Yoga for Traumatic Stress: A Three Paper Dissertation

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YOGA FOR TRAUMATIC STRESS: A THREE PAPER DISSERTATION

A dissertation
by

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Abstract

This three paper dissertation considers whether yoga—a popular mind-body practice combining physical postures and movement, mindfulness, and breath exercises—may be a useful component of treatment for adult trauma survivors. The first paper involves a systematic review and meta-analyses of the current evidence base for yoga in the treatment of anxiety, depression, and PTSD among trauma survivors. The second and third papers are grounded in a single, mixed-methods multi-wave data source aimed at examining yoga's contribution to recovery for adult women who have complex trauma histories (i.e., sustained and/or multiple traumatic experiences such as recurring physical or sexual abuse). The second paper is a quantitative study employing hierarchical linear and logistic regression to examine associations between yoga practice and reductions in traumatic symptomology over time. The third paper is a hermeneutic phenomenological study exploring how women with complex trauma histories experience practicing yoga and its potential role in their coping and healing processes over time. Taken together, these three papers offer insights into the complex healing needs of adult survivors suffering from the effects of traumatization, and the promising role of yoga within their recovery processes.

DEDICATION

For my mom who has always been a role model to me. From my early days with her on campus, and as a "research subject and illustrator" for her dissertation, this path has been in my mind from my youth. For my dad who sparked my passion for understanding human psychology and serving in a helping profession. For Benny, who gave me ongoing support through this long haul, and for celebrating all the mini-milestones along the way. For my son, Nathan, who taught me what is most important in life.

Lokah Samastah Sukhino Bhavantu

May all beings everywhere be happy and free, and may the thoughts, words, and actions of my own life contribute in some way to that happiness and to that freedom for all.

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Movement has played an important role throughout my life: a source of self-inquiry, expression, and healing. My passion for movement led me to pursue a yoga teacher training program nearly a decade ago. It was during that intensive period of studying and practicing yoga that I realized I wanted to find other ways to support individuals' healing and growth, and I decided to go back to school. Although it was yoga that had sparked my foray into social work, I did not at the time I began school imagine I would find a way to merge my passions for yoga, clinical work, and social justice.

About a year into my studies I learned about the innovative work going on at the Trauma Center of Justice Resource Institute, including their yoga program and the RCT study of yoga for complex trauma survivors. I began volunteering to work on the study, and got to know some of the brilliant and caring staff at the center, including Joseph Spinazzola, Bessel van der Kolk, Ritu Sharma, Jennifer Turner, and Amanda Zelechoski. With their support I gained valuable knowledge and skills related to working with complex trauma survivors and yoga as a clinical modality for survivors. Additionally, I am appreciative of the financial support I received from the Trauma Center during my data collection phase. I want to particularly thank Joseph Spinazzola who helped me conceptualize this project and supported me in carrying it out. The insights and advice he provided over the past several years were vital to the success of this project.

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me, and gave me the skill and confidence to pursue a similar approach in my dissertation. Moreover, Danny's input as I worked to find the right language to articulate the findings in my qualitative study was crucial.

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Although it took place years before I embarked on my dissertation, Kevin's research course provided me with a solid frame that enabled me to structure my dissertation in a way that made sense, and bring rigor to each of my three studies. Kevin's questions, insights, and support throughout the dissertation process have also been extremely helpful.

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Last, but certainly not least, I want to express my deep gratitude to my family and friends. I am so thankful for all the practical help—from advice, editing and feedback to providing childcare. More importantly, though, was your ongoing support through the ups and downs of my doctoral studies. I would not have been able to get through without your help and encouragement.

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Dissertation Introduction

The majority of people will be exposed to a traumatic stressor at some point during their lives, and many will go on to experience a range of negative aftereffects as a result of this exposure. Trauma has the potential to negatively alter individuals' internal bodily and affective sensations and reactions, cognitive schemas, and their ability to have meaningful relationships with others, and is associated with a range of psychiatric (e.g., depression, anxiety, PTSD) and physical health problems (e.g., chronic pain, heart disease, hypertension; see Briere & Scott, 2006; Herman, 1997; van der Kolk, McFarlane, & Weisaeth, 1996). Of course, the particular impact of trauma depends on the intersection of a multitude of factors such as individual level strengths and vulnerabilities, specific features of the event itself, and the availability of support and resources (Harvey, 1996). Regardless of the severity or specific presentation of problems, it is important to recognize that trauma impacts the whole person—body, mind, and spirit.

Despite the inextricable connection between the body and mind in traumatic stress disorders, the most commonly utilized treatments for trauma survivors tend to focus on the mental imprint of trauma, but leave the body largely unattended to (e.g., Foa, Keane, Friedman, & Cohen, 2009). However, it has been suggested by leaders in the field that mind-body treatments, including yoga—a practice combining physical postures linked by gentle movement, mindfulness, and breath exercises—may play an important role in recovery for trauma survivors (Courtois, 2004; van der Kolk, 2006). Moreover, individuals facing mental and physical health problems, including those commonly stemming from exposure to traumatic stress, are increasingly using mind-body treatments

such as yoga (Barnes, Bloom, & Nahin, 2008; Birdee et al., 2008; Libby, Pilver, & Desai, 2012).

Research shows that yoga may promote mental and physical health, and that yoga has been effectively utilized to treat a number of psychiatric and medical problems (see, for instance, Cabral, Meyer, & Ames, 2011; Evans, Tsao, Sternlieb, & Zeltzer, 2009; Khalsa, 2004; Salmon, Lush, Jablonski, & Sephton, 2009). However, research on yoga in the treatment of traumatic stress is still quite limited (e.g., Stoller, Gruel, Cimini, Fowler & Koomar, 2012). The current study contributes to this knowledge base through three papers exploring the efficacy of yoga as a component of treatment for trauma survivors.

The first paper is a meta-analytic review, assessing the current evidence base for yoga in the treatment of symptoms of anxiety, depression, and posttraumatic stress disorder (PTSD) among survivors of a variety of forms of traumatic stress (e.g., natural disasters, domestic violence, combat). The second and third papers draw on a mixed-methods multi-wave data source aimed at determining whether yoga contributes to recovery for adult women who have histories of sustained and/or multiple traumatic experiences (all had traumatic experiences beginning in childhood such as physical abuse, sexual abuse, and/or neglect). The second paper utilizes quantitative data to examine associations between yoga practice and reductions in traumatic symptomology over time. The third paper utilizes qualitative data and a hermeneutic phenomenological method of inquiry to explore the lived experiences of practicing yoga and its potential role in their coping and healing processes among these same participants. Taken together, these three papers offer insights into the complex healing needs of adult survivors

suffering from the effects of traumatization, and the potential role of yoga within their recovery processes.

Literature Review

Prevalence of trauma. A traumatic event is an experience that overwhelms an individual's coping capacities. Most often, traumatic events involve a direct confrontation with death or serious injury, a significant threat to one's life or livelihood, or witnessing acts of violence toward others (Briere & Scott, 2006). Such experiences include, for example, natural disasters, serious accidents, terrorist acts, combat, domestic violence, and physical or sexual abuse. Traumatic exposure is commonplace, with 60% of men and 51% of women in the United States reporting exposure to at least one traumatic event during their lifetime (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

While men may be more likely to be exposed to a traumatic event, women are more than twice as likely to develop PTSD (rates are 5.0% and 10.4% respectively; Kessler, Chiu, Demler, Merikangas, & Walters, 2005). This difference can be explained by the varying types of traumatic experiences that women and men tend to be exposed to (Briere & Scott, 2006; Kessler et al., 1995). Combat and witnessing injury or death are the most frequent precipitants among men for developing PTSD, while women are more likely than men to be exposed to recurrent, interpersonal traumas perpetrated by intimates, such as sexual abuse (Kessler et al., 1995; Craven, 1997; Tjaden & Thoennes, 2000).

