster healthy relationships and function effectively in the workplace.

The brainstem and limbic system are two of the oldest and most primitive parts of the brain. In contrast, the neocortex is the youngest part of the brain and makes up its outermost layer. The neocortex is responsible for "higher-order" functions such as reasoning, language, and abstract thought, the capacities that differentiate humans from other species within the animal kingdom (van der Kolk, 2015). The frontal lobes, which make up a considerable portion of the neocortex, are involved in abilities such as judgement, problem-solving, memory and language. The frontal lobes are also involved in empathy, mirroring, and attunement with other human beings. Ordinarily, the "emotional" and "rational" systems in the brain are in a state of balance,

allowing a person to effectively gauge a situation and consciously choose how to respond. In trauma, the hyperarousal of the emotional brain combined with the breakdown of the frontal lobes causes this balance to shift (van der Kolk, 2015). A trauma survivor enters autopilot mode, and behavior becomes instinctive and automatic rather than intentional. The ability to respond flexibly and openly to the various happenings of everyday life is lost; the survivor essentially becomes subject to their visceral trauma reactions.

This was a small glimpse into the effects of trauma on the brain. Another area of the body that is profoundly affected by trauma is the nervous system, which will be discussed in the next section.

Impact of Trauma on the Nervous System

The autonomic nervous system (ANS), a branch of the central nervous system, regulates homeostatic and defensive functions such as breathing, heart rate, respiratory rate, and arousal (Kolacz, Kovacic & Porges, 2019). The ANS is comprised of two different systems, the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). The sympathetic branch of the ANS regulates arousal and the activation of the fight-or-flight response. When the SNS receives a danger signal from the amygdala, the body becomes mobilized to respond: heart rate and blood pressure increase, pupils dilate, and cortisol and adrenaline flood into the system. In contrast, the parasympathetic nervous system is associated with functions such as digestion, relaxation, and sleep cycles. Activities such as deep, intentional breathing can activate the PNS, something that will be discussed further in the Yoga section of this paper. The relationship between the SNS and PNS is comparable to the relationship between the emotional and logical brains: a harmonious relationship between these two systems allows for appropriate self-regulation, arousal, and flexibility of response. In trauma these branches of

the autonomic nervous system are thrown out of sync, leading to poor impulse control and emotional regulation, as well as low heart rate variability (HRV). HRV measures the relationship between breathing and heart rate, and PTSD patients were found to have poor HRV, indicating an out-of-balance relationship between the sympathetic and parasympathetic nervous systems (Porges, 2011).

Stephen Porges' polyvagal theory is a central piece to understanding why trauma survivors feel chronically out of sync with the people around them. Porges coined the term *neuroception* to describe how neural circuits distinguish whether situations and people are safe, dangerous, or life-threatening. The tenth cranial nerve in the brain, known as the vagus nerve, acts as a system of social engagement, as it accounts for our ability to be responsive and attuned to the expressions and voice tones of the people around us (Porges, 2011). As humans grow and develop in early life, social reciprocity and mirroring help to strengthen the ventral vagal complex (VVC), a mechanism that evolved during the transition from primitive reptiles to mammals (Kolacz, Kovacic & Porges, 2019). When the VVC is engaged, it slows the heart rate, increases the depth of breathing, and enhances feelings of safety.

Trauma, which often involves immobilization and lack of responsiveness to cries for help, activates another part of the vagus nerve: the dorsal vagal complex (DVC). The DVC is involved in both homeostatic and threat reactions, and primarily stimulates organs below the diaphragm (Kolacz, Kovacic & Porges, 2019). When the fight-or-flight response fails to remove a person from the face of danger, the DVC induces a state of collapse and disengagement, which is the body's final effort to protect itself. Collapse and disengagement is our most primitive, reptilian response to danger. In collapse and disengagement, the body becomes immobilized, heart rate slows, and awareness of surroundings is diminished; physical pain may not even be

registered (van der Kolk, 2015). This immobilization explains why kids who are chronically abused often experience "learned helplessness", the feeling that they are powerless over their surroundings. Additionally, when the DVC takes over, the social engagement system is switched off, leaving the person unable to respond to the expressions and tones of others. A shut down of the social engagement system makes it difficult to feel soothed by the presence of other humans as well as foster healthy relationships with them. The ability to form relationships with others is a primary hallmark of overall well-being, and the polyvagal theory helps to explain why trauma survivors find this to be challenging.

Traumatic Memory

As we discussed in the first section, certain brain areas shut down and other brain areas go into overdrive when a person is experiencing a traumatic event. The thalamus, located right above the brainstem, is responsible for processing and filtering sensory input from the environment. The breakdown of the thalamus during trauma leads to an influx of overwhelming sensations, known as “sensory overload” (van der Kolk, 2015). The frontal lobes, which are responsible for language production and orientation to time, shut down, and the brainstem and limbic system take over (van der Kolk, 2015). Due to this, the organization, processing, and storing of a traumatic memory is vastly different from that of an ordinary memory. Ordinary memories change dynamically over time, whereas traumatic memories are fixed and static (Levine, 2015). People remember ordinary happenings in their lives as logical narratives with a beginning, middle, and end. They can easily recall details, including the way they felt about the event and the sequence of the event. In contrast, traumatic memories are often stored not as narratives but as splintered sensory fragments that are difficult to articulate (Levine, 2015). The episodic memory of the experience may be stored in the limbic system indefinitely, generating

vivid images of the traumatic experience: terrifying thoughts, feelings, body sensations, sounds, and smells (Solomon & Heide, 2005). Survivors are burdened with flashbacks and other sensory input and yet may be very limited in their ability to describe their experiences. Traditional psychotherapy, which is considered an important piece to the healing and recovery process, relies heavily on language and the construction of narratives. Working to find the right language to describe an experience can help a survivor to reactivate their frontal lobes and connect with others, decreasing their feelings of isolation. However, language has its limits, and a person may be limited in their ability to access and describe their internal world. It is crucial, then, to integrate therapies that address the entire system and help a survivor to feel safe in their body again. Only once survivors are able to feel safe in their bodies can they begin the healing process and move forward into change.

