

Chapter 8

Mindfulness-Based Interventions for Traumatic Stress



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Introduction

Growing evidence supports the claim that mindfulness, a purposeful and present-moment awareness, reduces symptoms of posttraumatic stress disorder (PTSD) faced by survivors of trauma (Gallegos et al., 2017; Hilton et al., 2017; Hopwood & Schutte, 2017). Intentional attention to present moment experience with an attitude of patience, compassion, and nonjudgment may specifically address symptoms of avoidance, hyperarousal, intrusions, and negative moods and thoughts commonly experienced by those suffering from PTSD. Mindfulness-based interventions have been tested both as stand-alone (e.g., Kelly & Garland, 2016) and adjunctive treatments (e.g., King et al., 2016) for survivors of trauma, with promising results. Further, a specific attitudinal foundation of mindfulness, self-compassion, has been linked to lower PTSD symptoms and has been found to prospectively, negatively predict levels of PTSD symptoms in trauma-exposed populations (Hiraoka et al., 2015; Maheux & Price, 2016; Seligowski et al., 2014; Thompson & Waltz, 2008).

Two prominent theoretical camps have emerged in the use of mindfulness-based interventions for survivors of trauma. Follette, Palm, and Pearson (2006) argued that mindfulness may enhance exposure-based treatment for survivors of trauma, and this theory has received empirical support in the form of mindfulness-based exposure therapy with samples of combat veterans reporting clinically significant reductions in PTSD symptoms (King et al., 2016). A second theoretical approach has pointed specifically to the fact that mindfulness practices lead to a natural exposure to both internal and external trauma reminders, leading to the same inhibitory learning experienced in exposure therapy (Brown et al., 2007; Holzel et al., 2011). This raises the possibility that mindfulness-based interventions can benefit trauma survivors in isolation without added imaginal or in vivo exposure.

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Mindfulness-based interventions also have received empirical support by producing reductions in PTSD symptoms, even when used as a stand-alone treatment (Kelly & Garland, 2016), and have received support from meta-analytic studies (Gallegos et al., 2017; Hilton et al., 2017; Hopwood & Schutte, 2017).

The following chapter reviews theories of PTSD treatment, mindfulness, and self-compassion, and empirical support for each theoretical perspective. First, the symptoms of PTSD are reviewed as they are reported in the *Diagnostic and Statistical Manual of Mental Disorders – 5* (DSM-5; American Psychological Association, 2013). Next, theoretical models of PTSD including Mowrer's (1947) two-factor theory, Foa and Kozak's (1986) emotional processing model, and Craske et al.'s (2014) inhibitory learning model are discussed. This information will lay the groundwork for the following section, which details theoretical models for the ways in which mindfulness may aid survivors of trauma. As a central focal point, Shapiro et al.'s (2006) intention, attention, and attitude (IAA) model is reviewed, as well as possible mechanisms of mindfulness including enhanced cognitive, emotional, and behavioral flexibility, enhanced self-regulation, and natural exposure to feared stimuli. Next, empirical findings are reviewed to support the claim that mindfulness-based interventions ameliorate symptoms of PTSD, and do so consistently, leading to significantly lower levels of PTSD than treatment as usual. Then, the relationship between PTSD symptoms and self-compassion, an attitudinal foundation of mindfulness, is reviewed, along with evidence to support the negative relationship between the two. Finally, the relationship between PTSD and inflammation is described, along with linkages to mindfulness-based interventions as a way to reduce both inflammation in the body and symptoms of PTSD.

Traumatic Stress

Traumatic stress and its related disorders are unique in the field of psychopathology due to the clarity of their etiology. Traumatic stress follows traumatic events. According to the *Diagnostic and Statistical Manual of Mental Disorders* (fifth ed.), traumatic events are those that involve “actual or threatened death, serious injury, or sexual violence” (American Psychiatric Association, 2013, p. 271). Stress that develops following events such as these qualifies as traumatic stress. Traumatic stress can result from directly experiencing or witnessing a traumatic event, from hearing about the extreme details of a traumatic event through work (e.g., police officers, first responders, victim advocates), or from a family member or close friend who experienced the event. Symptoms fall into four main categories: intrusion, avoidance, negative alterations in thoughts and mood, and changes in levels of arousal. If symptoms are present for less than a month following the traumatic event, a person may qualify for a diagnosis of acute stress disorder; if symptoms persist for longer than 1 month, they may qualify for a diagnosis of posttraumatic stress disorder (American Psychiatric Association, 2013).

Symptoms of intrusion include disturbances related to the traumatic event that a person has experienced. This aspect of traumatic stress involves the re-experiencing of the traumatic event through thoughts, dreams, psychological distress, physiological arousal, and flashbacks. Specific symptoms include intrusive and involuntary memories and/or dreams about the traumatic event, psychological distress and/or marked physiological reactions to internal and external reminders of the traumatic event, and dissociative reactions that give a survivor the feeling that the traumatic event is happening again (American Psychiatric Association, 2013). While some survivors may experience all of the symptoms described, others will experience only a subset.

Symptoms of avoidance include evasion of trauma reminders. This includes both avoidance of external stimuli that evoke memories, thoughts, and feelings related to the traumatic event and avoidance of internal stimuli, such as the memories, thoughts, and feelings themselves (American Psychiatric Association, 2013). For example, a person who has experienced a physical assault in a parking garage may choose street parking instead of risking entry into the adjacent garage which could in turn elicit memories related to their assault. Additionally, this person may listen to loud music or say a silent prayer at the first sign of a memory related to their trauma arising.

Negative alterations in cognitions and mood that are related to the traumatic event make up the third symptom group of trauma-related stress. In brief, this set of symptoms relates to negative emotional states such as fear, anger, and guilt as well as negative thoughts about oneself, the world, other people, and the traumatic event itself that occur following trauma. For example, following a traumatic event, a person may feel frequent guilt and shame related to the traumatic event, believe that the world is an extremely dangerous place, and feel detached from others. The following symptoms are included in this group: failure to remember important aspects of the traumatic event; distorted, negative beliefs about oneself, the world, and others; distorted cognitions about the cause and/or consequences of the traumatic event; negative emotional states that are persistent; diminished interest in significant activities; feelings of estrangement from others; and an inability to experience positive emotions that are persistent (American Psychiatric Association, 2013).

