

Yoga and the Ability to Counteract Negative Effects of Stress and Trauma

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### Abstract

Many individuals today struggle with the effects of chronic stress, whether due to social and environmental factors or as a result of trauma embedded in their psychophysiology. Research has demonstrated that once an individual endures a traumatic event, there are undesirable changes that occur in the brain and body. It is of the utmost importance that mental health counselors consider the relationship between the body and mind. The purpose of this paper is to describe the negative impact traumatic experiences and chronic stress has on the brain and body. Furthermore, the ways in which yoga practice can mitigate trauma symptoms and stress will be explored. Incorporating yoga as an adjunct to talk therapy has been found to lower stress levels while also working to repair biological mechanisms holding these ongoing stress patterns in place. Implications for mental health counselors will be discussed.

*Keywords:* yoga, trauma, stress, interoception, mind-body connection

### Yoga and the Ability to Counteract Negative Effects of Stress and Trauma

More than 50% of individuals in the United States have suffered from at least one traumatic experience (LaChiusa, 2016). Research has demonstrated that once an individual endures a traumatic event, there are undesirable changes that occur in the brain and body (Fareri & Tottenham, 2016; van der Kolk, 2015). While many people suffer with the stress-related consequences of trauma, there is also a concern that overall stress levels in the general population are on the rise. An annual survey by the American Psychological Association (APA, 2015) assessing stress levels in the United States found that Americans reported higher stress levels compared to the year prior. In 2015, 78% of individuals reported experiencing at least one symptom of stress and 24% of individuals reported experiencing extreme stress levels (APA, 2015).

Since stress is a major health concern, some Americans have begun to incorporate the Eastern practice of yoga into their everyday routines. “Yoga originating from India, is an ancient contemplative practice dating back over 3,500 years, which aims at one thing—to alleviate suffering and promote optimal physical and mental thriving” (Gard, Noggle, Park, Vago, & Wilson, 2014, p. 2) Not only is yoga being practiced as a part of a healthy lifestyle, many health professionals have begun to recognize yoga as an alternative or complementary form of healthcare, which has led to recent research efforts to measure the benefits of the age-old practice. While it is unlikely that today’s research will be able to measure every aspect of the ancient practice of yoga, the existing research is promising.

Practicing yoga has been found to decrease stress levels and increase coping skills (Gururaja, Harano1, Toyotake, & Kobayashi, 2011; Jindani & Khalsa, 2015). However, it is not

clear why yoga helps a person in these ways. This paper will explore the impact of trauma and stress on health. Additionally, research describing how yoga improves health and well-being will be examined. Next, research studying the mind-body connection will be reviewed. Finally, this paper will include a discussion of the incorporation of yoga into mental health practice.

### **The Impact of Trauma**

To facilitate an adequate understanding of the impact of trauma, it is important to begin by revisiting the Adverse Childhood Experience (ACE) study, which has serious and informative implications for our society. Its creator, Vincent J. Felitti (CDC, 2016) was the first to discover a strong positive correlation between ACEs (experiences that included sexual, physical, emotional or mental abuse or neglect, divorce/separation of parents, someone in the household being incarcerated, having substance abuse issues and/or mental illness) and a strong connection with physical and or mental illness in the future (Purewal, Bucci, Gutiérrez Wang, Koita, Silvério Marques et al., 2016). Felitti developed a small questionnaire, known as the “ACE questionnaire” which was distributed to 17,000 members of the Health Maintenance Organization, Kaiser Permanente, and incorporated into patient physical exams (CDC, 2016). Replications and variations of the study have been completed since and continue to show a strong positive correlation between ACEs and negative health consequences (Purewal et al., 2016).

More recent replications of the ACEs study have found a strong positive correlation between ACEs and a variety of negative health consequences in children including “fair or poor general health, illnesses requiring a doctor, fair or poor dental health, lifetime asthma, attention deficit hyperactivity disorder, autism, being overweight or obese and learning difficulties”

(Purewal et al., 2016, p. 11). Also, ACEs have been correlated with “cardiovascular disease, chronic lung disease, headaches, autoimmune diseases, sleep disturbances, early death, obesity, smoking, general poor health, depression, post-traumatic-stress-disorder, anxiety, substance abuse and binge drinking in adults” (Purewal et al. 2016, p. 11) along with links to violent behavior in both childhood and adulthood.