Emotional Regulation and Autonomy

The previous sections were brief descriptions of the various ways in which trauma can change the brain and body; but what about the emotional aftermath of trauma? Survivors can struggle with feelings of anger, sadness, guilt, and shame; they also struggle with emotional regulation and stress management. Children who are chronically abused tend to believe that they are "bad", and that they are somehow responsible for the abuse that they experienced. Living with an inherent sense of shame– the feeling that their existence in itself is wrong– is a heavy burden to bear. These tumultuous emotions, combined with the uncomfortable sensations and reactions happening within the body, can lead survivors to numb themselves in some way: whether that be through drugs, alcohol, sex, or another form of self-medication. Over time, the numbing of internal sensations can lead to a chronic sense of disconnection: survivors have trouble understanding and connecting with their feelings, thoughts, and needs. This inevitably

leads to the erosion of *sense of self;* reconnecting with the self is a core component of healing. van der Kolk (2015) stated, "One of the clearest lessons from contemporary neuroscience is that our sense of ourselves is anchored in vital connection with our bodies" (p.274). When someone is consistently on autopilot, they aren't intentionally and mindfully making choices but rather reacting based on past experiences. Until survivors can regain autonomy and begin to respond to new situations in a flexible manner, they are bound to continue reenacting and repeating past experiences; this is a painful cycle to be caught in. Therefore, one of the most important aspects of trauma therapy is helping survivors regain self-awareness and autonomy through re-establishing a connection with themselves. Mindfulness, which is the process of metacognitively thinking about and describing internal experiences, can help to re-establish self-leadership; the survivor regains a sense of control, rather than feeling that they are at the whim of their painful emotions and post-traumatic reactions.

The emotional and physiological effects of trauma are profound and often feed into each other, creating a vicious cycle. Due to the complex nature of traumatic reactions, traditional psychotherapy alone may not be enough to bring about full healing and recovery for traumatized people. It is crucial for mental health clinicians to help their clients access and understand the parts of their internal experience that words cannot describe. Trauma affects the entire system of a person: mind, body, and spirit, therefore it is essential to integrate treatment approaches that address all of these aspects. The purpose of this report is to describe innovative techniques that complement the counseling process in order to enhance the well-being of a trauma survivor. The next few sections are an introduction to alternative treatment approaches that can be added into a treatment plan. Addressing the full picture of trauma allows survivors to move forward into change and begin leading healthy, authentic, self-aware lives.

Yoga

The word *yoga* is derived from the Sanskrit word meaning *union* (Sharma, 2013). Developed in ancient India over 5,000 years ago, yoga is the practice of uniting mind, body, and spirit through techniques such as physical postures, breath work, and meditation (Nguyen-Feng, Clark, & Butler, 2019). Although yoga has been used as a spiritual and medicinal discipline in Eastern cultures for centuries, it has only recently become a popular practice in the Western world. In 1893, an Indian monk named Swami Vivekananda left India to bring yoga to the United States (Douglass, 2007). He gave an inspirational speech to the World's Parliament of Religions in Chicago, and from that point on a steady stream of Eastern practices began to gain traction in the West. Later on in the 1960's, the counterculture movement led to an influx of Asian spiritual teachers in the West, which acted as a catalyst for the spread of yoga (Osman, 2019).

There are many different branches of yoga and the way in which it is practiced varies widely. While classical texts describe yoga as mainly a mental discipline and a vehicle for meditation, yoga in the United States today is largely seen as a physical discipline and a form of exercise: it can tone the muscles, increase flexibility, and improve posture. However, a growing body of research has shown that yoga boasts an enormous amount of benefits that go far beyond just the physical realm. Yoga can improve mental and emotional health, alleviate symptoms of anxiety and depression, increase feelings of interpersonal connection, reduce muscular tension and pain, and decrease feelings of stress (West, Liang, & Spinazzola, 2017). The first section of this paper highlighted the ways in which trauma affects emotional health, brain health, physiology, regulation, and sense of connection. Yoga, a discipline which integrates all of these

realms– mental, emotional, physical, and spiritual– can be a beneficial complementary practice for people struggling with symptoms of traumatic stress.

We will start by focusing on yoga and the nervous system. Survivors of trauma experience the world with a nervous system that is hardwired for danger, interpreting even minor events as threats to the system. The sympathetic (SNS) and parasympathetic (PNS) branches of the autonomic nervous system are thrown out of sync, leading to difficulties with emotional regulation and impulse control, as well as decreases in heart rate variability (HRV). Survivors are consistently "hijacked" by these uncomfortable sensations and responses happening within their bodies, leading to a chronic sense of disconnection. Thus, an important first step in recovery is helping survivors to connect with their bodies and regain a sense of safety. This is where yoga comes in: a primary emphasis in yoga is the connection to and awareness of breath. Participants are instructed to breathe deeply and intentionally as they go throughout the sequence of yoga poses, and to practice aligning their breath with their movements. Why is this important? Studies have shown that changing the way one breathes can improve problems with anger, depression, and anxiety, as well as positively affect a host of medical problems, such as high blood pressure and stress hormone secretion (van der Kolk, 2015). Taking a deep breath in activates the sympathetic nervous system, and exhaling activates the parasympathetic nervous system, which slows the heart and calms the body (van der Kolk, 2015). Deep breathing increases feelings of calmness and relaxation, which is key for survivors who consistently feel hyper-aroused, tense, and on edge. Because deep breathing activates both the sympathetic and parasympathetic systems, it can also help to bring these systems back into balance, working in harmony to promote healthy self-regulation. Aligning breath with movement increases feelings of synchronicity, enhancing the connection between mind and body (Cabral, Meyer, & Ames,

2011).