Impact of trauma. Traumatic stress impacts the whole person; from changes in the individual's subjective and relational experiences to physiological changes and anatomical changes in the brain (Bremner, 2002; Briere & Scott, 2006; Nemeroff, 2004;

Rothschild, 2000; van der Kolk et al., 1996). In terms of subjective and relational experiences, trauma undermines survivors' senses of meaning and order in the world. Unable to make sense of the overwhelming experiences of trauma, basic beliefs in human decency, justice, and trust in others and the wider environment are often destroyed, and survivors commonly develop feelings of shame or self-blame, and have difficulty relating to others (Janoff-Bulman, 1992).

Trauma's impact on the body has to do with the way our body is hard-wired to deal with acute stress. When a person is confronted with a perceived threat to survival, it is a normal and adaptive response for the body to prepare to fight or take flight, to get the person out of harm's way. This process is controlled by a primitive part of the brain (the amygdala), and occurs without conscious awareness and without logical thought. The brain signals to the endocrine system to secrete hormones that shut down bodily functions that are not necessary for fight or flight (e.g., digestion) and to prepare other parts of the body for action (e.g., increasing oxygen flow to muscles to facilitate running). All attention and energy becomes focused on surviving in that moment of threat. Fight or flight is the body's reaction of choice in the context of a threat to survival. However, in some cases when threat is prolonged or when escape is not possible (e.g., child abuse), a third type of survival response is initiated—the freeze and submit response. Dissociative responses are a prime example of the freeze response (Rothschild, 2000; van der Kolk 1994; van der Kolk, 2006).

A traumatic stress reaction can be understood as what happens when these normative and adaptive reactions to a perceived threat to survival begin to be generalized to other stimuli, both external (e.g., loud noises) and internal (e.g., bodily sensations such

as rapid heartbeat and emotions). It is as if the person is chronically living in a state of fight, flight, or freeze and submit. Van der Kolk (1994) explains that:

> "Intense emotions at the time of the trauma initiate the long-term conditional responses to reminders of the event, which are associated both with chronic alterations in the physiological stress response and with the amnesias and hypermnesias characteristic of posttraumatic stress disorder. Continued physiological hyperarousal and altered stress hormone secretion affect the ongoing evaluation of sensory stimuli as well" (p. 253).

Exposure to traumatic stress has been shown to alter the brain and lead to chronic dysregulation of the central nervous system. In particular, the brain and nervous system are impacted in three important ways (van der Kolk, 2006). First, the ability to integrate sensory input with motor output is disrupted. Second, survivors have difficulty modulating physiological arousal. In other words, trauma survivors tend to overreact or underreact to stimuli, "blow[ing] up in response to minor provocations; freez[ing] when frustrated, or becom[ing] helpless in the face of trivial challenges" (van der Kolk, 2006, p.277). Essentially, they are responding to new stimuli in the environment as if they were responding to their past trauma—the fear response becomes generalized such that the fight, flight, or freeze response is initiated in the context of more innocuous stimuli. Finally, when triggered by reminders of the trauma, brain regions and the nervous system are impacted in such a way that the ability to communicate thoughts and feelings into words becomes inhibited. In sum, posttraumatic stress "interfere[s] with the capacity to engage in the present: traumatized individuals 'lose their way in the world'" (van der Kolk, 2006, p. 277).

The difficulty survivors face in communicating their experiences verbally when they feel threatened (whether that threat is real or not) makes it difficult for trauma survivors to engage in traditional talk-based treatment modalities until they have the capacity to modulate their arousal (more on this below). Longer-term, living in this chronic state of distress—regularly being flooded with intense emotions and physical reactivity that is irrelevant in the context of present stimuli—can result in a range of psychiatric problems as well as somatic and physical health issues (e.g., Corso, Edwards, Fang, & Mercy, 2008; Edwards, Holden, Felitti, & Anda, 2003; Felitti et al., 1998).

While at their core all traumatic stress reactions relate to alterations in the body and mind, the specific presentation of psychiatric problems or symptoms may vary depending on the nature of the stressor, the age of the victim during trauma exposure, and personal, social, and environmental risk and protective factors (Harvey, 1996). One distinction in symptomology related to differing types of trauma exposure that is particularly important in the context of this dissertation is PTSD versus "complex PTSD."

PTSD. The diagnosis of PTSD first appeared in the DSM-III in 1980 with diagnostic criteria for the disorder largely based on research examining the experiences of men returning from combat (e.g., Kardiner, 1941; Horowitz, Wilner, & Kaltreider, 1980). Despite ongoing recognition that the reactions that men have to combat may be somewhat different than experiences of individuals exposed to other types of traumatic events, particularly prolonged exposure to abuse and subjugation (see, for instance, Burgess & Holmstrom, 1974; Walker, 1984; Herman, 1997), the framework of PTSD has

remained the prevailing standard by which traumatic stress reactions are assessed and diagnosed (see American Psychiatric Association; APA, 2000; Foa et al., 2009).

PTSD is defined by the following criteria: exposure to a traumatic stressor (i.e., an event that involved actual or threatened death or injury or threat to physical integrity of self or others where the person experiences fear, helplessness, or horror); the presence of hyperarousal, avoidance/numbing, and intrusive symptoms for least one month duration; and functional impairment (APA, 2000)[1]. Hyperarousal is when the body is in a constant state of alert, and manifests in symptoms such as a strong startle response, scanning the environment for danger, irritability, sleep disturbance, and concentration difficulties. Intrusive symptoms are the chronic reliving of the traumatic experience through memory, thoughts, flashbacks, and distress associated with reminders of the trauma. Finally, avoidance and numbing can be understood as the body's response to intrusions. When survivors become flooded with traumatic images, sensations, and thoughts, they will often consciously or unconsciously avoid these stimuli (e.g., pushing disturbing thoughts and feelings out of the mind, distracting oneself, going out of their way to avoid reminders) (Briere & Scott, 2006).

Although PTSD is a useful framework for understanding the impact of traumatic stress since it captures many of the symptoms that are typically experienced by survivors of trauma, it fails to recognize the full impact of trauma on the majority of survivors. In fact, "simple" PTSD is the exception, rather than the norm, with approximately 84% of

[1] During the process of writing this dissertation, the DSM-V was released with some revisions to PTSD diagnostic criteria. Major distinctions between the DSM-IV and DSM-V with regard to PTSD include its classification being changed from an anxiety to a trauma and stressor related disorder. There is also more specification on the meaning of a traumatic stressor (criterion A), and the new manual proposes four symptoms clusters (rather than 3), including symptoms of: re-experiencing, avoidance, negative cognitions and mood, and arousal. While I wanted to recognize this change in the diagnostic manual, in this dissertation I focus on PTSD as classified by the DSM-IV since all data presented in this dissertation relied on measures assessing PTSD according to the DSM-IV criteria.

traumatized adults diagnosed with PTSD having at least one additional psychiatric diagnosis (e.g., depressive disorders, anxiety disorders, substance abuse disorders, Axis II disorders; Kessler et al., 1995).