Changes in the brain as a result of ACEs may contribute to negative health outcomes including some already discussed (Fareri & Tottenham, 2016). A literature review by Fareri and Tottenham (2016) analyzed studies that correlated early life stress, mental illness, and associations with neurological changes in the amygdala and striatum of the brain. These brain areas are involved with fear conditioning and the reward systems. Further, these brain changes were found to possibly contribute to “the development of social withdrawal, poor regulatory abilities, and higher risk for internalizing illness such as depression, anhedonia, anxiety disorders, externalizing disorders and behavioral problems” later in life (Fareri & Tottenham, 2016, p. 234).

While individuals that experience trauma at a young age are the most impacted, those that experience trauma in adulthood also undergo changes in their bodies and brains. Traumatic experiences may include car accidents, domestic violence, natural disasters, war or other events an individual may perceive as life-threatening (van der Kolk, 2015). van der Kolk (2015), discovered significant correlations with increased hormones such as cortisol in the body after trauma. Cortisol is a hormone utilized by the body for appropriate functioning and is released when an individual is experiencing stress. It assists the individual to effectively cope with the stress-inducing stimulus and to bring the body back down from an aroused state (Staufenbiel, Penninx, Spijker, Elzinga, & van Rossum, 2013). Additionally, van der Kolk (2015) reported

that a traumatized person may experience more sensitivity to stressful stimuli. Not only experiencing higher arousal at the time the stimulus is presented, but also remaining in an aroused state for longer periods of time after the stressful stimulus is gone (van der Kolk, 2015).

### **The Impact of Chronic Stress**

Previous research has linked trauma, or ACEs, with increased stress levels (van der Kolk, 2015). However, ACEs are not the only experiences that can result in an individual operating in a highly stressed state. Stress can be defined as when an individual experiences demands that exceed what one believes oneself is capable of handling (Cohen & Janicki-Deverts, 2012). The APA (2015) issued a report of findings on the Stress in America Survey. The report warned that chronic stress is becoming “a public health crisis” (p. 5). In the survey, 22% of individuals reported experiencing “extreme stress” (p. 15) in 2011 and 44% of individuals reported that their stress levels have increased in the last five years. Top stressors were found to include concerns about money, job stability, and the economy (APA, 2011).

It is clear that chronic stress has many negative health consequences (Arnsten, Raskind, Taylor, & Connor, 2015; Cohen & Janicki-Deverts, 2012; D’Andrea, Ford, Stolbach, Spinazzola & van der Kolk, 2012; Karlamangla, Miller-Martinez, Lachman, Tun, Koretz, & Seeman, 2014). Cohen and Janicki-Deverts (2012) analyzed results from a national survey on stress that took place in 1983, 2006 and 2009. Higher levels of psychological stress have been positively correlated with negative physical consequences including: higher cortisol levels, weakened immune systems, greater susceptibility to infectious disease, increased inflammation, slower healing of injuries and elevated indications of biological aging. Additionally, high stress levels have been correlated with diseases, including: upper respiratory infections, autoimmune diseases,

cardiovascular disease, AIDS/HIV, depression, and overall mortality. Of particular note, women, minorities, and those who are unemployed were found to have the highest levels of stress (Cohen & Janicki-Deverts, 2012).

Exposure to stress impairs the prefrontal cortex (PFC), the part of the brain imperative for executive functioning, which includes the ability to regulate attention, perform goal-directed activities, expend cognitive flexibility, and to be aware of and have insight into one's own and others' actions. High stress levels impair the PFC, preventing proper executive functioning, and triggering response from the amygdala and other areas involved with emotional reaction (Arnsten et al., 2015). The result is that an individual is unable to think clearly or operate at full cognitive capacity and is more likely to be overcome with intense emotional responses. These intense emotional responses have been found to result in diagnoses of attention-deficit-hyperactivity disorder (ADHD) along with dissociation and other symptoms related to PTSD in children (D'Andrea et al., 2012). Other findings also suggest that chronic stress may be linked with impaired cognition later in life (Karlamañgla et al., 2014).