The final group of symptoms relates to changes in arousal and reactivity that is associated with the traumatic event. Traumatic stress can lead to irritable outbursts, hypervigilance, and sleep difficulties that are related to a higher level of physiological arousal. Additionally, survivors may experience an exaggerated startle response and difficulty concentrating and may engage in self-destructive behavior (American Psychiatric Association, 2013). This state of heightened arousal related to the traumatic event is a visceral experience for survivors of trauma and can cause major disturbances in interpersonal relationships as well as functioning at work or school.

Theoretical Models of PTSD Mowrer's two-factor theory provided an early theoretical framework for the acquisition and maintenance of fear in response to traumatic events (Mowrer, 1947). First, a person acquires a fear response through classical conditioning. A neutral stimulus (seeing a traffic light turn green) is paired

with an unconditioned stimulus (a life-threatening car accident in the middle of an intersection) which elicits an unconditioned response (fear for one's life.) In the example provided, seeing a traffic light turn green becomes a conditioned stimulus capable of eliciting fear, which is now a conditioned response. Classical conditioning explains why this example trauma survivor may feel fearful when driving through an intersection.

Mowrer's second factor involves the maintenance of the fear response through operant conditioning (Mowrer, 1947). With enough repeated presentations of the conditioned stimulus in the absence of the unconditioned stimulus, the pairing between the conditioned stimulus and conditioned response will go extinct. Following the previous motor vehicle accident example, driving through many intersections after the light turns green without experiencing any life-threatening car accidents should lead to the extinction of fear in response to traffic lights turning green. However, for many survivors of trauma, avoiding the conditioned stimulus all together provides relief from negative emotions, which in turn negatively reinforces the avoidance behavior. As noted previously, avoidance symptoms make up one of the four primary categories of symptoms for trauma-related disorders. After experiencing a motor vehicle accident, a person may simply refuse to drive on roads with traffic lights, or perhaps refuse to drive under any circumstances. Choosing not to drive allows this person to escape the discomfort elicited by reminders of their trauma, but also robs them of their chance to experience extinction of the fear response.

Foa and Kozak's (1986) emotional processing model was built on Mowrer's theory. The emotional processing model rests on the assumption that fear structures exist within the brain that link stimuli, responses, and meaning (Rauch & Foa, 2006). The person who was involved in the motor vehicle accident may have a fear network that includes seeing a traffic light turn green (stimulus), activation of the sympathetic nervous system (physiological response) and driving away from the sound (behavioral response), and thoughts such as "I am in danger of dying" (meaning). Foa and Kozak (1986) posited that the structure itself must be modified through activation of the fear network by means of exposure to trauma reminders and the presentation of new information that is not compatible with the current fear structure. Clients will need to experience activation of their fear networks, for example, by driving through many intersections just after the light turns green, in order to integrate new information that objectively safe trauma reminders are not signs of danger.

However, newer studies have questioned the emotional processing model due to the frequency of relapse after treatment. The emotional processing model implies that those who successfully complete treatment should have a healthy, properly functioning fear network. This model therefore fails to explain why some clients experience relapse. Craske et al. (2014) suggested an alternative explanation for the success of exposure-based treatment: the inhibitory learning model. This model suggests that the original conditioned stimulus-unconditioned stimulus (CS-US) pairing, for example, driving through an intersection and colliding with another

vehicle, cannot be erased through exposure. Rather, a new conditioned stimulus-no unconditioned stimulus (CS-noUS) pairing is created through repeated presentations of the conditioned stimulus without the unconditioned stimulus, for example, driving through an intersection without a collision. Each pairing gives a separate instruction: the learned pairing of CS-US activates fear, and the newly learned CS-noUS pairing inhibits fear (Craske et al., 2014). With enough repeated presentations of traffic lights turning green without car accidents, the inhibitory learning will be strengthened, and the fear response will not be elicited.

Mindfulness and Trauma

Mindfulness-based interventions have been successfully implemented for those who suffer from anxiety and mood disorders across many clinical trials (see Chap. 9). However, early concerns that mindfulness practice could worsen trauma symptoms led to a delay in their implementation with survivors of trauma (Lustyk et al., 2009; Germer, 2005). In previous editions of MBSR treatment manuals, Santorelli and Kabat-Zinn (2009) cautioned that those with a current diagnosis of PTSD may not be ready to participate in the program. A large qualitative study interviewed current meditators about adverse experiences that have been encountered over the course of practice. After conducting a large qualitative study, authors reported that it “was not uncommon” for participants with a trauma history to report re-experiencing traumatic memories (Lindahl et al., 2017, p. 19).

One author from this qualitative study, mindfulness researcher Willoughby Britton, wrote in more detail about one such story of a survivor of trauma who experienced paralyzing flashbacks when attending a 10-day meditation retreat. Britton continued to describe several stories she had encountered from survivors who experienced dissociation during mindfulness practice as well as the shame that often accompanies these survivors’ stories and a sense that they somehow “failed” mindfulness practice (Treleaven, 2008, p. xi). David Treleaven, a psychotherapist and author of the book *Trauma-Sensitive Mindfulness*, offers several anecdotes from individuals who experienced an aggravation and intensification of trauma symptoms when engaging with mindfulness practice. Many of these stories involve participants who attended intensive, multiday silent retreats, and those who received mindfulness training as part of other classes, such as a high school student who participated in weekly mindfulness lessons with his classmates and reported re-experiencing symptoms and hyperarousal in response to the practices (Treleaven, 2008). However, as is noted later in this chapter, re-experiencing of traumatic memories during meditation may actually be ameliorative for survivors of trauma with proper guidance from a psychotherapist. Treleaven pointed to Peter Levine’s work, who also recognized the potential benefits of mindfulness practice for survivors of trauma but noted that it could be harmful if participants are not adequately prepared to encounter re-experiencing symptoms during meditation (Levine, 2010). Importantly, no iatrogenic effects were found in the five quantitative studies that

measured the potential adverse effects of conducting a mindfulness-based treatment with survivors of trauma (Bormann et al., 2013; Kearney et al., 2013; Mitchell et al., 2014; Niles et al., 2012; Polusny et al., 2015; see Hilton et al., 2017 for a complete review).

In contrast, mindfulness may provide benefits to either supplement concurrent trauma treatment or possibly treat traumatic stress directly (Gallegos et al., 2017; Hilton et al., 2017; Hopwood & Schutte, 2017). Specifically, mindfulness practice allows for greater cognitive, emotional, and behavioral flexibility, self-regulation and self-management, and exposure which all uniquely benefit survivors of trauma. Before seeing how these benefits arise and work to counter symptoms of PTSD, it is first important to provide a conceptual model of mindfulness. What follows is an exploration of different components that come together to describe mindful awareness, and synthesis of these ideas with what is already known about the treatment of survivors of trauma.