Another important aspect of yoga is *noticing the sensations happening within the body* in a nonjudgmental manner. This is a form of mindfulness, a concept which will be discussed in a later section. A great deal of post-traumatic stress symptoms are stored within the body, and the survivor is essentially at the whim of these unconscious, automatic responses. Many survivors begin to find ways to numb the uncomfortable sensations, which contribute to the sense of disconnection that they feel with their bodies. Practicing this *interoceptive awareness*– the noticing of the shifts and sensations happening in the body– leads to a greater self-understanding and connection with the self. The awareness, acceptance, and tolerance of one's inner world may increase the self-confidence necessary to make decisions that feel right (Impett, Daubenmier, & Hirschman, 2006). Increased interoceptive awareness, attention regulation, and self-acceptance are linked to decreases in stress, dysfunctional coping, and avoidance (West, Liang, & Spinazzola, 2017). Once they are able to feel safe in their bodies and establish a caring relationship with themselves, survivors of trauma can move forward in the direction of healthy, positive change.

While research on yoga and mental health is still relatively new, various studies have shown promising results. Bessel van der Kolk and his colleagues at the Trauma Center in Brookline, Massachusetts completed a pilot study with 37 women who had severe trauma histories. The women were placed at random into a yoga group or a dialectical behavior therapy (DBT) group for eight weeks. The women in the yoga group experienced significant improvement in PTSD arousal symptoms and developed a more positive and caring relationship with their bodies; in contrast, the women in the DBT group did not experience improvements their hyperarousal and other PTSD symptoms (van der Kolk, 2006).

Alison Rhodes (2015) completed a more long-term study at the Trauma Center in Brookline. Sixty women aged 18-58, all of whom met the criteria for PTSD, were divided into 3 yoga groups and 3 control groups. The yoga group participated in yoga once a week for ten weeks, while the control group attended a women's health seminar once a week for ten weeks. 49 of the original 60 participants completed follow-up interviews and reported experiencing "a growing sense of self-efficacy and feelings that they were no longer defined by their trauma history, living in the past or reacting based on the past . . . they saw themselves in a new, more positive way and felt a growing sense of well-being in body and mind" (Rhodes, 2015, p. 249). It is important to note that long-term studies are more beneficial for determining the efficacy of yoga in mental health treatment (Osman, 2015). Participants across studies experienced more benefits if they continued their yoga practice after the studies were completed (Osman, 2015).

As is the case with any treatment method, yoga has limitations that mental health practitioners should be aware of. Clients may have limited accessibility to yoga classes due to the lack of availability in certain areas, as well as limited financial means. Extremely rural areas typically have less offerings of exercise classes such as yoga, and purchasing yoga class packages tends to be expensive. Seeking yoga studios that offer "community classes," which are available to anyone in the community, can make yoga more accessible for people coming from low socioeconomic backgrounds. Another limitation of yoga is that certain poses might be extremely triggering, leading to increased instances of early drop-out; this can be particularly problematic for survivors of sexual-related trauma. Trauma-informed yoga classes, which are rapidly growing in popularity, help to address some of these concerns– these classes are catered to the unique needs of trauma survivors.

Victoria Folette and colleagues stated that "yoga and psychotherapy both seek to foster growth, understanding, and freedom from suffering . . . both share a fundamental assumption that there is an inherent potential within each person toward continual growth" (Folette, Palm, & Pearson, 2006, p. 48). Yoga is a discipline that integrates mental and physical practices, making it an extremely beneficial tool for trauma survivors. Incorporating a regular yoga practice, in addition to engaging in traditional psychotherapy, can bring about long-term healing and positive change.

Neurofeedback

Neurons in the brain communicate via electrical impulses known as *brain waves*, and brain waves are thought to influence our emotions, thoughts, and behaviors. Post-traumatic stress disorder and other psychological conditions are associated with dysregulated patterns of brainwaves and electrical activity. What if we could train the brain to create new patterns of electrical activity? Enter *neurofeedback*: neurofeedback is an evidence-based therapy that combines brainwave feedback with operant conditioning techniques. This computer-brain interface system allows patients to train their brains to achieve more desirable frequencies, which works to restore emotional balance and widen the window of stress tolerance. Neurofeedback was developed in the mid 1900's and has largely been used as a treatment for epileptic seizures. Due to its ability to increase focused attention, creativity, and awareness, it has also been used as a tool for performance enhancement in athletes and musicians. In the late 1950's, Joe Kamiya, a professor at the University of Chicago, discovered that people could voluntarily produce alpha waves in response to a specific cue (Myers & Young, 2012). Later on in 1971, a sleep researcher at UCLA named Barry Sterman made an important discovery in his experiments with cats: the cats he had trained to produce the 12-15 Hz "SMR" frequency were significantly more seizure

resistant than the other felines (Fisher, 2014). This discovery led Sterman to hypothesize that brain wave training could help humans with epilepsy to become seizure-resistant. His hypothesis proved to be correct: when he used neurofeedback with his first human subject, a 23-year-old woman with epilepsy, she was nearly seizure-free after three months of the procedure (Fisher, 2014). Sterman's studies paved the way for the rise of neurofeedback, a treatment that has only recently emerged into the mental health field. Research has shown that neurofeedback procedures can treat a variety of health and psychological conditions such as anxiety, depression, PTSD, ADHD, schizophrenia, and insomnia, all of which are associated with disrupted brain rhythms.