### **The Benefits of Yoga**

Yoga, first described by a sage named Patanjali over a thousand years ago, is an ancient practice said to be made up of eight different "limbs" or aspects of life. Patanjali is the known author of the classic text, *Yoga Sutras*. These eight limbs include: yamas (virtues/ethics), niyamas (observances/actions), asanas (physical postures or poses), pranayama (breath work), pratyahara (control of senses or sense withdrawal), dharana (concentration), dyana (meditation) and samadhi (enlightenment/bliss). There are many different forms and practices of yoga today but the *Yoga Sutras* are still thought by many to be the definitive text on yoga (Gard et al., 2014).

The purpose of the eight limbs of yoga are to help one to maintain balance in life (Gard et al., 2014). The word yoga means “to yolk” and refers to bringing together a union of the body, mind and spirit (Woodyard, 2011, p. 1). Westernized versions of yoga have more of a focus on asanas and pranayama (i.e., physical postures and breath work), though some teachers may incorporate various other limbs into a yoga practice at different times (Gard et al., 2014). The purpose of what many in the United States believe is yoga (i.e., asanas) was actually brought about as a way to prepare the body to sit still for long periods of time in meditation in the hope of reaching a state of samadhi (i.e., bliss or enlightenment with the divine) (Gard et al., 2014).

Growing popularity of yoga around the world has translated into research exploring potential benefits of this practice for both physical and mental health (Büssing, Michalsen, Khalsa, Telles, & Sherman, 2012; Gururaja et al., 2011; Jindani & Khalsa, 2015; LaChiusa, 2016; Stoller, Greuel, Cimini, Fowler & Koomar, 2012) Although, more research is needed before the benefits of yoga can be fully understood, there are many indications for the importance of a yoga routine in one’s life. The benefits of yoga have been found to be especially helpful for those that experience high levels of chronic stress (Büssing et al., 2012; Gururaja et al., 2011) that can be due to the burdens of modern life and social inequality/discrimination, (Cohen & Janicki-Deverts, 2012; Clay, 2011) and/or as result of the neurological and biological changes resulting from childhood or adult trauma (CDC, 2016; Emerson, 2015; Fareri & Tottenham, 2016; Haase et al, 2016; Purewal et al., 2016; Staufenbiel et al., 2013; van der Kolk, 2016). In this section, research that has found connections with yoga lowering stress levels and improving wellbeing and overall quality-of-life will be explored.

In an analysis of existing literature, Büssing et al. (2012) found significant correlations between practicing yoga and positive effects on physical fitness, blood pressure and



hypertension, pulmonary function, glucose regulation, menopausal symptoms, musculoskeletal function and pain (low back pain, arthritis, headaches/migraines, etc.), depression, fatigue, anxiety and anxiety disorders, cancer, epilepsy and cardiovascular endurance. While these findings are promising, research related to health implications of practicing yoga are in their infantile stages; “it is quite likely that yoga may help to improve patient self-efficacy, self-competence, physical fitness, and group support, and may well be effective as a supportive adjunct to mitigate medical conditions, but not yet as proven stand-alone, curative treatment” (Büssing et al., 2012, p. 6).

It should be noted that Büssing et al. (2012) included research which found evidence of positive correlations with yoga enabling more activation of the parasympathic nervous system, (PNS) also known as the “rest and digest” system (Wainapel, Rand, Fishman, & Halstead-Kenny, 2015 p. 365) while lowering engagement in the sympathetic nervous system (SNS), also known as the “fight or flight” system (Wainapel et al., 2015, p. 365). These findings are promising regarding yoga’s role in lowering high stress levels for those that experience them often.