Intention, Attention, and Attitude In order to understand the role that mindfulness plays in the amelioration of mental illness broadly, Shapiro et al. (2006) introduced a model that breaks mindfulness down into three smaller, interconnected components. The model describes three axioms of mindfulness: intention, attention, and attitude (IAA). Intention is the purpose that a practitioner ascribes to the practice. For example, a meditator may practice with the intention of learning more about their habitual patterns of responding to stress. A previous study that investigated intentions of long-term meditators found a common progression of intentions starting with self-regulation, transitioning to self-exploration, and ending with the intention of self-liberation (Shapiro, 1992). The second axiom, attention, refers to the process of observing present moment experience. Attending to moment-to-moment experiences includes both external phenomena taken in through sensory data and internal events such as thoughts, emotions, and physical sensations. The final axiom, attitude, is the quality with which a person attends to the present moment. Attitudinal foundations of mindfulness include patience, compassion, and nonjudgment. An open and accepting quality of awareness is the difference between mindfulness and other states that involve intentionally attending to the present moment with judgment, such as hypervigilance or anxious overanalysis.

Taken together, these three axioms describe the essential features of mindfulness, a purposeful, present moment awareness that is nonjudgmental (Kabat-Zinn, 2013). Shapiro et al. (2006) coined the term “reperceiving” to describe the shift in perspective that occurs when these three mechanisms come together. This shift allows the practitioner to experience greater clarity of mind, and to recognize that thoughts themselves are distinct from the mind in which they were formed (Shapiro et al., 2006). This “de-fusion” between the observer and the observed allows space for disidentification, (e.g., “I am not my thoughts,” “I am not my fear”).

Cognitive, Emotional, and Behavioral Flexibility

Shapiro et al. (2006) suggested that increases in cognitive, emotional, and behavioral flexibility may partially explain why mindfulness is beneficial for those

suffering from mental illness. Here, the term flexibility refers to the ability to see multiple options for responding, the willingness to respond adaptively, and the self-efficacy to believe that it is possible to adapt (Martin & Rubin, 1995). A cognitively flexible person can see that there are several ways to respond to being cut off in traffic, selects the most adaptive and situationally appropriate option, and believes they have the power to follow through on their decision to assume the person has somewhere important to be rather than responding habitually by cursing their fellow driver's performance.

Mindfulness is positively related to cognitive flexibility (Moore & Malinowski, 2009). The skill of re-perceiving provides a chance to deidentify from habitual patterns of reactivity while also seeing a broader range of options for responses. Intentionally attending to thought patterns with an attitude of nonjudgment allows a person to notice habitual, maladaptive ways of responding to stimuli. Those high in trait mindfulness can be flexible and chose to see the situation in a new light in order to adjust prior beliefs. For example, a combat veteran may experience symptoms of intrusion, such as reoccurring, unwanted memories about taking the life of an enemy combatant. Perhaps this person has a tendency to feel frustrated with themselves for having these intrusive memories and thinks things like, "I am a broken and damaged individual." With mindfulness, this veteran has an opportunity to observe the habitual thought and re-perceive the intrusive memories with a broader range of response options. Perhaps they say to themselves, "These memories are difficult to face but they will not last forever." In this example, this person was able to see several options of responding to the intrusive memory and select a more adaptive response thanks to their intention to attend to the memories with an attitude of openness and acceptance. Empirical findings support this conclusion; researchers found cognitive flexibility to be a negative predictor of PTSD severity in survivors of interpersonal violence (Palm & Follette, 2011).

As seen in the example above, greater flexibility across the domains of thoughts, behaviors, and emotions can aid survivors in their attempts to cope with symptoms, including intrusive thoughts. Flexibility is also likely to have a positive impact on the group of symptoms known as negative alterations in mood and cognitions. As a survivor becomes more aware of their negative thought patterns and selects more adaptive responses, they should encounter changes in their beliefs about themselves, the world, and others. However, no studies that have applied mindfulness-based interventions to trauma populations have investigated this specific question. More research is needed to determine whether cognitive flexibility is the mechanism of change for improvement of the negative alterations in cognitions that occur following trauma.

Self-Regulation

Self-regulation refers to the processes involved in maintaining stability in functioning while also adapting to a constantly changing world (Shapiro & Schwartz, 2000). This model of self-regulation identified a chain of events essential to achieve and maintain health:

Intention → Attention → Connection → Regulation → Order → Health

Shapiro and Schwartz (2000) upheld that attention is a necessary precursor but emphasized the importance of the intention behind the attention being afforded. The authors offer mindfulness – a specific way of paying attention – as an avenue for achieving the correct intentions and attention that inevitably lead to health. For example, someone who aims to lose weight can choose to attend to their caloric intake and the interoceptive experience of hunger. Without an attitude that is in accordance with mindfulness, this person may inhabit judgments such as “My body will never be satisfied with such a small portion,” or “I hate this body.” Ultimately, these judgments are more likely to lead to disconnection between the mind and body, possibly leading to greater dysregulation and eventually disorder. On the other hand, an attitude of warmth, nonjudgment, and loving-kindness may lead to greater self-acceptance and self-compassion, and in turn connection, regulation, order, and health. The attitude behind the attention being offered functions as a major determining factor as to which outcomes are available: regulation vs. dysregulation, order vs. disorder, and ultimately health vs. an absence of health.

This model applies to both physical and mental health. Shapiro et al. (2006) elaborated on ways that mindful self-regulation can benefit those suffering from mental illness. Cultivating mindfulness allows for a person to attend to data that may have previously been too uncomfortable to examine. This includes habitual, maladaptive patterns of thoughts, behaviors, and emotions that may be maintaining dysregulation in the system. For example, a survivor of trauma who is introduced to mindfulness may begin attending to thoughts and emotions that arise when reminded of their traumatic experience. While sensing into an experience of fear, a survivor may notice a thought such as “I am broken and weak for feeling this way,” which is representative of the negative cognitions commonly experienced by survivors. Mindfulness allows for re-perceiving, the freedom to demarcate oneself from one’s thoughts and perceive the emotion in a new way. Now perhaps the emotion can function as a signal for a need that is not being met or a sign that it is time to implement a coping skill, thus putting into motion greater self-regulation.