In order to better understand neurofeedback, we will first explore brain wave frequencies and their relationship with emotional states and affect regulation. In this context, *frequency* is defined as the rate at which a brain wave rises and falls within a period of 1 second (van der Kolk, 2015). Brainwave frequency is measured in Hertz (Hz), and the brain can experience frequencies anywhere from 0-100 Hz. Frequency levels are associated with different states and affects, and they also have assigned names; the frequencies we will briefly touch on are delta, theta, alpha, and SMR waves. *Delta* waves, ranging from 0-3 Hz, are the slowest brain waves and are often associated with sleep states. *Theta* waves, at 4-7 Hz, are associated with creative, hypnotic-like states: we pass through theta as we are falling asleep. When a person is day-dreaming and their mind is wandering, they are experiencing theta waves in the brain (Fisher, 2014). *Alpha* waves, at 8-11 Hz, are associated with a sense of peace and feelings of relaxation, and *SMR* waves at 12-15 Hz are thought to induce a state of "calm alertness." Beyond SMR waves are beta, high beta, and gamma frequencies, which are all associated with high levels of alertness and arousal. Neurofeedback targets specific brain frequencies and rewards them,

leading to increases in the desired frequencies and decreases in undesired frequencies. Many individuals with PTSD exhibit excessive brain wave activity in the temporal lobe and unusually slow brain wave activity in their frontal lobes (van der Kolk, 2015). Decreased activity in the frontal lobes is associated with poor impulse control and decreased concentration. This also explains why the emotional and rational sides are thrown out of balance: the hyper-aroused emotional brain takes the driver's seat, and the reasoning abilities of the frontal lobe fall into the background. Emotional regulation becomes extremely difficult– survivors suffering from this imbalance in the brain may be prone to overreact to minor stimuli in the environment. Neurofeedback focuses on specific brain areas (e.g. the frontal lobe) and works to either slow down or speed up the brain waves in these areas. The brain is then restored to an optimal level of arousal, enabling survivors to learn self-regulation and respond to situations in an appropriate manner. The ability to respond to situations intentionally and authentically is a core component of well-being.

How exactly does neurofeedback train the brain to produce the desired waves? Neurofeedback combines EEG technology with techniques of operant conditioning. Operant conditioning, a learning method with roots in behavioral psychology, asserts that the probability of a future response is dependent on its association with an immediately following consequence (Enriquez-Geppert, Huster, & Herrmann, 2017). In other words, a person is more likely to increase a certain behavior when that behavior is met with a positive outcome, and they are less likely to engage in a behavior when it is met with a negative outcome. In neurofeedback, electrodes are placed on the scalp of the patient and brain frequencies appear on screen; the frequencies are assessed and measured by the practitioner. The patient is then presented with an on-screen task and given instructions for how the task works. Engaging in the task requires no

buttons, clickers, or remotes: the patient is able to control what is happening on the screen solely through brain power. This increased state of focus and concentration produces certain brain frequencies, and the desired frequencies are reinforced through rewards (e.g. winning the game). When concentration wanes and less desired brain waves are produced, these frequencies are essentially "punished" (e.g. losing the game). The goal is that the person will naturally be able to produce more of the desired brain frequencies after several neurofeedback sessions. This was a simplified overview of the way neurofeedback works– neurofeedback is a complex treatment method that can be administered in a variety of different ways. No brain is the same: determining which frequencies should be increased and which frequencies should be decreased is an individualized process, and requires the use of different protocols.

Various studies have demonstrated the efficacy of neurofeedback as a treatment method for PTSD. Gapen and colleagues (2016) completed a pilot study with adults ranging from ages 32-64, all of whom met the criteria for PTSD and had been in prior treatment for at least three months. Self-report questionnaires were developed to measure various categories of trauma symptoms and levels of functioning; items were measured on a Likert scale. Participants filled out the questionnaires before and after undergoing 40 sessions of neurofeedback treatment. The results were promising: participants experienced a significant reduction in PTSD symptoms, and reductions in these symptoms were related to the reduction of affect dysregulation (Gapen et al., 2016). In other words, learning to self-regulate had a ripple effect– it cleared the way for positive growth and change in other areas.

Despite the clear evidence that neurofeedback is an efficacious treatment for post-traumatic stress symptoms, neurofeedback is still not widely used in the United States today. While it is known that brain functioning depends on both electrical and chemical activity, the rise

of the chemical model of the brain put methods like neurofeedback to the back burner. Psychiatric drugs became widespread and promised quicker results than an extensive neurofeedback protocol. That is not to say that psychiatric medication is not beneficial; medication provides the short-term symptom relief that can allow a person to function optimally in their day-to-day lives. Neurofeedback, however, creates long-lasting change through the modification of communication patterns in the brain. Once the electrical activity in the brain is restored and regulated, no further treatment is necessary. Drugs, on the other hand, only work for as long as you are taking them.

Lack of research funding is another reason that neurofeedback has not gained widespread acceptance in the United States. Conducting numerous large-scale studies that back the clinical efficacy of a treatment method is largely how treatments can gain traction and credibility. It becomes difficult, then, to make the case for why therapists and insurance companies should adopt neurofeedback. Neurofeedback machines are expensive, which can deter therapists from implementing this treatment method into their practice. Additionally, insurance companies cover only a select few neurofeedback protocols, which means that clients would be expected to pay out of pocket. This limits the range of clients who can access this treatment, because it is catered to clients who come from high socioeconomic statuses. It's a Catch-22: trauma is more prevalent in low SES communities, yet the people from these communities face the most barriers when it comes to accessing the resources that could help them.

Despite these limitations, neurofeedback has been slowly rising in prevalence and understanding throughout the United States. While large scale studies have yet to be done, smaller studies have clearly demonstrated the benefits of neurofeedback as a treatment for post-traumatic stress and various other pathologies. Neurofeedback brings about marked improvement

in emotional regulation and executive functioning capacities, both of which make up the foundation for healing. Improvements in these areas have a ripple effect, and can lead to healthier relationships and improved work performance. Fisher (2014) described this transition into health: “Our job is to help move the system from rigidity, repetition, and reactivity, to complexity, creativity, and stability. . . when patients are released from the grip of fear, they naturally open to their full potential” (pp. 68 & 84).