In an analysis of the presence of the hormone, amalyse, Gururaja et al., (2011) found that lowered amounts of amalyse were present when the SNS was not activated. They analyzed the presence of amalyse in individuals practicing yoga poses (asanas), breathing exercises (pranayama), and relaxation. Additionally, participants were also given The State Trait Anxiety Inventory (STAI) before starting their yoga practice and after a month of participating in the yoga program. At the end of the study, researchers found decreased anxiety levels as a result of lowered salivary amylase activity and lowered anxiety scores on the STAI (Gururaja et al., 2011).

Multiple studies have demonstrated the benefit of yoga for individuals experiencing symptoms of PTSD (Jindani & Khalsa, 2015; Stoller et al., 2012). After an 8-week yoga program, participants reported that their yoga practice gave them self-care tools which gave them greater awareness of stress-induced sensations in the body and strategies to cope when feeling these sensations (Jindani & Khalsa, 2015). Additionally, a study of military veterans who had been deployed to Iraq found that yoga decreased anxiety and increased quality-of-life when compared to the control group. Quality-of-life factors included an increased ability to concentrate, feeling less irritable, less difficulty sleeping, fewer angry outbursts, not feeling on guard as often, and experiencing fewer intrusive thoughts (Stoller et al., 2012).

These findings suggest that yoga can be an essential component of treatment for individuals experiencing PTSD. Stoller et al., (2012) theorized that practicing yoga could inhibit the SNS response and in turn, increase quality-of-life. Additionally, yoga's benefits are enhanced by combining body movements with positive affirmations, assisting participants to put a halt to negative thinking patterns. Stoller et al., (2012) also attributed the use of encouragement to be in the present moment while practicing yoga as an important tool for assisting participants in no longer replaying the past and anticipating the future. Lastly, yoga's utilization of "bottom-up processing" (i.e., taking information from the body and communicating to brain) and "top-down processing" (i.e., taking information from the brain and communicating it in the body) as an important part of recovery (Stoller et al., 2012).

Yoga has also been found to improve emotion regulation in survivors of childhood abuse (LaChiusa, 2016). In a qualitative analysis of these survivors who had been practicing yoga for one year, 90.3% reported that practicing yoga helped them regulate their emotions "a lot" and 96.8% said that yoga helped them feel "a lot" more body awareness (p. 261). Researchers

concluded that those who experience trauma often struggle with a disconnection with their bodies as well as their emotions, also sometimes referred to as dissociation (LaChiusa, 2016).

### **The Mind-Body Connection**

The research to date has found a positive correlation with the practice of yoga and decreased stress and anxiety levels, (Büssing et al., 2012; Gururaja et al., 2011; Stoller et al., 2012) decreased symptoms of PTSD, (Jindani & Khalsa, 2015; Stoller et al., 2012) decreased symptoms of depression, (Büssing et al., 2012) and increased ability to regulate the body and emotions in those that have experienced childhood adversity (Emerson, 2015; LaChiusa, 2016; van der Kolk, 2015). What remains unknown is the process by which yoga improves these areas of life for individuals who practice it. One major way the practice of yoga benefits an individual is through strengthening the mind-body connection. There are various parts of the brain that facilitate this connection: the PFC, insula, and the vagus nerve are areas of the brain that will be discussed further next (Emerson, 2015; Gard et al., 2014; Haase et al., 2016; Kanbara & Fukunaga, 2016, LaChiusa, 2016; McEwen & Morrison, 2013; Stoller et al., 2012; van der Kolk, 2015).

The prefrontal cortex, (PFC), is essential in carrying out executive functioning, a form of “top-down control” or processing (McEwen & Morrison, 2013, p. 16). The PFC is connected with lower areas of the brain including the midbrain, brainstem and limbic system with an especially strong connection with the amygdala (Kanbara & Fukunaga, 2016). These connections are mostly all reciprocal; communication of information goes in both directions. The PFC allows for a person to be able to exhibit that top-down control/processing of the brain-body connection. For example, the PFC gives an individual the ability to choose to breathe slower and other

connections of the body can then exhibit “bottom-up” feedback and communicate a calmed state to the individual (Stoller et al., 2012). Stress hinders proper executive functioning; reducing cognitive abilities in the present along with possibly negatively altering the brain in the future (Arnsten et al., 2015; Karlamangla et al., 2014). Neuroimaging has found that trauma patients who are given trigger reminders of their trauma, experience a deactivation in a part of the PFC that is important for speech expression. These findings indicate why some individuals may not benefit as effectively from traditional talk therapy alone and may significantly benefit from the incorporation of yoga practice (Emerson, 2015; Stoller et al., 2012; van der Kolk, 2015).