Exposure

Exposure is the best empirically supported treatment for a mix of anxiety and trauma-related disorders (Craske et al., 2014). In the case of trauma, survivors have learned to fear objectively safe stimuli through classical conditioning which then can generalize to other similar, objectively safe stimuli. This fear learning is maintained by avoidance of the feared stimuli which removes the chance for exposure and the inhibitory learning that follows. Exposure is the process of facing one’s fears; experiencing repeated inhibitory learning (CS-noUS pairings) results in the inhibition of the fear response.

Follette, Palm, and Pearson (2006) note that the avoidance behaviors that prevent successful exposure could be resolved with mindful awareness. As noted previously, the DSM-5 identifies two types of avoidance symptoms for survivors experiencing traumatic stress: avoidance of external reminders and avoidance of internal reminders. Mindful awareness can reduce avoidance of both types of reminders. As survivors learn to attend intentionally to the present moment without judgment, they

will have the opportunity to experience internal reminders (i.e., thoughts, memories, and emotions) as they arise. This willingness to be with whatever arises allows a survivor to be exposed to internal reminders (CS) in the absence of real danger (noUS) which allows for inhibitory learning to take place. Survivors realize that memories and feelings that serve as reminders of their traumatic experience are not inherently dangerous. The same principles apply to external reminders. With mindful awareness, clients can become aware of what situations, people, and places they are avoiding, and attempt to approach these situations. Further, when a client approaches a feared external stimulus, they may cope by using covert avoidance tactics (e.g., silently praying, distracting with other thoughts) which serve to maintain their original fear of the external stimulus. Mindfulness provides the opportunity to be with whatever arises in the present moment, likely optimizing planned exposures as part of exposure-based treatment for PTSD. As avoidance symptoms decrease and survivors approach additional feared stimuli with mindful awareness, they will have increased opportunities for inhibitory learning in natural settings, that is, greater number of naturally occurring “exposures” in day-to-day living.

Empirical Findings

Experimental studies concerning the implementation of mindfulness-based interventions with survivors of trauma broadly fall into two theoretical camps. First, along the lines of Follette, Palm, and Pearson (2006), mindfulness has been added as an adjunct to exposure-based protocols as a way to enhance the effectiveness of gold-standard treatments for trauma survivors. A clear example of this is King et al.’s (2016) mindfulness-based exposure therapy (MBET), which significantly reduced symptoms of PTSD in populations of combat veterans. The second group of studies attempts to test the theory that mindfulness practice will naturally lead to increased exposure to previously avoided thoughts, feelings, and even environments, as suggested by Brown, Ryan, and Cresswell’s (2007) theoretical work and enhanced by the psychophysiological work of Hölzel et al. (2011). An example can be found in the work of Kelly and Garland (2016), who crafted a modified version of MBSR for survivors of trauma, which they refer to as Trauma-Informed Mindfulness-Based Stress Reduction (TI-MBSR). When compared to a waitlist control, TI-MBSR resulted in significantly greater reductions in symptoms of PTSD in a group of survivors of intimate partner violence. The following section details findings to support each theoretical position and then explores future directions for research in this area.

Mindfulness as an Adjunct Treatment There are four main ways in which mindfulness has been evaluated as an adjunct to treatment as usual conditions, in order to test whether mindfulness interventions enhance treatment for survivors of trauma. First, as mentioned previously, MBET adds mindfulness practices to intervention components from prolonged exposure therapy, a gold-standard treatment for treat-

ing symptoms of trauma, with promising results (King et al., 2016). Next, the practices of mantram repetition and yoga have been added to treatment as usual, also showing promising results (Bormann et al., 2013; van der Kolk et al., 2014). Finally, researchers have explored the effects of enrolling participants in both treatment as usual and MBSR simultaneously, without significant results (Kearney et al., 2013).

Mindfulness-based exposure therapy (King et al., 2016) began after a research group at the Ann Arbor VA tested the effectiveness of MBCT with a group of combat veterans (King et al., 2013). Using a matched control support group focused on present difficulties and coping skills, researchers found that MBCT resulted in roughly the same statistically significant reduction in PTSD symptoms as the control group. Following the successful trial of MBCT, King et al. (2016) designed and tested a protocol that merged elements of MBCT with elements of prolonged exposure therapy for PTSD. In line with MBCT, MBET is a group program that covers topics including mindfulness and self-compassion, while heavily emphasizing mindfulness practices, including mindfulness of breathing and mindfulness of emotions practices. In accordance with prolonged exposure therapy, MBET offers psychoeducation about PTSD and implements *in vivo* exposures, in which survivors of trauma collaborate to identify objectively safe situations and places that they have been avoiding and purposefully approach such situations in order to gain the benefits of inhibitory learning (i.e., CS-noUS pairings). The intervention is broken up into four modules as follows: psychoeducation about PTSD and relaxation, *in vivo* exposure and mindfulness of the breath and body, *in vivo* exposure and mindfulness of emotions, and training in self-compassion.

Results from King et al.'s (2016) trial compared MBET with the same matched control as in their 2013 study, Present-Centered Group Therapy, with each group consisting of combat veterans diagnosed with PTSD (MBET, $N = 14$; PCGT, $N = 9$). Both the group who underwent MBET and the group who participated in Present-Centered Group Therapy showed statistically significant reductions in trauma symptoms, as measured by Clinically Administered PTSD Scale (CAPS). Additionally, only those in the MBET group showed statistically significant increases in connectivity between the default mode network, which is a network of interconnected brain regions associated with both mind-wandering and self-reference (Kiviniemi et al., 2003), and the regions of the brain that are involved in executive control. King and colleagues explained that this increase in connectivity points to an enhanced ability to volitionally shift attention, a common element of formal mindfulness practices. This psychophysiological finding implicates the ability to choose the focus of the spotlight of one's attention as a key to understanding how it is that mindfulness may enhance treatment for PTSD. Shapiro et al. (2006) emphasized the importance of attention in the IAA model discussed previously in this chapter. The ability to choose where attention is focused allows for greater opportunities for reperiencing, self-regulation, and present moment awareness.