Mindfulness

The Buddhist scholar Nyanaponika Thera described mindfulness as “the unfailing master key for knowing the mind . . . the perfect tool for shaping the mind . . .and the lofty manifestation of the achieved freedom of the mind” (Kabat-Zinn, 2015, p. 1481). Mindfulness is essentially the practice of paying attention– it is the moment-to-moment awareness of the present moment. Like yoga, mindfulness originated in Eastern cultures as a spiritual practice. The Buddha introduced mindfulness by including it in the eightfold path, citing it as a way to unify the mind and alleviate suffering (Bodhi, 2011). Mindfulness was introduced to the Western world in 1979, when Jon Kabat-Zinn developed his Mindfulness-Based Stress Reduction (MBSR) program at the University of Massachusetts medical center (Bodhi, 2011). Kabat-Zinn is one of the primary figures in the contemporary mindfulness movement. He moved away from the Buddhist idea of mindfulness as a spiritual practice, and instead focused on mindfulness as a research-based science. Ever since Kabat-Zinn’s widely successful MBSR program, various studies have shown that mindfulness can be used as a tool to treat a broad range of psychological and physical ailments.

Why is mindfulness– the simple act of cultivating awareness and acceptance in the present moment– so beneficial? While mindfulness can involve paying attention to both external

and internal stimuli, the main focus for this section will be on using mindfulness as a tool for increasing awareness of one's internal world. Post-traumatic reactions often involve the experience of both physical and psychological distress: unexplained pain, muscle tension, headaches, fatigue, hyperarousal, and distressing thoughts and emotions. What becomes problematic is the way that survivors *respond* to these symptoms– they suppress, numb, or over-identify with the internal sensations that they are experiencing, leading to a chronic sense of disconnection with the body and the self. Living in a state of disconnection makes it extremely difficult to tune in with one's thoughts, feelings, and needs. Mindfulness increases metacognitive awareness, which is the ability to notice thoughts and feelings from the viewpoint of an observer. Mindfulness challenges survivors to respond to their symptoms differently: it enables them to get back in touch with their internal world through the process of noticing sensations as they arise. Once survivors become able to listen to what their body is trying to tell them, they can better understand and meet their needs.

Two important pieces of mindfulness are *awareness* and *nonjudgmental acceptance.* We have briefly touched on awareness: the process of noticing what is happening within one's body from moment-to-moment. This is a core component of mindfulness, because without awareness, survivors are unable to understand and respond to what they need. Once one is oriented to and aware of their internal experience, they are encouraged to meet these experiences with a sense of curiosity, openness, and nonjudgmental acceptance. Keng, Smoski, and Robins (2011) noted that nonjudgmental acceptance should not be equated to passivity or resignation. Rather, acceptance in this context refers to the ability to experience these feelings fully, without resorting to extreme methods of coping (Keng, Smoski, & Robins, 2011). Survivors learn to meet their painful feelings with compassion rather than judgement, shame, or fear. The resistance of painful

feelings and events leads to stress and suffering*;* learning to tolerate and accept uncomfortable sensations can alleviate stress and lead to more intentional, mindful decision making.

Meditation, a practice that involves the intentional cultivation of awareness and introspection, is one way that trauma survivors can incorporate mindfulness into their daily lives. Like mindfulness, meditation has its roots in Eastern spiritual traditions and only recently became a popular practice in the West. While mindfulness can involve paying attention to both external and internal stimuli, the aim of meditation is to focus on what is happening within. Additionally, meditation is typically practiced while sitting down in a quiet, secluded space, with eyes closed. Monk-Turner (2003) stated that the "primary purpose of meditation is to quiet the mind, to be aware in the present, and to essentially find a calm center in ourselves" (p. 467). At the heart of meditation practice is the idea that self-awareness is crucial for deep healing to take place (Monk-Turner, 2003). Without awareness, trauma survivors are at the whim of their automatic responses and reactions. Establishing a sense of self-leadership can steer survivors in the right direction for self-care (van der Kolk, 2015). Not only does meditation help to cultivate insight and increase positive emotions, it has been shown to have physical health benefits as well. Studies have found that meditation can decrease blood pressure, relieve symptoms of chronic pain, and reduce insomnia, leading to more restful and restorative sleep (Loizzo, 2009). Post-traumatic stress reactions often involve both physical and emotional symptoms, and the practice of meditation addresses both of these domains.

Studies on the effectiveness of mindfulness practices as a clinical intervention are promising. Kimbrough and colleagues (2010) conducted a study with 27 adult survivors of childhood sexual abuse. Participants engaged in an 8-week mindfulness-based stress reduction (MBSR) program and were encouraged to practice mindfulness skills daily at home. By the end

of the 8 weeks, participants experienced a clinically significant reduction in PTSD symptoms, with the largest observed change in the avoidance and numbing symptoms of PTSD (Kimbrough et al., 2010). Lykins and Baer (2009) compared a group of meditators to a group of demographically similar non-meditators on various constructs of psychological well-being. Meditators reported significantly higher levels of self-compassion and self-regulation, and significantly lower levels of rumination, thought suppression, and fear of emotion (Lykins & Baer, 2009). Additionally, mindfulness is the foundation of several psychotherapy interventions, including Dialectical Behavior Therapy (DBT), Acceptance and Commitment Therapy (ACT), and Mindfulness-Based Cognitive Therapy (MBCT).

The beauty of mindfulness is its universality and accessibility. While some treatment approaches may be difficult to access for certain populations, cultivating mindful attention to the present moment can be practiced anywhere, at no cost. Survivors of trauma are often pulled out of the present moment and feel as though they are stuck in a perpetual state of helplessness and horror; mindfulness teaches survivors that emotions are passing states. Germer, Siegel, and Fulton (2016) summed up mindfulness in *Mindfulness and Psychotherapy*: "When we're mindful, our attention is not entangled in the past or future. . . we are present in an openhearted way. This kind of attention generates energy, clear-headedness, and joy. Fortunately, it is a skill that can be cultivated by anyone" (p. 5).