The insula, located in the frontotemporal junction of the brain has important connections with the sensory motor cortex, the limbic system and the PFC and is thought to be the “central nervous system hub for interoceptive processing” (Haase et al., 2016, p. 37). Current neurological research indicates that individuals that display lower resilience also show heightened anterior insula activity while those with higher resilience only increased activity in the anterior insula when experiencing extreme negative emotions. Additionally, interoception has been found to be a vital part of resilience because it links arousal of the nervous system to goal-directed action that can restore homeostasis in the body. If an individual cannot access that connection appropriately this interferes with the ability to regulate the body properly. Therefore, lower resilience is marked with an overactive reaction to threat (Haase et al, 2016).

While trauma experiences result in neurological changes that impact an individual’s ability to connect with their body (Haase et al., 2016), researchers have found yoga to be beneficial for increasing activation in these areas of the brain important for interoception (Emerson, 2015). Interoception is a person’s ability to connect with and have awareness of different parts of their own body (Emerson, 2015). These findings support the hypothesis that the

mindfulness aspects of yoga including practicing interoception, may help to counteract the negative impact of stress on these portions of the brain by strengthening one's ability to be interoceptive.

Another important component of the mind-body connection is the vagus nerve. It is the longest nerve in the body and is theorized to start in the brainstem and connect with the majority of the primary organs including: areas of the mouth, pharynx, larynx, esophagus, bronchi, heart, stomach and intestine. This nerve is a part of the involuntary nervous system that allows reciprocal communication between the organs and the brain (Gard et al., 2014). A simplified example of how these connections work is if an individual is frightened, this would register in facial expression and would then be communicated through the vagus nerve to the heart which would then begin to beat faster, pumping more blood to the extremities in case of the need for fight or flight (Gard et al., 2014). After the threat has disappeared, an individual may register the aroused response in the body and then would be able to exhibit top-down control to calm down. This could be done through taking deep breathes that would register in the bronchi of the lungs and would then be communicated to the heart to slow its beating (Gard et al., 2014).

The interactions between the PFC, insula, vagus nerve and other areas such as the limbic system appear to work together to connect the mind and body (LaChiusa, 2016). Researchers suggest that when an individual experiences trauma, the SNS is activated for the sake of survival and energy is brought forth so that an individual can take action to survive (i.e., turning the wheel of a car to avoid hitting another vehicle). They theorized that if someone is unable to utilize this energy, it unfortunately, does not go away but remains trapped within the mind-body connection (Payne, Levine, & Crane-Godreau, 2015). Other researchers propose that traumatic

memories are stored in the connection between the PFC and limbic system and encoded through somatic sensations within the body (i.e., the mind-body connection) (LaChiusa, 2016).

Though traumatic memories are not consciously stored in this mind-body connection, a certain stimulus may trigger these stored memories and/or responses and may activate thinking processes and behavior. As a result of this activation, individuals with these stored responses go through life being influenced in this ongoing cycle, unable to find relief (van der Kolk, 2015). An example would be someone that has flashbacks and/or a highly conditioned fear response as a result of experiencing a trauma. There are clear indications here for the need for some sort of body work to be utilized in combination with talk therapy so that these trapped responses have a way to be processed so that the person in turn, experiences healing (van der Kolk, 2015).