Additionally, research consistently links exposure to multiple or prolonged exposure to traumas, particularly when exposure began in childhood, with a more complex constellation of symptoms in adulthood, including, for example, impulsive or aggressive behavior, anxious arousal, dissociative symptoms, somatic symptoms, physical health problems, and socially avoidant behavior (Campbell et al., 2002; Cloitre et al., 2009; Corso et al., 2008; Felitti et al., 1997; Ford & Kidd, 1998; Gallop, 2002; Pelcovitz et al., 1997; van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005; Walker et al., 1999). The terms "complex trauma," "complex PTSD," and "Disorders of Extreme Stress Not Otherwise Specified (DESNOS)" are used interchangeably to refer to trauma exposure that involves prolonged or recurring experiences of interpersonal violence or subjugation (often, but not necessarily, beginning in childhood), and the associated immediate and longer-term outcomes. While some leaders in the field of traumatic stress studies favor the inclusion of a complex trauma diagnosis in the DSM (e.g., van der Kolk et al. 2005), these symptoms are only included in the DSM-IV as "associated and descriptive features" of PTSD (APA, 2000, p.465).[2]

[2]Prior to the publication of the DSM-IV, multisite field trials assessed the validity of a distinct diagnosis of "Complex PTSD" (see, for instance, Pelcovitz et al., 1997; van der Kolk et al., 2005). Researchers found that trauma, particularly when it is prolonged and initiates at an early age, was indeed associated with psychological impairments beyond PTSD along the problem areas outlined in the "complex trauma" section, below. While the committee conducting the field trials favored a distinct complex trauma diagnosis, the DSM-IV only includes complex trauma symptoms as "associated and descriptive features" of PTSD (APA, 2000; van der Kolk et al., 2005). The issue of whether complex trauma merits a distinct diagnostic category in the DSM is beyond the scope of this dissertation. However, the conceptual distinction between "simple" PTSD and more complex manifestations of symptoms has important treatment implications for the population under study in papers 2 and 3 of this proposed dissertation.

Complex Trauma. Complex trauma is characterized by six interrelated problem areas (see Briere & Spinazzola, 2005; Courtois & Ford, 2009; van der Kolk et al., 2005). First, there are problems with regulating affect and impulses. This includes difficulty modulating emotional reactivity (e.g., explosive anger), and the subsequent maladaptive methods for coping with dysregulation, including for instance, self-injury and substance abuse. Second are alterations in attention, memory, and consciousness, including amnesia, dissociative episodes, and depersonalization. Third, are problems with self-perception such as shame, guilt, and self-blame. Fourth, are the problems with relationships to others, including difficulties with trust and intimacy. Fifth, are problems with systems of meaning, including for example, loss of faith or a sense of hopelessness. Finally, there are somatoform symptoms, including pain or other bodily distress and bodily dysfunction. This may involve real physical damage associated with abuse, and it may include the psychosomatic reactions to abuse such as unexplained numbness or pain in the body. It also includes physical problems related to chronic arousal of the autonomic nervous system (e.g., gastrointestinal problems, fatigue).

It is important to note that the array of symptoms associated with complex trauma all reflect deficits in affective and interpersonal self-regulatory capacities. As Cloitre and colleagues (2009) explain:

> Understanding the effects of trauma as the result of disturbances or vulnerabilities in self-regulatory capacities is useful as it creates conceptual coherence to the multiple, diffuse, and apparently contradictory symptoms of complex PTSD. Disturbances in self-regulation account for both overactivation and deactivation/avoidance in emotions and interpersonal behaviors as seen in

> dysphoria and anger as well as dissociation; and in interpersonal behaviors that are aggressive or dependent, as well as those that are distant and avoidant (p. 2).

In summary, traumatic exposure is associated with a range of negative aftereffects, including physical, behavioral, cognitive, emotional, and interpersonal problems. Although PTSD is a useful diagnostic framework for capturing the experiences of adults exposed to time-limited traumatic events, it is important to recognize that prolonged or repeated exposure to trauma, particularly when that exposure begins in childhood, is associated with a complex array of additional symptoms and functional impairments. At the core of these problems of complex trauma are self-regulatory deficits. Not only are self-regulatory deficits associated with significant impairment in nearly all domains of daily functioning, but self-regulatory problems underlie the challenge of effectively treating complex trauma.

Limitations of Current Gold-Standard Treatments

In the past two decades there has been significant progress in outcome research for treatment of traumatic stress disorders, and several PTSD treatment guidelines have been produced based on aggregate research data and expert opinions (e.g., APA, 2004; Foa et al., 2009; U.S. Department of Veterans Affairs, 2004). Current gold-standards in treatment—those interventions that are considered best practice based on current research—utilize exposure-desensitization and cognitive reframing techniques. Examples of some current gold-standard treatments are cognitive behavioral therapy, prolonged exposure, and eye movement desensitization and reprocessing (Foa et al., 2009). Psychopharmacology is also recommended as a supplement to psychotherapy where appropriate, and may be used to relieve some posttraumatic stress symptoms as well as

comorbid issues such as depression, anxiety, and sleep problems (Briere & Scott, 2006; Courtois, 2004). However, it is important to note that while medication may help address some specific symptoms of traumatic stress, medications are not recommended as a stand-alone treatment, and there are often negative side-effects associated with psychopharmacological treatments (Briere & Scott, 2006).

Overall, symptoms of PTSD are quite responsive to treatment (Kessler et al., 1995). However, the U.S. National Comorbidity Survey reveals that over 1/3 of the traumatized adults sampled had symptomology that was persistent for years regardless of receiving treatment (Kessler et al., 1995). This indicates the presence of a subpopulation of trauma survivors whose symptomology may be less responsive to traditional treatment modalities. Indeed, research from the DSM-IV field trials indicated that PTSD symptoms appear to be more persistent among trauma survivors who also have higher rates of somatic symptoms, affect dysregulation, and dissociation, and that among trauma survivors who no longer met criteria for PTSD diagnosis, somatic symptoms, affect dysregulation and dissociation problems often continued (van der Kolk et al., 1996). In other words, complex trauma symptoms may be more resistant to traditional treatment approaches than the symptoms of PTSD, and these same symptoms may hinder the effective treatment of PTSD.

There are several limitations associated with gold-standard cognitive- and exposure-based treatments for traumatic stress that must be noted. First, treatment guidelines were established based on criteria for PTSD from the DSM-IV-TR—criteria which does not include symptoms of complex trauma as described above (e.g., problems with affect regulation, dissociation, somatoform symptoms, problems with self-

perception; Courtois, Ford, & Cloitre, 2009). Second, most treatment outcome studies are based on samples unrepresentative of the large portion of PTSD survivors who manifest more complex symptom profiles and comorbid conditions (Spinazzola, Blaustein, & van der Kolk, 2005). Indeed, evidence supporting exposure- and cognitive-based therapies comes primarily from studies of PTSD related to adult-onset traumas (see, for instance, Foa et at., 1999; Marks, Lovell, Noshirvani, Livanou, & Thrasher, 1998; Resick, Nishith, Weaver, Astin, & Feuer, 2002). A review of the sample composition and enrollment data of studies examining gold-standard treatments for adult PTSD, including 34 studies cited in the International Society for Traumatic Stress Studies 2000 Practice Guidelines, and data from more recent research also reveals that severe comorbid psychopathology was a common exclusion criterion across studies (Spinazzola et al., 2005). These findings highlight the fact that treatment efficacy for PTSD has rarely been tested on individuals whose complicated and often persistent traumatic symptomology stems from repeated or prolonged exposure to trauma, often beginning in childhood.

When outcomes of trauma processing treatments have been compared across groups with adult onset trauma versus those with histories of childhood trauma, treatments appear less effective for those with childhood onset trauma (van der Kolk et al., 2007). Exposure based treatments also seem to be less well tolerated by individuals with histories of prolonged trauma exposure, including problems staying in treatment (McDonagh-Coyle et al., 2000; Scott & Strandling, 1997), symptom exacerbation during treatment (Pitman et al., 1991), and worsening symptoms following treatment (Ford & Kidd, 1998; Tarrier et al., 1999; Zayfert et al., 2005). Rather than desensitizing a person to trauma triggers as intended, it appears that exposure to traumatic stimuli may

overwhelm some individuals and activate the same symptoms it aims to reduce (Ladwig et al., 2002; Lanius et al., 2010; Michelson, June, Vives, Testa, & Marchione, 1998; Rufer et al., 2006). It has been theorized that individuals with more complex traumatic symptoms may not have developed the internal resources to withstand exposure to traumatic memories or related triggers, and thus cannot effectively engage in treatment (Ford & Kidd, 1998; Zayfert et al., 2005). For instance, a dissociative response to exposure treatments may render the treatment ineffective because it allows the survivor to avoid the stimuli and removes the opportunity for habituation (Jaycox & Foa, 1996; Michelson et al., 1998; Rufer et al., 2006).