Expressive Arts & Psychodrama

In previous sections, we have explored the unique way in which traumatic memories are processed and stored: not as coherent narratives, but as jumbled sensory fragments. During trauma, brain areas that are associated with memory processing and storage shut down; survivors can be bombarded with images, physical sensations, and sounds from the event, but have

difficulty putting words to their experience. Subsequently, the trauma takes on a life of its own: it becomes “split off,” unable to integrate into the ever-shifting autobiographical memory of the survivor (van der Kolk, 2015). A crucial part of therapy, then, is to access these memories, put words to experiences, and integrate them into the person’s narrative. However, when trying to access, understand, and describe one’s internal experience, language can only go so far. For this reason, both verbal and non-verbal modalities of healing are essential for the trauma survivor. We have already discussed body-based and mindfulness-based therapies that allow survivors to regain autonomy and re-establish equilibrium in the nervous system. What about creative, art-based therapies? Enter the expressive arts: expressive arts therapy is defined as a treatment in which clients, facilitated by the art therapist, use arts materials and the creative process to explore their emotions, foster self-awareness, reduce anxiety, and increase self-esteem (Schouten et al, 2018). Where words can fail to describe the complex emotions associated with trauma, the creation of symbols and metaphors to make sense of these experiences can bring about greater understanding and empowerment. Once able to consolidate and integrate the memory of the traumatic event(s), survivors can move forward into healthy change and no longer feel like they are perpetually stuck in the past.

The domain of expressive arts encompasses a variety of different techniques that can be used: including, but not limited to, art, dance, music and sound therapy, poetry, journaling, symbolism, and improvisational drama. Therapists are encouraged to incorporate these techniques within the broader framework of their theoretical approach. The theoretical approach can act as a guide for how to introduce the creative arts process, and as a lens through which therapists can facilitate the process of helping clients to interpret and make sense of their creations in the context of their experiences. This leaves a lot of flexibility to be creative and

innovative when deciding which techniques to incorporate into therapeutic work.

It is important to note that no client is the same, therefore the use of expressive arts techniques will vary widely depending on the client. An attuned therapist who understands how the client has processed and made sense of their traumatic experience(s) will likely be able to sense which expressive art modality would be the most useful in helping them access their internal world. In addition to the therapist's own intuition, it is important to bring the client in on this decision-making process. Therapy is a collaborative process, and the expressive arts are no different. A client-centered approach to expressive arts emphasizes the client's capacity for self-direction and desire for growth (Rogers, 2016). Therapists can explain the purpose of creative modalities and offer their suggestions, while making sure to inform the client that the decision is ultimately up to them.

Another important piece of expressive arts therapy is letting the client know that *this is not a test of their creativity or ability.* Clients may hold the belief that they are not creative, and thus shy away from creative expression out of the fear that their work will be judged or ridiculed. Informing the client that the purpose of expressive arts is self-discovery, not the end product, will increase the chances that client will be willing to take risks and be vulnerable. Therapists are encouraged to create a warm, empathic holding space while facilitating a creative arts activity. When trauma survivors begin to access their internal world– a world that they had been cut off from for so long– it may bring up painful and overwhelming emotions. Providing a corrective emotional experience and helping clients self-regulate through this process is crucial; if this does not happen, re-traumatization can occur (Perryman, Blisard, & Moss, 2019).

One modality of expressive arts that has recently emerged is improvisational drama, also known as *psychodrama* or *urban improv* (these terms will be used interchangeably). Researchers

have begun to study the efficacy of psychodrama groups as a conjunctive treatment for traumatized teens and young adults. Psychodrama involves the creation of a skit that members of the group act out– the skits tell stories of traumatic events that group members have experienced. The members are able bear witness to one another's stories, and the reenacting of these stories in a group setting lessens feelings of shame and isolation surrounding the experience. The key here is that in addition to telling the story, the psychodrama experience provides an opportunity to retell the story, reframe the situation, and regain a sense of agency (Carbonell & Barehmi, 1999). In essence, psychodrama is a creative way to change one's inner narrative, and begin to think of themselves as a survivor rather than as a victim. Psychodrama groups offer a creative, hands-on way to increase autonomy and internal locus of control, both of which are crucial aspects of trauma recovery. Recently, urban improv groups have been used as a preventative measure in high-risk areas. Middle and high schools in urban, low SES areas are beginning to implement urban improv groups with students, all of whom are at a high risk for complex trauma in their homes and communities. These groups allow students to act out challenging situations that they might be faced with, and brainstorm ways in which they could navigate these situations. Students are enabled to think critically about everyday problems in a group setting, and decide how they would respond. The hope is that down the road, when these students are faced with violence, peer pressure, or family discord, they can draw on the coping tools that they learned in the improv group. The future of psychodrama groups as a method of prevention and treatment is promising.

Like neurofeedback, there have been no widespread studies that back the clinical efficacy of expressive arts– art is ambiguous, making it difficult to operationalize and measure treatment progress. Despite this, numerous small-scale studies have shown that expressive arts approaches

can reduce symptoms of PTSD. Schouten and colleagues (2018) completed a pilot study with twelve PTSD patients: the patients were given eleven sessions of a research-based art therapy protocol that consisted of three different phases. Symptoms were measured via a self-report questionnaire that patients completed both before and after the protocol. About half of these participants experienced a decrease in PTSD symptoms (Schouten et al., 2018).