The PFC, insula and vagus nerve are all theorized to be contributing forces that are strengthened through practicing interoception, a highly encouraged aspect of yoga (Emerson, 2015; Kanbara & Fukunaga, 2016; van der Kolk, 2015). It has also been found that the amygdala and other associated connections can be reconditioned through yoga (Gard et al., 2014). High levels of stress impair the PFC; paradoxically the amygdala is conditioned to bring about a heightened response (Arnsten et al., 2015). It has been theorized, however, that practicing yoga reconditions the amygdala's response. This reconditioning adjusts the interconnected responses in other areas of the brain-body connection. Overall, this allows decreased activation of the SNS; lowering stress and improving functioning in the brain and body (Gard et al., 2014).

As a person experiences the effects of a calmed state, this improves their ability for executive functioning through the PFC (Emerson, 2015; Payne et al., 2015 van der Kolk, 2015). At the same time, through the practice of interoception in yoga individuals may begin to allow

themselves to feel their bodies once more (Emerson, 2015; van der Kolk, 2015). It is speculated that through these experiences, trapped feelings in the mind-body connection possibly connected with traumatic memories, may have the opportunity to come to a person's conscious awareness (Payne et al., 2015). As a result, an individual may be able to release and/or process these feelings in a calm, welcoming environment (Emerson, 2015).

Information from the body is continuously communicated and integrated while doing yoga. Holding body postures, utilizing diaphragmatic breath and being mindful of feelings in the body encourages the practice of interoception while boosting the body's ability to remain calm (Gard et al., 2014). Additionally, mindfulness-based practices like yoga encourage individuals to observe their experiences and become aware of their reaction; thus empowering one to reduce the amount of attention to unwanted thoughts. This is a form of exercising and strengthening of self-regulation, which allows an individual to increase emotional stability and recover more quickly from emotional upset (Gard et al., 2014; Kanbara & Fukunaga, 2016).

Yoga is also helpful in allowing an individual to practice "positive reappraisal" which is a strategy for reframing one's perception of stressful stimuli (Gard et al., 2014, p. 8). An example of positive reappraisal is when holding a challenging posture in yoga. As students feel their legs shaking from the burden on the muscles, they may be reminded how the legs are being strengthened. They might also be encouraged to breathe or work through the discomfort because it is temporary (Gard et al., 2014). The practice of positive reappraisal is helpful in hindering negative thought patterns that often develop as a result of stress or trauma (Stoller et al., 2012).

## **Discussion**

In this paper, biological changes observed as a result of high levels of stress and trauma have been introduced. The research reviewed demonstrated a strong link between ACEs and chronic mental and physical illnesses (CDC, 2016; Fareri & Tottenham, 2016; Purewal et al., 2016). The negative impact of trauma later in life and overall, chronic stress was also explored and found to have detrimental effects on health and well-being (Arnsten et al., 2015; Clay, 2011; Cohen & Janicki-Deverts, 2012; D'Andrea et al., 2012; Haase et al., 2016; Karlamangla et al., 2014; Staufenbiel et al., 2013; van der Kolk, 2016).

It may be surmised that some individuals experience a more highly stressed state as a result of traumatic experiences, while others may come to a stressed state devoid of trauma. Biological differences, life circumstances and/or cultural backgrounds (e.g., race/ethnicity, gender, lower socioeconomic status, etc.) also appear to have an effect on the impact of stress (Cohen & Janicki-Deverts, 2012; Clay, 2011). Whether a person deals with stress as a disadvantage invoked on them from a young age, as a result of chronic stress or some combination of the two, it is clear that physical and mental health concerns arise as a result of these psychosocial factors (Arnsten et al., 2015; CDC, 2016; Clay, 2011; Cohen & Janicki-Deverts, 2012; D'Andrea et al., 2012; Fareri & Tottenham, 2016; Haase et al., 2016; Karlamangla et al., 2014; Purewal et al., 2016; Staufenbiel et al., 2013; van der Kolk, 2016). All these effects put those that experience them at a great disadvantage in carrying out healthy, prosperous and full lives.