Moreover, as noted above, exposure to traumatic reminders activates brain regions associated with intense emotional responses while at the same time decreasing activation in regions related to inhibition of emotions and the ability to translate experience in to communicable language (van der Kolk, 2006). This means that talk-based therapies may be ineffective until the trauma survivor can better tolerate and modulate distress. This issue may be particularly pertinent for complex trauma survivors who often struggle with affective and physiological regulation. However, survivors of more time-limited traumas may also struggle with talk-based therapies involving memory processing or confronting feared stimuli until they can learn to stay present and to tolerate some level of activation. Finally, although professional guidelines recommend exposure based treatments, most clinicians do not regularly use these techniques because of their concerns over the challenges clients may have in managing feelings that arise from memory processing and the risk of related adverse effects (Becker, Zayfert, & Anderson, 2004; Jaycox & Foa, 1996).

Recovery from Trauma

Leading scholars and clinicians in the trauma field explain that recovery among trauma survivors occurs in three phases (e.g., Herman, 1997; Courtois, 2004). First is the establishment of survivors' sense of safety and improved capacity for affect regulation. This is followed by processes of meaning-making. The last stage involves improvements in daily living and personal growth. Courtois (2004) explains that this meta-model does not prescribe particular treatment modalities, but rather serves as an overarching guide for the therapist, prioritizing safety, security and affect regulation as precursors to processing traumatic memory. The final phase emphasizes the ability to function and thrive in the world, transcending trauma symptoms toward opportunities for new learning and higher levels of functioning in various life spheres (e.g., self-awareness, self-expression, professional, social).

While phase one is essential to recovery for any trauma survivor, it is often the most challenging, and time-consuming phase of treatment for complex trauma survivors (Courtois, 2004). Courtois (2004) explains that the primary emphasis of this stage is safety and stabilization, both real and perceived. Many complex trauma survivors constantly experience the world as unsafe, and often place themselves in risky situations either as a conscious or unconscious reenactment of earlier traumas. Consequently, this period of treatment must support the client in gaining "control over impulsive behavior, self-destructive thoughts and behaviors, dangerous interpersonal situations, addictions, ongoing dissociation, and intense affect discharges that can result in retraumitization and…provid[ing] the client with alternative means of self-regulation and self-management" (p.419).

There is a small body of research supporting interventions that take a phase oriented approach with complex trauma survivors, beginning with the promotion of affect tolerance and regulation prior to exposure-based treatments (see, for instance, Cloitre et al., 2010; Cloitre, Koenen, Han, & Cohen, 2002; Harned, Jackson, Comtois, & Linehan, 2010). However, these treatments still take a verbal approach and do not directly address the profound impact of trauma on the body (van der Kolk, 2006). Courtois (2004) argues that mind-body issues may be central to Stage 1 work for these clients:

> Many CPTSD [complex trauma] clients are alienated from themselves, their general well-being, and their bodies (as well as their minds). The mind-body split experienced by these clients is often quite problematic, with the client in a more or less perpetual state of disconnect. As a result, many ignore their bodies, are neglectful regarding wellness and medical concerns, and put themselves at unnecessary risk in a variety of ways. As these issues are identified, the clinician may need to actively engage the client in paying attention to his or her bodily reactions and around planning for general self-care, preventative medicine, and/or actual treatment (p.420).

Yoga as Treatment

Treatment for traumatic stress disorders may be improved by adding a mind-body precursor or adjunctive component to treatment that directly addresses the body and promotes self-regulatory capacity. Yoga is one intervention that appears promising for improving arousal tolerance and regulation, connecting with the body in a positive way, and helping individuals stay oriented in their present moment experience (see, for instance, Salmon et al., 2009). These improvements, in turn, might facilitate future

engagement in traditional treatment approaches prioritizing memory processing work, desensitization to triggering stimuli, and meaning-making. It is also possible that yoga may be useful at any phase of recovery. Yoga might facilitate meaning-making processes, improve an individual's ability to feel connected to others, or promote enhancements in daily living. While research has begun to demonstrate yoga's role in improving traumatic symptomology (described below), there is a deficit of research into how, if at all, individuals experience yoga within the context of their healing processes, and how it may operate as a coping mechanism to facilitate recovery (Evans et al., 2009).

Although skepticism exists regarding the value of mind-body approaches like yoga (see Wylie, 2011) and somatic interventions are notably absent in current treatment guidelines for traumatic stress disorders (see Foa et al., 2009), there is growing interest among scholars and practitioners in these modalities (see Ringel & Brandell, 2012; Ogden, Minton, & Pain, 2006). Body-based therapies have grown in popularity based on recent advances in neuroscience showing that traumatic experiences may be stored in non-verbal parts of the brain, and that trauma survivors may need therapies that allow them to improve affect regulation and process the impact of trauma through means other than talk-based therapy (Ogden et al., 2006; Solomon & Siegel, 2003; van der Kolk, 2006). Mindfulness and meditation based therapies have also emerged as a promising area for addressing traumatic stress symptoms through their ability to promote affect tolerance and regulation (see, for instance, Follette, Palm, & Pearson, 2006; Kabat-Zinn, 2003). Yoga, which combines elements of mindfulness and body-based treatments, may be particularly useful as a healing modality.

Today yoga is among the top ten most widely practiced forms of complementary health care in the United States (Barnes et al., 2004) with over 15 million adults having practiced yoga in 2008 (Yoga Journal, 2008). Although there is a large body of literature on the use of yoga for medical disorders (see Khalsa, 2004), and a growing body of research documenting yoga's use for psychiatric disorders (see Cabral et al., 2011), few studies have systematically investigated yoga's effectiveness in the treatment of traumatic stress.

What is Yoga?

The term "yoga" comes from the Sanskrit root "yuj," and refers to the union of the self with a higher power, universal consciousness, or God (Iyengar, 1979, p.19). While the precise origins of yoga are unknown, the practice emerged thousands of years ago in India. The physical postures that we recognize today in the West as yoga were only a small part of yoga's "eightfold path," that is, the set of practices and principles aimed at controlling the mind, intellect, and ego so that the individual could experience his true nature, the "oneness" with all of being (Iyengar, 1979, p.19). This eightfold path provided guidance on everything from how we should treat ourselves and others, to how we should interact with the divine (Emerson & Hopper, 2011). Although yoga clearly has spiritual underpinnings, and shares much terminology with Hinduism, it was never intended to be tied to a particular religion or guru, and some historians argue that it was actually formed in opposition to dogmatic religious teachings—a way for an individual to pursue "an inquiry into being" on one's own without need to be part of an organized religion. To put it simply, yoga, as Iyengar (1979) explains, is the "human endeavor to win inner peace and happiness" (p.20).

There are multiple yogic practices aimed at achieving this inner peace and happiness (e.g., Karma yoga: through work and service to others; Bhakti yoga: through devotion to God; Jnana yoga: through study and the acquisition of knowledge; Iyengar, 1979). However, in contemporary Western societies, the term yoga typically refers to the practice of Hatha yoga, which deals primarily with the physical discipline. Through the practice of "asana" (yoga postures and movement), "pranayama" (breath exercises that involve controlling the rate and depth of breathing), and "dharana" (concentration/mindfulness of the present moment experience) the mind becomes prepared for "dhyana" (meditation), which in turn paves the way for "higher states of consciousness…[and] ultimately, practitioners experience universal awareness, in which the distinction between subject and object (or the knower and known) dissolves" (Ware, 2007, p.15).