Mantram repetition, or the meditation practice of repeating mantras, has been tested as an adjunctive treatment with a group of veterans undergoing treatment as usual, using a randomized control design (experimental group, $N = 66$; control

group, $N = 70$; Bormann et al., 2013). Veterans who were randomized to the added mantram repetition condition showed statistically significant improvements in PTSD symptoms when compared to the control group. Those in the control group and those in the experimental group had identical dropout rates, 7%, which could indicate that this meditation adjunct is an acceptable treatment for combat veterans with PTSD.

Yoga has been explored as an asynchronous add-on to treatment as usual for female survivors with treatment resistant PTSD (van der Kolk et al., 2014). This study randomized 64 female survivors of various traumas to either a 10-week trauma-informed yoga class or an active control condition, a women's health education program. In order to be included in the study, survivors had to report at least 3 years of previous therapy focused on symptoms of PTSD, yet still qualify for diagnosis. Those in the yoga condition showed significantly greater reductions in PTSD symptoms at the midpoint of treatment (yoga, $d = 1.07$; health education, $d = 0.66$). However, improvements maintained only for those in the yoga condition by the end of the treatment period. This study indicates that mindfulness-based interventions could be beneficial specifically in treatment-resistant groups; however, more studies are needed, especially studies including male survivors of trauma, to support this conclusion.

One study explored the utility of adding MBSR to a treatment as usual condition. Kearney et al. (2013) examined a sample of 47 veterans diagnosed with PTSD, randomizing half to receive treatment as usual, while the other half were assigned to receive both treatment as usual and MBSR. The results showed no significant differences between the two conditions in the reduction of PTSD symptoms, failing to support the hypothesis that adding MBSR to treatment as usual would further decrease symptoms of PTSD. Those who participated in MBSR were more likely to report increases in health-related quality of life, and decreases in symptoms of depression (Kearney et al., 2013).

In sum, adding mindfulness practices to treatment as usual often yields statistically significant reductions in symptoms of PTSD when compared to treatment as usual on its own (Bormann et al., 2013; King et al., 2016). Psychophysiological evidence points to an increased ability to volitionally shift attention as a possible mechanism to explain the added power of mindfulness practices to treatment as usual. Nascent support also exists for the use of trauma-informed yoga interventions for women with treatment-resistant PTSD (van der Kolk, 2014). The limited research available does not support adding MBSR to treatment as usual for those diagnosed with PTSD (Kearney et al., 2013).

Mindfulness as a Stand-Alone Treatment Mindfulness may work well as a stand-alone treatment because the practice itself leads to exposure to internal experiences, such as thoughts and emotions (Brown et al., 2007; Holzel et al., 2011), consistent with Shapiro et al.'s (2006) IAA model. Intentionally attending to objectively safe internal and external trauma reminders with an attitude of openness, curiosity, and nonjudgment provides a converse approach to the way that survivors usually respond to such stimuli (i.e., avoidance). Other authors have also noted that

the grounding component of mindfulness, connecting back to the present moment by purposefully attending to sensory data in the present moment, may further ameliorate symptoms of PTSD such as hyperarousal (Kelly & Garland, 2016; Lang et al., 2012).

While results from programs such as MBET show the virtue of adding mindfulness as an adjunctive treatment, Lang et al. (2012) made a case for the removal of formal exposure exercises from the treatment of PTSD. Authors describe that exposure-based protocols, while effective, suffer from high dropout rates and clinicians have reported that their own discomfort leads them away from implementing exposure exercises with clients (Becker et al., 2004; Schottenbauer et al., 2008). The MBET developers specifically mentioned to participants that imaginal exposure, an intervention in which survivors are asked to repeat their trauma memory with as many details as possible, would not be a part of treatment in hopes of recruiting more participants (King et al., 2016). The IAA model and the theoretical work of Brown, Ryan, and Cresswell (2007) suggest that mindfulness practice on its own could lead to increased cognitive, emotional, and behavioral flexibility, improved self-regulation, and increased opportunities for natural exposure to external and internal stimuli with an attitude of kindness, openness, and curiosity.

While relatively few studies have explored the effectiveness of mindfulness practices as an adjunct to treatment as usual, many more studies have tested the effectiveness of mindfulness-based interventions as a stand-alone treatment for PTSD. Two recent, largely overlapping, meta-analyses were conducted to examine the effects mindfulness for PTSD (Gallegos et al., 2017; Hopwood & Schutte, 2017).

Hopwood and Schutte (2017) conducted a meta-analysis that included studies that compared mindfulness-based interventions to waitlist, active, and placebo control conditions. Their analysis ultimately included 18 studies which reported the results from a total of 21 samples. Almost all studies included required that participants received a diagnosis of PTSD prior to enrolling in the study, and used a variety of mindfulness-based interventions, including MBSR, yoga, and mindfulness interventions that were specifically tailored to trauma. Interventions ranged from as short as 2 hours to as long as 27 hours. Most of the experiments reported in this meta-analysis conducted follow-up assessments 1 week after treatment, and some conducted follow-up assessments as long as 1 year after the intervention took place. The primary focus of this meta-analysis was to compare the effectiveness of mindfulness-based interventions to controls; however, researchers also analyzed the impact of mindfulness-based interventions on survivors' self-reported levels of mindful awareness and explored other possibly influential variables such as treatment length to further elucidate possible mechanisms and moderators.

The overall results of Hopwood and Schutte's (2017) meta-analysis supported the conclusion that mindfulness-based interventions yield a statistically significant reduction in symptoms of PTSD. The overall mean weighted effect size was Hedges' $g = -0.44$, which shows that mindfulness-based interventions had a significant, moderate, negative effect on symptoms of PTSD when compared to control conditions. This effect size remained in a similar range regardless of whether symptoms

of PTSD were assessed by a clinician, with measures such as the Clinician-Administered PTSD Scale ($g = -0.43$), or a self-report measure, such as the PTSD Checklist ($g = -0.38$). Further, no statistically significant difference in effect size was found between studies that compared mindfulness-based interventions to waitlist controls, placebo controls, nor active treatment controls. The only significant moderator was treatment length, with interventions of longer duration showing greater reduction in PTSD symptoms. Authors describe these meta-analytic findings as evidence that PTSD should be added to the list of clinical disorders that mindfulness-based interventions treat.

Further exploratory analyses conducted by Hopwood and Schutte (2017) looked at the 12 studies that measured mindfulness for increases that resulted from treatment. The overall mean effect size for mindfulness was Hedge's $g = 0.52$, which indicates that mindfulness-based interventions increased mindfulness with a moderate significant effect size, compared to control conditions. The sample of 12 studies was underpowered to properly test whether greater increases in self-reported mindfulness would be correlated with greater decreases in PTSD symptoms. Future studies involving mindfulness-based interventions for survivors of trauma should include self-reported measures of mindfulness as a manipulation check, and to further investigate self-reported mindfulness as a mediator between practicing meditation and PTSD symptom reduction.