As you can see, expressive arts therapies offer a broad range of tools that allow trauma survivors to process and assign meaning to their experiences and move away from rigidity. The beauty of expressive arts is that there really is no "right" or "wrong" way to go about it: therapists can get creative with the way that they choose to introduce and implement these approaches. Expressive arts therapies transcend language, allowing therapists to connect with clients that may have language barriers. Natalie Rogers summed up her clients' responses to the expressive arts: "Clients report that the expressive arts help them to go beyond their problems, to find a new sense of soul or spirit, and to envision themselves taking constructive action in the world" (Rogers, 2016, p. 231).

Discussion

This paper explored various approaches to trauma treatment that can be implemented into a comprehensive, holistic treatment plan. Neurofeedback, yoga, the expressive arts, and mindfulness offer unique pathways to accessing and healing traumatic experiences. These treatments can increase self-awareness, autonomy, and regulation, and work to restore equilibrium in the brain and nervous system. Early studies for neurofeedback, yoga, and the expressive arts have shown promising results; however, larger-scale studies still need to be done in order for these methods to gain widespread acceptance. The clinical efficacy of mindfulness as a treatment for various ailments has been well documented thus far, and more research continues

to be done in this area. The possibilities seem to be endless; it is exciting to consider what new discoveries might be made in the coming years.

The next question is, what are ways in which clinicians can incorporate these approaches into practice? Some of these approaches can be practiced in the counseling room, while other approaches require outside services. Teaming up with other practitioners in the area is one way that clinicians can ensure their clients will have access to these services. For example, counselors could choose to work with a specific neurofeedback practitioner in the community and refer clients to that practice. Working with other professionals in the community is a great way to ensure well-rounded care, and allows for the opportunity to collaborate and discuss the client's progress. Additionally, clinicians can carve out a period of time during each session where the client can discuss their experience with the complementary treatment. This allows the clinician to determine if the treatment seems to be benefitting the client, or if another approach to treatment needs to be taken. Working with licensed art therapists or yoga instructors that offer trauma-informed yoga classes is another example of a community-based approach to treatment.

It is important to keep in mind that certain clients may have financial restraints or limited access to certain treatments. Searching the community for accessible treatment options– for example, community yoga classes or a clinician who offers neurofeedback at a reduced price– can increase the chances that a client would be able to partake. Clinicians working in impoverished, low-income areas should be especially sensitive to the barriers that their clients face on a regular basis. Working to find ways to help clients overcome these barriers and access services is an important part of our work as therapists.

Finally, becoming specialized in one or more of these areas is a great way to incorporate complementary treatments into your practice. If you find you are drawn to a specific approach,

you can seek out certification programs or online courses that allow you to become a practitioner of this approach. Becoming specialized in a certain area is also a great way to build a reputation in your community.

There is no "one size fits all" treatment for clients: each client has their own unique background, experiences, and way of being in the world. Clinicians are encouraged to work collaboratively with the client in determining which of these approaches would be the most beneficial for them. Continually tracking progress and checking in with the client can be helpful in determining if a given treatment has been beneficial, or if another route of treatment needs to be taken. Language constructs our reality, yet language is also limited in its ability to fully describe the complex, tumultuous inner experience of a trauma survivor. Drawing upon alternative approaches to trauma treatment in addition to traditional psychotherapy can work to bring about full healing.

It seems that every day, new light is shed on the way in which trauma can impact individuals, groups, and societies; many of the clients we work with will have experienced a trauma in some form. Chronic, complex trauma is a widespread public health problem that lies at the heart of societal issues such as the opioid epidemic, crime and violence, and chronic health struggles. The groundbreaking ACEs study found that childhood abuse and neglect has been linked with poor health outcomes, decreased life expectancy, and overall decreased well-being. While this may seem overwhelming at first, remember that creating change at the societal level can start at the individual level, with individual clients.

Future directions in the field of trauma include researching not only ways in which to treat trauma, but also *ways we can prevent trauma from occurring in the first place.* While certain traumas– such as natural disasters and war– cannot be prevented, traumas that are

interpersonal by nature *can* be prevented. Interpersonal trauma is cyclical and tends to be passed on, which is why we so often see abused children go on to abuse their own children. Prevention and early intervention can break that cycle; implementing psychoeducation and supporting high-risk families can lead to less instances of child abuse and neglect. Trauma prevention is a crucial ingredient to the overall pursuit of a healthier, happier society comprised of individuals that feel seen, known, and loved.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.) Washington, DC: American Psychiatric Publishing.

Bloom, Sandra. (1999). *Trauma theory abbreviated.* Sanctuary Web. Retrieved from http://www.sanctuaryweb.com/Portals/0/Bloom Pubs/1999 Bloom Trauma Theory Abbreviated.pdf

Bodhi, B. (2011). What does mindfulness really mean? A canonical perspective. *Contemporary Buddhism*, *12*(1), 19–39.

Bremner J. D. (2006). Traumatic stress: effects on the brain. *Dialogues in clinical neuroscience*, *8*(4), 445–461.

Cabral, P., Meyer, H. B., & Ames, D. (2011). Effectiveness of Yoga Therapy as a Complementary Treatment for Major Psychiatric Disorders. *The Primary Care Companion For CNS Disorders*.

Carbonell, D. M., & Parteleno-Barehmi, C. (1999). Psychodrama Groups for Girls Coping with Trauma. *International Journal of Group Psychotherapy*, *49*(3), 285–306.

Douglass, L. (2007). How Did We Get Here? A History of Yoga in America, 1800-1970. *International Journal of Yoga Therapy*, *17*(1), 35–42.

Echterling, L. G., Field, T. A., & Stewart, A. L. (2015). Evolution of PTSD diagnosis in the DSM. In H. Wallach, A. Rizzo, & M. Safir (Eds.), *Future directions in PTSD: Diagnosis, prevention, treatment* (pp. 189-212). New York, NY: Springer.

Enriquez-Geppert, S., Huster, R. J., & Herrmann, C. S. (2017). EEG-Neurofeedback as a Tool to Modulate Cognition and Behavior: A Review Tutorial. *Frontiers in Human Neuroscience*, *11*.