Today, there are many styles of Hatha yoga that are taught—from the faster-paced, flowing Asthanga vinyasa tradition to the precise alignment based forms of the Iyengar method to the relaxed, longer-held supported postures of restorative or yin yoga (see, for instance, Cook, n.d.; Evans et al., 2009). Some Western practitioners embrace the spiritual roots of yoga, although many practice for the physical and mental health benefits that they experience without attention to the spiritual or philosophical components of the practice. While the pacing, focus, execution, and teaching methodologies vary widely, what is similar across these Hatha traditions is the combination of asana (postures and movement), pranayama (breath work), and dharana (mindfulness) for the purpose of mental, physical, and spiritual well-being (Evans et al., 2009).

Theories of Yoga as a Healing Modality

There are several theories about the underlying mechanism of action in yoga in promoting healing, health, and well-being. It has been proposed, for instance, that the combination of gentle movement, breath exercises, and mindfulness target physiological dysregulation by reducing allostatic load (the cumulative impact of chronic HPA and SNS activation) and activating the parasympathetic nervous system, thus eliciting a relaxation response, and countering some of the effects of chronic stress (Innes, Bourguignon, & Taylor, 2005). This theory is supported by research demonstrating associations between practicing yoga and improvements in arousal regulation and elicitation of the relaxation response (see, for instance, Arch & Crask, 2006; Brown & Gerbarg, 2009; Bortz, Summers, & Pipe, 2007; Holzel et al., 2011; Ross & Thomas, 2010; Streeter et al., 2007; West, Otte, Geher, Johnson, & Mohr, 2004).

Evans and colleagues (2009) explain the benefits of yoga through a biopsychosocial model. They propose that there are physical health benefits that could be similar to any form of exercise, but unlike more competitive physical endeavors, yoga helps "quiet the body." Thus, not only are there improvements in musculoskeletal and cardiopulmonary systems, but also improvements in the regulatory functioning of the autonomic nervous system. Moreover, they note that the non-competitive nature, combined with the mindfulness practice, may foster self-efficacy, coping, social support, and positive mood. Finally, Evans et al. (2009) describe the "spiritual" benefits of yoga, including compassionate understanding, acceptance, and mindful awareness. They add that while they refer to these as "spiritual" benefits, these concepts may be quite secular,

and have much in common with mainstream psychological thinking (e.g., Acceptance and Commitment Therapy; Fletcher & Hayes, 2005).

Ware (2007) compares yoga with psychotherapy, arguing that like psychotherapy, yoga can facilitate self-awareness and introspection, behavioral change, cognitive change and self-acceptance, and a sense of connection to others. For instance, with regard to self-awareness and behavioral change, she explains that psychotherapy helps clients focus on present thoughts and feelings, ways in which their awareness may be limited, and promotes the client to engage in healthy thoughts, choices and behaviors. Yoga, she says, teaches practitioners to be present to their immediate experience, and in doing so, they have opportunities to reflect on intentions, choices, and take effective actions within the practice (e.g., modifying a pose if it causes physical pain, or intensifying a stretch if it feels good). These practices "on the mat" may carry over and expand into daily life (e.g., being aware of feelings and experiences in the present moment and taking actions to facilitate well-being). While each of these theories provides plausible insights into the potential role of yoga as a healing modality, the validity of these theories would be enhanced by examining how trauma survivors themselves experience yoga within their healing process.

Research on yoga for physical and mental health. It has long been thought that yoga promotes physical and mental health (see Iyengar, 1979). However, it is only recently that scientists have begun to systematically study its use in health-promotion and in the treatment of various medical and psychiatric problems. Although the term "yoga" in Western societies typically refers to the combination of asana, pranayama, and dharana, one of the challenges of reviewing the literature on the impact of yoga on

physical and mental health is that often the intervention is not clearly described, and when it is, there appears to be a range of practices that are classified as yoga, not all of which integrate these three elements. For example, in a recent meta-analysis by Cabral and colleagues (2011) that looked at ten randomized controlled trials of yoga for psychiatric disorders, only 3 among these ten examined a form of Hatha yoga that clearly included asana (the physical postures and movement), pranayama (breathwork) and dharana (mindfulness). Two of the studies described focused on the impact of yogic breathwork alone. One study focused on mindfulness meditation alone, and one examined a combination of mindfulness and breathwork. The others were "integrated or alternative forms of yoga and meditation," the meaning of which was not made clear. Despite this limitation, the literature speaks to the power of each of the component elements of yoga in the promotion of physical and mental health, as well as the potentially greater impact when integrating all three of these components.

Studies of breathwork have shown improvements in emotional regulation (Arch & Craske, 2006), improvements in heart rate variability (which is often irregular in trauma survivors reflecting dysregulation of the autonomic nervous system; Brown & Gerbarg, 2009), and reductions in symptoms of PTSD and depression (Descilo et al., 2010). Research shows that mindfulness practices may help decrease ruminations (Bortz et al., 2007); reduce anxiety, depression, and stress (Schreiner & Malcolm, 2008); and treat substance abuse (Bowen, Witkiewitz, Dillworth, & Marlatt, 2007). Mindfulness practice has also been shown to increase brain gray matter concentration, which is involved in learning, memory, emotion regulation, self-referential processing, and perspective taking—all areas of functioning that can be impaired by trauma (Holzel et al., 2011). The

effects of asana are likely similar to other forms of exercise, including: musculoskeletal benefits such as increased range of motion, strength, reduced pain or tenderness in joints, and relaxation (Evans, Subramanian, & Sternlieb, 2008); cardiopulmonary benefits (Raub, 2002); and autonomic nervous system functioning as manifest in reduced stress responses such as blood pressure, heart rate, and respiration (Ross & Thomas, 2010; Sinha et al., 2004). While the effects of each of these component elements speak to the promise of yoga in the treatment of trauma disorders, the integration of these elements may be greater than the sum of the parts. For instance, there is some research showing that the physical practice of asana, combined with pranayama and dharana, leads to greater benefits than exercise alone, including improvements in mood, reductions in anxiety, and increases in brain GABA levels (Streeter et al., 2010; West et al., 2004).

The use of yoga in the treatment of medical disorders has been well studied (see Khalsa, 2004; Grossman, Niemann, Schmidt, & Walach, 2004; Raub, 2002 for reviews). However, the methodological rigor across these studies varied widely (Salmon et al., 2009). Recent research attesting to the physical health benefits of yoga that involved a randomized controlled design, include, for instance, studies demonstrating the use of yoga for alleviating chronic back pain (Sherman, Cherkin, Erro, Miglioretti, & Deyo, 2005), reducing gastrointestinal problems associated with irritable bowel syndrome (Kuttner et al., 2006), improving sleep quality, and reducing fatigue among lymphoma patients (Cohen, Warneke, Fouladi, Rodriguez, & Chaoul-Reich, 2004).

There has been less research until quite recently on yoga as a treatment modality for mental health problems. Among these studies, yoga has been shown to reduce symptoms of: anxiety and depression (e.g., Bennett, Weintraub, & Khalsa, 2008; Butler et

al., 2008; Campbell & Moore, 2004; da Silva, Ravindran, & Ravindran, 2009; Forbes et al., 2008; Lavey et al., 2005; Pilkington, Kirkwood, Rampes, & Richardson, 2005; Uebelacker et al., 2010), eating disorders (e.g., Scime & Cook-Cottone, 2008), attention-deficit hyperactivity disorder (e.g., Abadi, Madgaonkar, & Venkatesan, 2008; Jensen & Kenny, 2004), insomnia (Khalsa, 2007), and PTSD (e.g., van der Kolk et al., in press). Studies have also shown that yoga may improve quality of life, emotional well-being, positive affect, stress management, self-concept, and body awareness and responsiveness (Campbell & Moore, 2004; Dale et al., 2011; Granath, Ingvarsson, von Thiele, & Lundberg, 2006; Impett et al., 2006; Moadel et al., 2007; Woolery, Myers, Sternlieb, & Zeltzer, 2004; Wheeler & Wilkin, 2007).