A second meta-analysis was published in the same year, conducted by Gallegos et al. (2017). In this largely overlapping analysis, 19 studies were included that compared mindfulness-based interventions to active and waitlist control groups. This meta-analysis resulted in a similar effect size, Hedge's $g = -0.39$, indicating that meditation and yoga interventions outperformed their comparison active and non-active controls in the amelioration of symptoms of PTSD. Authors separated interventions by type as follows in an exploratory analysis: mindfulness-based (e.g., MBSR), other meditation (e.g., transcendental meditation), and yoga. While the yoga interventions yielded a larger effect size than the other two categories of interventions (yoga, Hedge's $g = -0.71$; mindfulness-based, Hedge's $g = -0.34$; other meditation, Hedge's $g = -0.38$), the combined effect size of the yoga interventions was only marginally significant ($p = 0.055$).

Of the 19 studies included in Gallegos et al.'s (2017) meta-analysis, eight compared MBSR to control conditions for the treatment of PTSD. The overall mean weighted effect size from these studies was Hedge's $g = -0.33$. MBSR applies different mindfulness practices throughout the course of the 8-week intervention. Colgan, Christopher, Michael, and Wahbeh (2016) tested whether practices presented in MBSR result in different outcomes for survivors of trauma than matched, non-mindfulness practices (e.g., sitting quietly). Researchers collected a sample of 102 combat veterans diagnosed with PTSD. Random assignment was used to compare four practices, two from MBSR, body scan and breathing meditation, and two matched, non-mindfulness interventions, slow breathing and sitting quietly. Only those in the body scan and breathing meditation groups showed significant decreases in PTSD symptoms and significant increases in self-reported mindfulness. A follow-up qualitative analysis reported that veterans in the body scan group were most

likely to report enhanced present moment awareness, reduced anger, and reduced hyperarousal. Those in the mindful breathing condition were the most likely of any group to report increased coping skills and increased nonjudgmental acceptance. Both groups had about an equal number of participants reporting increased non-reactivity as a benefit of their assigned practice (Colgan et al., 2017).

While MBSR has consistently shown benefits as a stand-alone treatment for PTSD, a modified version of MBSR for survivors of trauma, Kelly and Garland's (2016) Trauma-Informed Mindfulness-Based Stress Reduction (TI-MBSR), yielded a large effect size of Hedge's $g = -0.92$. While the effect size calculated in meta-analysis is more robust and is of higher validity, the effect size of TI-MBSR may point to the importance of tailoring mindfulness-based interventions specifically to trauma.

Kelly and Garland (2016) reported that their intervention preserved all content from the original MBSR curriculum, and adds psychoeducation about psychological, neurophysiological, and relational effects of trauma. Authors aimed to reduce self-blame and increase self-efficacy of survivors by adding this educational component about surviving trauma. The only other piece added to TI-MBSR is specific coping strategies to help survivors better regulate their physiological arousal. It is not clear whether these regulation techniques conflict with traditional mindfulness teachings, such as allowing what is here to be here, and treating every experience, even an unpleasant experience, as a welcome guest. Additionally, TI-MBSR was created for survivors of intimate partner violence, childhood sexual abuse, and/or childhood physical abuse. Added psychoeducation included about parenting, attachment style, and the trauma triangle (victim, victimizer, and bystander) may or may not be relevant to survivors of other forms of trauma such as motor vehicle accidents or natural disasters.

In a sample of 39 survivors of intimate partner violence, childhood sexual abuse, and/or childhood physical abuse, researchers randomly assigned half to receive TI-MBSR and the other half was assigned to a waitlist control condition. Participants in both groups completed measures of PTSD at the beginning and end of the 8-week intervention. While both groups reported significant decreases in PTSD over the course of 8 weeks, the TI-MBSR group showed a significantly greater reduction compared to the waitlist group. All participants qualified for a diagnosis of PTSD upon enrolling in the study; 8 weeks later, only 20% of those in the TI-MBSR group still qualified for the diagnosis, compared to 80% in the waitlist condition (Kelly & Garland, 2016).

In conclusion, large meta-analyses resulted in small to medium effect sizes for mindfulness-based interventions when compared to active, placebo, and waitlist control conditions in the reduction of PTSD symptoms. These studies provide support for the theory that mindfulness-based interventions cause significant reductions in symptoms of PTSD for survivors of trauma. However, many moderators explored in these meta-analyses (e.g., gender, type of trauma, etc.) were nonsignificant. This is either due to type II error, the evidence for which is the relatively small number

of RCTs in this area, or because mindfulness-based interventions produce similar effects across diverse groups. More RCTs are needed, and a future, adequately powered, meta-analysis would help draw conclusions on this topic. Further, researchers designing such RCTs should consider collecting a diverse sample of trauma survivors. Across many of the studies reviewed in this chapter, survivors of a single type of trauma are examined in isolation (i.e., combat veterans or survivors of IPV). Combat veteran studies in these reviews are predominately male, while studies concerning the treatment of survivors of IPV are predominately female. This is not a sampling error, but rather due to base rates for both types of trauma. An ideal RCT would include diverse traumas and diverse genders to test the mindfulness-based intervention, unless authors have justification for the separate examination of different categories of traumatic events. The investigations listed in Table 8.1 allow the reader to compare results across different types of trauma.