The effects of trauma and stress on the brain and body demonstrate a mind-body connection that should be acknowledged and considered important by mental health counselors. Many of the benefits yoga practice appear to reverse these unwanted changes that often occur with childhood adversity, trauma and chronic stress. First, practicing yoga has been found to



lower stress levels, which is immensely important for individuals who struggle with chronic stress in their lives (Büssing et al., 2012; Gururaja et al., 2011). Giving an individual the ability to bring their body to a calmer, more relaxed and clear state of being can be life-changing and simply lowering one's stress levels may allow this to begin to take place. Mental health counselors have the opportunity to recommend yoga practice for clients as a conjunctive treatment.

Yoga practice in mental health counseling can be implemented at varying degrees. Importantly, it seems as though clear standards for incorporating yoga into mental health counseling practice have not been delineated specifically by counseling associations nor professional yoga organizations. Some options to implement yoga into mental health practice may be to first, consider the incorporation of meditative breathing and simple yoga poses and stretches. These techniques can begin to facilitate client awareness of their mind-body connection. Counselors may incorporate deep breathing and relaxing postures for clients who are chronically anxious; while clients who experience significant depression may benefit from arousing breathing and energizing postures.

Additionally, those clinicians who have advanced professional training in yoga practice may incorporate longer yoga practice alongside their talk therapy with clients. Regardless, yoga practice in mental health counseling requires a specific set of skills and training and the American Counseling Association (2014) ethical codes require that counselors practice within their scope of expertise. Additionally, the utilization of yoga in mental health counseling would need to be agreed upon by the client and a detailed informed consent of its use and purpose in session should be incorporated to protect the counselor and client (American Counseling Association, 2014).

Some of the findings for stress-induced neurological changes that are reversed with yoga were also explored in this paper. Stress impairs the PFC of the brain (Arnsten et al., 2015) and yet, practicing yoga is a way to lower stress levels and allow the PFC to work properly (van der Kolk, 2015). Also, stress and/or trauma may cause an over-arousal of the amygdala and other interconnected portions of the brain but practicing yoga is theorized to reverse this and recalibrate the amygdala to regular functioning (Gard et al., 2014). These findings alone demonstrate that yoga can begin to allow a person to think clearly once more and rescue oneself from operating in a constant state of confusion and emotional arousal. These neurological implications emphasize the importance of yoga practice in the treatment of individuals who have experienced significant trauma and stress.

Additionally, the practice of yoga may enable a person to discover areas of the body associated with trauma and to release or process these feelings, ultimately facilitating liberation from unwanted thought patterns and trapped tension that may otherwise result in mental and/or physical illness (Payne et al., 2015). While this takes place, a person's strengthened ability to be interoceptive to their body allows for further emotional stability and regulation while they are able to find clarity as a result of being able to properly carry out executive functioning and process emotions (Kanbara & Fukunaga, 2016; van der Kolk, 2015).

Overall, not only can practicing yoga aid in overcoming past trauma and relieve current stress, but it may also strengthen one's ability to combat future trauma and stress. This is done by giving the client coping skills and also strengthening the mind-body connection improving the abilities of the PFC, insula, vagus nerve and other areas involved, improving body and emotional regulation (Emerson, 2015; Gard et al., 2014; Kanbara & Fukunaga, 2016; van der Kolk, 2015).

While emerging data provides support, additional research exploring the function of yoga is required. Büssing et al. (2012) reported that more rigorous and larger scale, and more longitudinal studies are needed in order for researchers to fully be able to support the various findings that indicate the benefits of a yoga practice. Additionally, it also is recommended that there be a wider range of participants in future studies on yoga. While there is some research that has taken place for those that have struggled with ACEs, this is not the case for those experiencing higher allostatic loads as a result of discrimination and poverty. Also, a more comprehensive understanding of the key benefits of yoga in relation to neurological findings would be helpful.

### **Conclusion**

The purpose of this paper was to describe the negative impact and scope of traumatic experiences and chronic stress on the brain and body. In doing so, this set the stage to explore the ways in which a yoga practice can reverse these negative effects on the mind-body connection and how this can improve overall health and well-being. There is a need for further research in order to help to prove and support the many theories involved in how the body and mind are connected and why it is important for individuals to partake in yoga or other mindfulness practices involving the body to assist in healing from trauma and/or chronic stress.

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