This dissertation adds to this growing body of research. The three papers that compose this dissertation shed light on the efficacy of yoga as a treatment modality for trauma survivors, and its meaning to adult female survivors of complex trauma within their processes of healing. The specific research questions and aims of the three papers are as follows.

Research Questions and Aims of the 3 Papers

The first paper considers the impact of yoga on trauma symptoms stemming from various types of trauma exposure. More specifically, this study seeks to assess the current evidence base for yoga as a treatment modality for common psychiatric problems stemming from trauma exposure, including symptoms of PTSD, anxiety, and depression. Although there is a growing body of research literature on this subject, there are no systematic reviews or meta-analyses to date that have specifically focused on trauma survivors. This paper reviews relevant studies, and by combining the results of these

primary studies using meta-analytic techniques, it produces a more precise estimate of the effect of yoga on symptoms of PTSD, depression, and anxiety among trauma survivors.

Papers 2 and 3 utilize a single, mixed-methods longitudinal data source to assess the efficacy of yoga for adult women with complex trauma histories (i.e., exposure to recurring, multiple, and/or sustained trauma beginning in childhood). Paper 2 draws on quantitative data, and addresses the following research questions:

- Is practicing yoga associated with a reduction in traumatic symptomology and loss of PTSD diagnosis over time? More specifically:
    - Does practicing yoga predict reductions in symptoms of PTSD, dissociation, and depression?
    - Does practicing yoga reduce problems with affect dysregulation and associated negative tension reducing activities (e.g., self-injury)?
    - Is practicing yoga associated with a loss of PTSD diagnosis?
- Is frequency of yoga practice over time associated with the degree of symptom improvements and the likelihood of a loss of PTSD diagnosis?

Finally, the third paper is a qualitative hermeneutic phenomenological study which aims to understand the lived experiences of healing through yoga among adult women who experienced prolonged trauma exposure. Participants were asked the following questions:

- Please describe how your experience of yoga or your practice of yoga has changed over time? (*if participant stopped practicing after intervention ended, ask:* How did your experience of yoga change during your time in the intervention? Can you describe any lingering effects or continuing changes?)

- Please describe any influence the yoga intervention (and/or your ongoing yoga practice) has had for you within the context of your experiences of healing from trauma—either positive or negative.
- Please describe any influence of your yoga practice on your experience of trauma symptoms day to day or the way you manage your trauma symptoms in your day to day life.
- Please reflect for a moment on your experiences over time of being connected or disconnected from your body, the way you have felt or feel now about your body, and any influences your yoga practice may have had on this dimension of your life. Please describe how your yoga experiences have shaped your relationship with your body or your experiences in your body. What stands out about these experiences in relation to your healing process?
- Can you describe a time when your yoga practice influenced the way you feel, express, tolerate, or have control over your emotions? What was that (or those) experience(s) like for you? What stands out about the experience(s) in relation to your healing?
- When you reflect on your experiences of yourself as a person, and the influence of the yoga intervention (and/or your practice of yoga) has had on your notion of who you are or your sense of self, please describe these experiences. What does this (participants' answers) mean for you in terms of your healing?
- Can you describe any experiences where your yoga practice influenced your relationships with others, or your feelings of being connected to or disconnected from others? Please describe how your yoga experiences have impacted this dimension of

your life. What do these experiences mean for you in terms of your healing?

- Has your practice of yoga influenced your ability to make meaning from the struggles you have faced related to your trauma history? If so, please describe this experience further.
- Has your practice of yoga influenced your priorities or outlook more generally in any way? If so, please describe this impact. What does this mean for you in terms of your healing? (if participant doesn't understand question might say: for instance, has it influenced your sense of what is possible, your sense of hope for the future, or your sense of optimism/pessimism, etc.)
- Has your yoga practice impacted your spirituality, your sense of meaning in life, or your sense of feeling connected to something greater then yourself? If so, please describe that experience. What does that experience mean to you in terms of your healing?

References

Abadi, M.S., Madgaonkar, J., & Venkatesan, S. (2008). Effects of yoga on children with attention deficit/hyperactivity disorder. *Psychological Studies, 53(2),* 154-159.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (Revised 4th ed.). Washington, DC: Author.

American Psychiatric Association (2004). *Practice guideline for the treatment of patients with acute stress disorder and posttraumatic stress disorder.* Washington, DC: Author.

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 44*, 1849-1858.

Barnes, P. M., Powell-Griner, E., McFann, K., & Nahin, R. L. (2002). Complementary and alternative medicine use among adults: United States, 2002. *Advance Data,* 1-19.

Becker, C. B., Zayfert, C., Anderson, E. (2004). A survey of psychologists' attitudes towards and utilization of exposure therapy for PTSD. *Behavioral Research Therapy, 42,* 277–292.

Bennett, S.M., Weintraub, A., & Khalsa, S. (2008). Initial evaluation of the LifeForce Yoga program as a therapeutic intervention for depression. *International Journal of Yoga Therapy, 19,* 49-57.

Berger, B. (1994). Coping with stress: The effectiveness of exercise and other techniques. *Quest, 46,* 100-119.

Birdee, G. S., Legadza, A., Saper, R., Bertisch, S., Eisenberg, D., & Phillips, R. (2008). Characteristics of yoga users: Results of a national survey. *Journal of General Internal Medicine, 23*, 1653-1658.

Bremner, J. D. (2002). *Does stress damage the brain? Understanding trauma-related disorders from a neurological perspective.* New York, NY: W. W. Norton & Company, Inc.

Briere, J. & Scott, C. (2006). Biology and Psychopharmacology of Trauma. In *Principles of Trauma Therapy: A Guide to symptoms, Evaluation, and Treatment* (pp. 185-229). Thousand Oaks, California: Sage Publications.

Briere, J. & Spinazzola, J. (2005). Phenomenology and psychological assessment of complex posttraumatic states. *Journal of Traumatic Stress, 18*(5), 401–412.

Bortz, J. J., Summers, J. D., & Pipe, T. B. (2007). Mindfulness meditation: Evidence of decreased rumination as a mechanism of symptom reduction. *Journal of Neuropsychiatry and Clinical Neurosciences, 19*, 217-218.

Bowen, S., Witkiewitz, K., Dillworth, T. M., & Marlatt, G. A. (2007). The role of thought suppression in the relationship between mindfulness meditation and alcohol use. *Addictive Behaviors, 32*, 2324-2328.

Brown, R. P., & Gerbarg, P. L. (2009). Yoga breathing, meditation, and longevity. *Annals of the New York Academy of Sciences, 1172*, 54-62.

Burgess, A.W., & Holmstrom, L.L. (1974). Rape trauma syndrome. *American Journal of Psychiatry*, *131,* 981–986.

Butler, L.D., Waelde, L.C., Hastings, T.A., Chen, X., Symons, B., Marshall, J.,…Spiegel, D. (2008). Meditation with yoga, group therapy with hypnosis, and

psychoeducation for long-term depressed mood: A randomized pilot trial. *Journal of Clinical Psychology, 64(7),* 806–820.

Cabral, P., Meyer, H. B. & Ames, D. (2011). Effectiveness of yoga therapy as a complementary treatment for major psychiatric disorders: a meta-analysis. *The Primary Care Companion to CNS Disorders, 13*(4).

Campbell, D.E., & Moore, K.A. (2004). Yoga as a preventative and treatment for depression, anxiety, and stress. *International Journal of Yoga Therapy, 14(1),* 53-58.