Table 8.1 Suggested readings by type of population served

Type of trauma	Suggested reading
Military	Bormann et al. (2013)
Military	Bremner et al. (2017)
Military	Cole et al. (2015)
Military	Davis et al. (2019)
Military	Harding et al. (2018)
Military	Heffner et al. (2016)
Military	Held et al. (2017)
Military	Kearney et al. (2013)
Military	King et al. (2013)
Military	Nakamura et al. (2011)
Military	Niles et al. (2012)
Military	Polusny et al. (2015)
Military	Possemato et al. (2016)
Military	Rice et al. (2018)
Military	Wahbeh et al. (2016)
Sexual/domestic violence	Centeno (2013)
Sexual/domestic violence	Gallegos et al. (2020)
Sexual/domestic violence	Kelly and Garland (2016)
Sexual/domestic violence	Müller-Engelmann et al. (2019)
Sexual/domestic violence	Valdez et al. (2016)
Sexual/domestic violence	Kimbrough et al. (2010)
Mixed	Bränström et al. (2012)
Mixed	Earley et al. (2014)
Mixed	Goldsmith et al. (2014)
Mixed	Kim et al. (2013)
Mixed	Mitchell et al. (2014)
Mixed	Müller-Engelmann (2017)

Best Practices in Mindfulness Interventions for Trauma

In reviewing studies related to the treatment of trauma with mindfulness as a stand-alone treatment, and in recognition of Lindahl et al.'s (2017) finding that survivors of trauma often report re-experiencing symptoms during meditation, it is important to recognize emerging best practices in this area. Several have emerged, from both Kelly and Garland's (2016) TI-MBSR and suggestions made by Treleaven (2008) in his work, *Trauma-Sensitive Mindfulness*.

Kelly and Garland (2016) added psychoeducation about common reactions and effects of trauma to traditional MBSR education. Survivors are informed about the re-experiencing, avoidance, negative alterations in mood and cognition, and arousal symptoms before beginning mindfulness practice. Once symptoms are normalized for survivors, authors suggested that they may experience less self-blame when encountering symptoms such as flashbacks or intrusive thoughts during practice and may benefit from an enhanced self-efficacy when educated about the potential to ameliorate symptoms by resisting avoidance symptoms. TI-MBSR also provides participants with strategies to regulate physiological arousal. This may assist survivors if they encounter significant hyperarousal or other dysregulation during mindfulness practice.

Treleaven (2008) builds on the concept of the regulation of physiological arousal during meditation practice for survivors of trauma. He describes that when a survivor experiences hyperarousal during meditation, such as after encountering an intrusive memory of their traumatic experience, their sympathetic nervous system becomes active, leading to traumatic sensations and disorganized cognition. Treleaven calls on those who teach mindfulness to monitor participants for signs of hyperarousal. For example, noticing hyperventilation, excessive sweating, and ridged muscle tone during meditation and checking in which any survivors exhibiting such symptoms in a one-on-one setting after class. He encourages teachers to use a "phase-oriented approach," in which stabilization and safety need to be established before a survivor can continue to subsequent phases of processing trauma memories and reintegrating with family, culture, and normal daily life (p. 103). Another helpful tip comes in the suggestion to participants that they notice their own arousal, gauge approaching hyperarousal, and "apply the brakes," meaning slowing down their mindfulness practice by opening their eyes during practice, taking a break, engaging in self-soothing behaviors, focusing on external objects instead of internal, and considering shorter practices (p.106–107).

Self-Compassion

Survivors of trauma commonly experience negative changes in their beliefs about themselves (American Psychiatric Association, 2013). Negative beliefs can change as immediate reactions to trauma; survivors often believe that they are helpless, and

that they are to blame for what has happened to them. Long-term reactions to trauma include grief, shame, and feelings of fragility (Center for Substance Abuse Treatment, 2014). These common experiences of self-blame and shame often warrant special attention in trauma therapies (e.g., cognitive processing therapy; Resick & Schnicke, 1992).

Shapiro et al.'s (2006) IAA model specifies several components to the attitude of mindfulness. Self-compassion can be thought of as the attitudinal foundation of one's relationship with oneself. Self-compassion is a complementary Buddhist practice recently added to the western canon of Buddhist psychological research (Neff, 2003). Neff conceptualized self-compassion as having three pairs of traits, with one half of each pair representing a self-compassionate trait, and the other half of the pair representing its opposite. The first pair includes self-kindness and self-judgment. Self-compassion requires a level of kindness toward all parts of the self, including those parts that often feel inadequate and experiences that are painful. Self-kindness is the opposite of the all too common habitual response of self-judgment, or a tendency to find fault and provide criticism toward oneself. The second pair presented by Neff (2003) is common humanity and isolation. Common humanity is the recognition that no person is alone in their experience of suffering. If one is unable to recognize suffering is universal, a feeling of isolation in one's own pain is evoked. The final pair is mindfulness and overidentification. The non-judgmental and welcoming awareness of mindfulness stands opposite to a tendency to become fused to thoughts and emotions, which Neff (2003) refers to as being overidentified with experience. In sum, the self-compassionate person treats all parts of oneself with kindness, recognizes one is not alone in the experience of suffering, and neither ignores nor overindulges in emotions and thoughts.

Thompson and Waltz (2008) conducted a study to test the theory that self-compassion can benefit survivors of trauma. Data from 210 undergraduate students was collected, 100 of whom endorsed one or more traumatic event falling under Criterion A for PTSD. Participants self-reported on their levels of posttraumatic stress symptoms and level of self-compassion. The measure used for posttraumatic stress symptoms unfortunately drew from DSM-IV criteria, which did not include the negative alterations in mood and cognition criterion (added in DSM-5). Working with the other three symptom sets (i.e., re-experiencing, avoidance, and hyperarousal), only avoidance symptoms were significantly related to self-compassion. Seligowski, Miron, and Orcutt (2014) conducted a similar study with undergraduate students, although with a larger sample of 453 students, and found significant relationships between self-compassion and re-experiencing, avoidance, and hyperarousal symptoms. Again, this study did not include the added DSM-5 criterion of negative alterations in mood and cognition. These significant relationships support the claim that symptoms of PTSD have a negative relationship with self-compassion – but these studies cannot support the theory that self-compassion negatively predicts the negative alterations in mood and cognition experienced by survivors of trauma.

Maheux and Price (2016) conducted a study involving two samples comparing the predictive validity of self-compassion to both DSM-IV and DSM-5 criteria for

PTSD. The first sample, composed of 74 trauma-exposed individuals, received measures for self-compassion and DSM-IV PTSD symptoms. Similar to the results from Thomson and Waltz (2008), self-compassion was only significantly associated with avoidance symptoms. The second sample, comprising 152 trauma survivors, completed measures of self-compassion and DSM-5 PTSD symptoms. In this sample, self-compassion was significantly, negatively related to all four symptom clusters. Authors described that the discrepancy could be due to the different sampling methods. On the whole, the study provides further support that self-compassion is negatively related to symptoms of PTSD, including the DSM-5 addition of negative alterations in mood and cognition.