Fisher, S. F. (2014). *Neurofeedback in the treatment of developmental trauma: calming the fear-driven brain*. New York: W.W Norton & Company.

Follette, V., Palm, K. M., & Pearson, A. N. (2006). Mindfulness and trauma: implications for treatment. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *24*(1), 45–61.

Gapen, M., Kolk, B. A. V. D., Hamlin, E., Hirshberg, L., Suvak, M., & Spinazzola, J. (2016). A Pilot Study of Neurofeedback for Chronic PTSD. *Applied Psychophysiology and Biofeedback*, *41*(3), 251–261.

Germer, C. K., Siegel, R. D., & Fulton, P. R. (2016). *Mindfulness and psychotherapy*. New York: Guilford Press.

Impett, E. A., Daubenmier, J. J., & Hirschman, A. L. (2006). Minding the body: Yoga, embodiment, and well-being. *Sexuality Research and Social Policy*, *3*(4), 39–48.

Kabat-Zinn, J. (2015). Mindfulness. *Mindfulness*, *6*(6), 1481–1483.

Keng, S.-L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, *31*(6), 1041–1056.

Kimbrough, E., Magyari, T., Langenberg, P., Chesney, M., & Berman, B. (2010). Mindfulness intervention for child abuse survivors. *Journal of Clinical Psychology*, *66*, 17-33.

Kolacz, J., Kovacic, K. K., & Porges, S. W. (2019). Traumatic stress and the autonomic brain-gut connection in development: Polyvagal Theory as an integrative framework for psychosocial and gastrointestinal pathology. *Developmental Psychobiology,* 61(5), 796-809.

Levine, P. A. (2015). *Trauma and memory: brain and body in a search for the living past: a practical guide for understanding and working with traumatic memory*. Berkeley, CA: North Atlantic Books.

Loizzo,J.(2009). Optimizing learning and quality of life throughout the lifespan: A global framework for research and application. Annals of the New York Academy of Sciences, *1172*, 186-198.

Lykins, E., & Baer, R. A. (2009). Psychological functioning in a sample of long-term practitioners of mindfulness meditation. *Journal of Cognitive Psychotherapy: An International Quarterly*, *23*, 226–241.

Monk-Turner, E. (2003). The benefits of meditation: experimental findings. *The Social Science Journal*, *40*(3), 465–470.

Myers, J. E., & Young, J. S. (2012). Brain Wave Biofeedback: Benefits of Integrating Neurofeedback in Counseling. *Journal of Counseling & Development*, *90*(1), 20–28.

Nguyen-Feng, V. N., Clark, C. J., & Butler, M. E. (2019). Yoga as an intervention for psychological symptoms following trauma: A systematic review and quantitative synthesis. *Psychological Services, 16*(3), 513–523.

Ogden, P., Pain, C., & Fisher, J. (2006). A Sensorimotor Approach to the Treatment of Trauma and Dissociation. *Psychiatric Clinics of North America*, *29*(1), 263–279.

Osman, G. (2019). *Mental and emotional healing through yoga: a guiding framework for therapists and their clients*. New York: Routledge/Taylor & Francis Group.

Perryman, K., Blisard, P., & Moss, R. (2019). Using Creative Arts in Trauma Therapy: The Neuroscience of Healing. *Journal of Mental Health Counseling*, *41*(1), 80–94.

Porges, S. W. (2011). *The polyvagal theory neurophysiological foundations of emotions, attachment, communication, and self-regulation*. New York: W. W. Norton.

Ray, S. L. (2008). Evolution of Posttraumatic Stress Disorder and Future Directions. *Archives of Psychiatric Nursing*, *22*(4), 217–225.

Rhodes, A. M. (2015). Claiming peaceful embodiment through yoga in the aftermath of trauma. *Complementary Therapies in Clinical Practice*, *21*(4), 247–256.

Ringel, S., & Brandell, J. R. (2011). Chapter 1: Overview. In *Trauma: contemporary directions in trauma theory, research, and practice*. SAGE Publications.

Rogers, N. (2016). Person centered expressive arts therapy: a path to wholeness. In J. Rubin (Ed), *Approaches to Art Therapy, Third Edition* (pp 230-248). Routledge.

Sharma, M. (2013). Yoga as an Alternative and Complementary Approach for Stress Management. *Journal of Evidence-Based Complementary & Alternative Medicine*, *19*(1), 59–67.

Schouten, K. A., Hooren, S. V., Knipscheer, J. W., Kleber, R. J., & Hutschemaekers, G. J. (2018). Trauma-Focused Art Therapy in the Treatment of Posttraumatic Stress Disorder: A Pilot Study. *Journal of Trauma & Dissociation*, *20*(1), 114–130.

Solomon, E. P., & Heide, K. M. (2005). The Biology of Trauma: Implications for Treatment. *Journal of Interpersonal Violence*, *20*(1), 51–60.

US Department of Health and Human Services (2014). Understanding the Impact of Trauma. In *Trauma Informed Care in Behavioral Health Services.* US Department of Health and Human Services.

Traumatic Stress Disorder Fact Sheet (n.d.) *Sidran Institute.* Retrieved from https://www.sidran.org/wp-content/uploads/2018/11/Post-Traumatic-Stress-Disorder-Fact-Sheet-.pdf

van der Kolk, B.A. (2015). *The body keeps the score: brain, mind, and body in the healing of trauma*. New York: Penguin Books

van der Kolk, B. A. (2006). Clinical Implications of Neuroscience Research in PTSD. *Annals of the New York Academy of Sciences*, *1071*(1), 277–293.

West, J., Liang, B., & Spinazzola, J. (2017). Trauma sensitive yoga as a complementary treatment for posttraumatic stress disorder: A qualitative descriptive analysis. *International Journal of Stress Management*, *24*(2), 173–195.