Campbell, J., Jones, A.S., Dienemann, J., Kub, J., Schollenberger, J., O'Campo, P., Gielen, A.C., & Wynne, C. (2002). Intimate partner violence and physical health consequences. *Archives of Internal Medicine,162*(10), 1157-1163.

Cloitre, M., Koenen, K. C., Cohen, L. R., & Hart, H. (2002). Skills training in affective and interpersonal regulation followed by exposure: A phase-based treatment for PTSD related to childhood abuse. *Journal of Consulting and Clinical Psychology, 70*, 1067-1074.

Cloitre, M., Stolbach, B. C., Herman, J. L., van der Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). Developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress, 22*(5), 399-408.

Cloitre, M. Stovall-McClough, C. K., Nooner, K., Zorbas, P., Cherry, S. Jackson, C. L., Gan, W. & Petkova, E. (2010). Treatment for PTSD related to childhood abuse: a randomized controlled trial. *American Journal of Psychiatry, 167*(8), 915-924.

Creswell, J.W. (2009). *Research design: Qualitative, quantitative and mixed methods approaches, 3rd Edition*. Thousand Oaks, CA: Sage Publications, Inc.

Cohen, L., Warneke, C., Fouladi, R. T., Rodriguez, M. A., & Chaoul-Reich, A. (2004). Psychological adjustment and sleep quality in a randomized trial of the effects of a Tibetan yoga intervention in patients with lymphoma. *Cancer, 100*(10), 2253–2260.

Cook, J. (n.d.). Not all yoga is created equal. *Yoga Journal*. Retrieved January 19, 2012 from http://www.yogajournal.com/basics/165.

Corso, P. S., Edwards, V. J., Fang, X., & Mercy, J. A. (2008). Health-related quality of life among adults who experienced maltreatment during childhood. *American Journal of Public Health, 98*(6), 1094-1100.

Courtois, C. A. (2004). Complex trauma, complex reactions: Assessment and treatment. *Psychotherapy, Research, Practice, Training, 41,* 412-425.

Courtois, C. A. & Ford, J. D. (2009). *Treating complex traumatic stress disorders: An evidence-based guide.* New York, NY: The Guildford Press

Craven, D. (1997). *Sex Differences in Violent Victimization*. Bureau of Justice Statistics, U.S. Department of Justice, Government Printing Office, Washington D.C.

da Silva, T. L., Ravindran, L. N., & Ravindran, A. V. (2009). Yoga in the treatment of mood and anxiety disorders: A review. *Asian Journal of Psychiatry, 2*(1), 6-16.

Dale, L.P., Carroll, L.E., Galen, G.C., Schein, R., Bliss, A., Mattison, A.M., & Neace, W.P. (2011). Yoga practice may buffer the deleterious effects of abuse on women's self-concept and dysfunctional coping. *Journal of Aggression, Maltreatment, & Trauma, 20*(1), 90-102.

Descilo, T., Vedamurtachar, A., Gerbarg, P. L., Nagaraja, D., Gangadhar, B. N., Damodaran, B., … Brown, R. P. (2010). Effects of a yoga breath intervention alone and in combination with an exposure therapy for PTSD and depression in survivors of the 2004 South-East Asia tsunami. *Acta Psychiatrica Scandinavica, 121*, 289-300.

Edwards, V.J., Holden, G.W., Felitti,, V.J., Anda, R.F. (2003). Relationship between multiple forms of child maltreatment and adult mental health in community respondents: Results from the adverse childhood experiences study. *American Journal of Psychiatry, 160,* 1453-1460.

Emerson, D. & Hopper, E. (2011). *Overcoming trauma through yoga: Reclaiming your body.* Berkeley, CA: North Atlantic Books.

Evans, S. Subramanian, S., & Sternlieb, B. (2008). Yoga as treatment for chronic pain conditions: a literature review. *International Journal on Disability and Human Development, 7*(1), 25-32.

Evans, S., Tsao, J. C. I., Sternlieb, B., & Zeltzer, L. K. (2009). Using the biopsychosocial model to understand the health benefits of Yoga. *Journal of Complementary and Integrative Medicine*, *6*(1), Article 15, 1-22.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V…. Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine*, *14*(4), 245-258.

Fletcher, L. & Hayes, S. C. (2005). Relational frame theory, acceptance and commitment therapy and a functional analytic definition of mindfulness. *Journal of Rational-Emotive & Cognitive-Behavior Therapy, 23*, 315-336.

Foa, E. B., Keane, T. M., Friedman, M. J., & Cohen, J. A. (2009). *Effective treatments for PTSD: Practice guidelines from the international society for traumatic stress studies.* New York, NY: The Guilford Press.

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

Forbes, B., Akturk, C., Cummer-Nacco, C., Gaither, P., Gotz, J., Harper, A., & Hartsell, K. (2008). Using integrative yoga therapeutics in the treatment of comorbid anxiety and depression. *International Journal of Yoga Therapy, 18*, 87-95.

Ford, J. D., & Kidd, P. (1998). Early childhood trauma and disorders of extreme stress as predictors of treatment outcome with chronic PTSD. *Journal of Traumatic Stress, 18,* 743–761.

Gallop, R. (2002). Failure of the capacity for self-soothing in women who have a history of abuse and self-harm. *Journal of the American Psychiatric Nurses Association, 8*(1), 20-26.

Granath, J., Ingvarsson, S., von Thiele, U., & Lundberg, U. (2006). Stress management: A randomized study of cognitive behavioural therapy and yoga. *Cognitive Behaviour Therapy, 35,* 3-10.

Grossman, P., Niemann, L., Schmidt, S. & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*, 35-43.

Harned, M. S., Jackson, S. C., Comtois, K. A., & Linehan, M. M. (2010). Dialectical Behavior Therapy as a precursor to PTSD treatment for suicidal and/or self-injuring women with borderline personality disorder. *Journal of Traumatic Stress*, *23*(4), 421–429.

Harvey, M. R. (1996). An ecological view of psychological trauma and trauma recovery. *Journal of Traumatic Stress, 9*(1), 3-21.

Herman, J. (1997). *Trauma and recovery: The aftermath of violence - from domestic abuse to political terror.* New York, NY: Basic Books.

Holzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging, 191*, 36-43.

Horowitz, M., Wilner, N., & Kaltreider, N. (1980). Signs and symptoms of post-traumatic stress disorder. *Archives of General Psychiatry, 37*, 85–92.

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

Innes, K. E., Bourguignon, C., & Taylor, A. G. (2005). Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga: a systematic review. *Journal of American Board of Family Practice, 18*(6), 491-519.

Iyengar, B. K. S. (1979). *Light on Yoga.* New York, NY: Shocken Books.

Janoff-Bulman, R. (1992). *Shattered assumptions: Towards a new psychology of trauma.* New York, NY: The Free Press.

Jaycox, L. H., & Foa, E. B. (1996). Obstacles in implementing exposure therapy for PTSD: case discussions and practical solutions. *Clinical Psychology and Psychotherapy, 3*, 176–184.

Jensen, P.S., & Kenny, D.T. (2004). The effects of yoga on the attention and behavior of boys with Attention-Deficit/hyperactivity Disorder (ADHD). *Journal of Attention Disorders, 7*(4), 205-216.

Kabat-Zinn, J. (2003). Mindfulness based intervention in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10,* 144-156.

Kardiner, A. (1941). *The traumatic neuroses of war.* New York, NY: Hoeber.

Kessler, R.C., Chiu, W.T., Demler, O., Merikangas, K.R., & Walters, E.E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6): 617-627.

Kessler, R.C., Sonnega, A., Bromet, E. Hughes, M., & Nelson, C.B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*(12), 1048-1060.