Building on correlational studies, a prospective study was conducted with 115 Iraq and Afghanistan combat veterans who reported being exposed to at least one traumatic event (Hiraoka et al., 2015). Self-compassion and level of combat exposure were assessed at baseline; PTSD symptoms were assessed at baseline, and again at 12-month follow-up. Self-compassion negatively predicted symptoms of PTSD at both baseline ($\beta: -0.59, p < 0.05$) and 12-month follow-up ($\beta: -0.24, p < 0.05$), above and beyond the predictive ability of level of trauma exposure. This provides evidence that self-compassion is negatively related to PTSD symptoms, but also that self-compassion prospectively predicts levels of PTSD symptoms.

Growing evidence supports the negative relationship between self-compassion and PTSD symptoms (Hiraoka et al., 2015; Maheux & Price, 2016; Seligowski et al., 2014; Thompson & Waltz, 2008). This attitude toward oneself may deserve extra attention in therapy with those suffering from PTSD. For a review of possible techniques to integrate into therapy with trauma survivors, see Germer and Neff (2015).

Mindfulness, Trauma, and Inflammation

Chronic inflammation has been termed the “common soil,” or mutual underlying factor, of many diseases including type 2 diabetes, cardiovascular disease, and cancer (Scriver et al., 2011). Recent findings suggested that stress-triggered psychological disorders, such as posttraumatic stress disorder (PTSD), may both maintain and be maintained by chronic inflammation (Michopoulos et al., 2017). Those with PTSD experience heightened and more frequent stress responding in the body. This chronic stress responding leads to dysregulation of the physiological systems involved in the stress response, including the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic-adrenal-medullary (SAM) system (Cohen et al., 2007). The dysregulation in these physiological systems leads to overall increased activity in the sympathetic nervous system, and decreased parasympathetic nervous system responding. This pattern of responding feeds back into the area of the brain that regulates the fear response (e.g., insula, amygdala, hippocampus), which maintains PTSD symptoms. PTSD has specifically been associated with increased risk for a wide array of inflammatory disorders (Boscarino, 2004).

Kadziolka, Di Pierdomenico, and Miller (2016) measured participants' self-reported levels of mindfulness before having them vividly describe a personal example of a stressful event. While undergoing the recall of a stressful event, participants' heart rate variability (HRV) was measured using an electrocardiogram (ECG), and their skin conductance response (SCR) was measured using galvanic skin response finger electrodes. Participants with higher self-rated dispositional mindfulness showed lower sympathetic nervous system activation, as measured by their SCR, and greater parasympathetic nervous system responding, as measured by their HRV and their return to a neutral state. In sum, self-reported mindfulness is negatively associated with the pattern of responding that is believed to both maintain and be maintained by PTSD.

MBSR has been found to reduce inflammation (Rosenkranz et al., 2013). MBSR has been compared to an active control intervention, the Health Enhancement Program (HEP), designed for the purposes of testing the unique effects of MBSR. While both MBSR and HEP participants experienced similar levels of stress-evoked cortisol responses following participation in their respective interventions, those in the MBSR group had significantly smaller inflammatory responses compared to those in the HEP group (Rosenkranz et al., 2013). The hidden cost of PTSD may be the inflammation-related illnesses acquired by survivors of trauma that simultaneously cause harm to the body and likely maintain PTSD symptoms. Mindfulness-based interventions offer a psychotherapeutic option for reducing both symptoms of PTSD and chronic inflammation in the body.

Summary and Future Directions

In sum, there is now significant evidence to support the use of mindfulness-based interventions with survivors of trauma suffering from PTSD (Gallegos et al., 2017; Hilton et al., 2017; Hopwood & Schutte, 2017). Survivors of trauma likely benefit from increased emotional, behavioral, and cognitive flexibility, enhanced self-regulation, and natural exposure through mindfulness practice (Shapiro et al., 2006). Additionally, self-compassion has been found to significantly negatively predict symptoms of PTSD in both cross-sectional and longitudinal studies (Hiraoka et al., 2015; Maheux & Price, 2016; Seligowski et al., 2014; Thompson & Waltz, 2008). These empirical findings support theoretical positions that mindfulness and self-compassion improve symptoms of PTSD experienced by survivors of trauma. Additionally, recent research concerning the bidirectional relationship between PTSD and chronic inflammation reveal a new avenue for psychophysiological studies connecting mindful awareness, PTSD symptoms, and inflammation.

More work is needed to determine significant variables that may moderate the effectiveness of mindfulness-based interventions. The only significant moderator found in meta-analytic reviews of mindfulness-based interventions for survivors of trauma included length of intervention, with longer interventions performing better than shorter interventions (Hopwood & Schutte, 2017). Future studies should aim to

include large samples of participants across genders, culturally diverse samples, and participants who have survived different types of Criterion A traumatic events. These more diverse samples would allow for the identification of individual difference variables that moderate the effectiveness of mindfulness-based interventions for survivors of trauma.

Additionally, dismantling study designs, such as the one conducted by Colgan, Christopher, Michael, and Wahbeh (2016), could investigate which features of multicomponent programs such as MBSR are most effective in the reduction of PTSD symptoms. This nomothetical information can inform idiographic treatment recommendations for survivors of trauma. For example, for a survivor who reports experiencing the most distress when exhibiting hyperarousal symptoms, the body scan practice is likely to be the most helpful (Colgan et al., 2017). Further research, including qualitative studies about the experiences of trauma survivors in mindfulness-based treatments, can help inform and better tailor future interventions.

Furthermore, a clear negative association exists between self-compassion and symptoms of PTSD, even in prospective studies (Hiraoka et al., 2015). Questions remain about the role that self-compassion may already be playing in mindfulness-based intervention with survivors of trauma. In future studies that involve a mindfulness-based intervention for PTSD, self-compassion could be as closely monitored as each participant's levels of mindful awareness and PTSD symptoms. Intensive longitudinal methods (see Bolger & Laurenceau, 2013) also may shed light on the between-subject and within-subject relationships between PTSD, mindfulness practice, and self-compassion.

Finally, while PTSD has been linked to inflammation in the body in a bidirectional relationship, and mindfulness has been associated with both reductions in PTSD and inflammation in separate studies, no study examines the relationship among mindfulness, inflammation, and PTSD symptoms (Michopoulos et al., 2017; Rosenkranz et al., 2013). More research examining the interplay between these three variables is needed in order to address the mental and physical health of survivors of trauma. Findings in this area could be the key to unlocking the psychophysiological mechanisms behind mindfulness-based interventions for survivors of trauma.

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