Khalsa , S. B. (2004). Yoga as a therapeutic intervention: A bibliometric analysis of published research studies. *Indian Journal of Physiology and Pharmacology, 48*, 269-85.

Khalsa, S. B. (2007). Treatment of chronic insomnia with yoga: A preliminary study with sleep-wake diaries. *Applied Psychophysiology & Biofeedback, 29*(4), 269-278.

Kilpatrick, D. G., Acierno, R., Resnick, H. S., Saunders, B. E., Best, C. L. (1997). A 2-year longitudinal analysis of the relationships between violent assault and substance use in women. *Journal of Consulting and Clinical Psychology, 65*(5)*,* 834-847.

Kirkwood, G., Rampes, H., Tuffrey, V., Richardson, J., & Pilkington, K. (2005). Yoga for anxiety: a systematic review of the research evidence. *British Journal of Sports Medicine, 39*(12), 884-891.

Kuttner, L., Chambers, C. T., Hardial, J., Israel, D. M., Jacobson, K., & Evans, K. (2006). A randomized trial of yoga for adolescents with irritable bowel syndrome. *Pain Resolution Management, 11*(4), 217-223.

Ladwig, K.H., Marten-Mittag, B., Deisenhofer, I., Hofmann, B., Schapperer, J., Weyerbrock, S.,…Schmitt, C. (2002). Psychophysiological correlates of peritraumatic dissociative responses in survivors of life-threatening cardiac events. *Psychopathology, 35*(4), 241-248.

Lanius, R.A., Vermetten, E., Loewenstein, R.J., Brand, B., Schmahl, C., Bremner, J.D., & Spiegel, D. (2010). Emotion modulation in PTSD: Clinical and neurobiological evidence for a dissociative subtype. *American Journal of Psychiatry, 167*(6), 640-647.

Lavey, R., Sherman, T., Mueser, K.T., Osborne, D.D., Currier, M., & Wolfe, R. (2005). The effects of yoga on mood in psychiatric inpatients. *Psychiatric Rehabilitation Journal, 28*(4), 399–402.

Libby, D.J., Pilver, C. E., & Desai, R. (2012). Complementary and alternative medicine use among individuals with posttraumatic stress disorder. *Psychological Trauma: Theory, Resesarch, Practice and Policy, 5*(3), 277-285.

Marks, I., Lovell, K., Noshirvani, H., Livanou, M., & Thrasher, S. (1998). Treatment for posttraumatic stress disorder by exposure and/or cognitive restructuring: A controlled study. *Archives of General Psychiatry, 55*(4)*,* 317-325.

McDonagh-Coyle, A., Friedman, M., McHugo, G., Ford., J., Sengupta, A., Mueser, K., Demment, C. C., Fournier, D., Schnurr, P. P., & Descamps, M. (2005). Randomized trial of cognitive-behavioral therapy for chronic posttraumatic stress disorder in adult female survivors of childhood sexual abuse. *Journal of Consulting and Clinical Psychology, 73*(3), 515-524.

Michelson, L., June, K., Vives, A., Testa, S., & Marchione, N. (1998). The role of trauma and dissociation in cognitive-behavioral psychotherapy outcome and maintenance for panic disorder with agoraphobia. *Behaviour Research and Therapy, 36*(11), 1011-1050.

Moadel, A. B., Shah, C., Wylie-Rosett, J., Harris, M. S., Patel, S. R., Hall, C. B., & Sparano, J. A. (2007). Randomized controlled trial of yoga among a multiethnic sample of breast cancer patients: Effects on quality of life. *Journal of Clinical Oncology, 25*(28), 4387-4395.

Nemeroff, C. B. (2004). Neurobiological consequences of childhood trauma. *Journal of Clinical Psychiatry, 65*(Suppl 1)*,* 18-28.

Ogden, P., Minton, K., Pain, C. (2006). *Trauma and the body: A sensorimotor approach to psychotherapy.* New York, NY: Norton & Co.

Ospina, M. B., Bond, K., Karkhaneh, M., Tjosvold, L., Vandermeer, B., Liang, Y., et al. (2007). Meditation practices for health: state of the research. *Evidence Report/Technology Assessment (155)*, 1-263.

Pelcovitz, D., van der Kolk, B. A., Roth, S., Mandel, F. S., Kaplan, S., & Resick, P. A. (1997). Development of a criteria set and a structures interview for disorders of extreme stress (SIDES). *Journal of Traumatic Stress, 10*(1)*,* 3-17.

Pilkington, K., Kirkwood, G., Rampes, H., & Richardson, J. (2005). Yoga for depression: The research evidence. *Journal of Affective Disorders, 89*(1-3)*,* 13–24.

Pitman, R. K., Altman, B., Greenwald, E., Longpre, R. E., Macklin, M. L., Poire, R. E., & Steketee, G. S. (1991). Psychiatric complications during flooding therapy for Posttraumatic Stress Disorder. *Journal of Clinical Psychiatry, 52*(1), 17-20.

Raub, J. A. (2002). Psychophysiological effects of Hatha Yoga on musculoskeletal and cardiopulmonary function: a literature review. *Journal of Alternative and Complementary Medicine, 8*(6), 797-812.

Resick, E A., Nishith, E, Weaver, T. L., Astin, M. C., & Feuer, C. A.(2002). A comparison of cognitive-processing therapy with prolonged exposure and a waiting condition for the treatment of chronic posttraumatic stress disorder in female rape victims*. Journal of Consulting and Clinical Psychology, 70*(4)*,* 867-879.

Ringel, S. & Brandell, J. R. (2012) *Trauma: Contemporary directions in theory, practice, and research.* Los Angeles, CA: Sage Publications.

Ross, A. & Thomas, S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *The Journal of Alternative and Complementary Medicine, 16* (1), 3-12.

Rothschild, B. (2000). *The body remembers: The psychophysiology of trauma and trauma treatment.* New York, NY: W.W. Norton & Company.

Rufer, M., Held, D., Cremer, J., Fricke, S., Moritz, S., Peter, H., & Hand, I. (2006). Dissociation as a predictor of cognitive behavior therapy outcome in patients with obsessive-compulsive disorder. *Psychotherapy and Psychosomatics, 75*(1), 40-46.

Salmon, P., Lush, E., Jablonski, M., & Sephton, S. E. (2009). Yoga and mindfulness: Clinical aspects of an ancient mind/body practice. *Cognitive and Behavioral Practice*, *16*(1), 59-72.

Scime, M., & Cook-Cottone, C. (2008). Primary prevention of eating disorders: A constructivist integration of mind and body strategies. *International Journal of Eating Disorders, 41*(2), 134-142.

Scott, M. J., & Stradling, S. G. (1997). Client compliance with exposure treatments for posttraumatic stress disorder. *Journal of Traumatic Stress, 10*(3), 523-526.

Sherman, K. J., Cherkin, D. C., Erro, J., Miglioretti, D. L., & Deyo, R. A. (2005). Comparing yoga, exercise and self-care book for chronic low back pain. *Annals of Internal Medicine, 20*(143), 849-856.

Sinha, B., Ray, U. S., Pathak, A., & Selvamurthy, W. (2004). Energy cost and cardiorespiratory changes during the practice of Surya Namaskar. *Indian Journal of Physiology and Pharmacology, 48*(2), 184-190.

Solomon, M. & Siegel, D. (Eds.) (2003). *Healing trauma: Attachment, mind, body, and brain* New York, NY: Norton.

Spinazzola, J., Blaustein, M., & van der Kolk, B. A. (2005). Posttraumatic stress disorder treatment outcome research: The study of unrepresentative samples? *Journal of Traumatic Stress, 18*(5), 425-436.

Stoller, C. C., Gruel, J. H., Cimini, L. S., Fowler, M.S., & Koomar, J. A. (2012). Effects of sensory-enhanced yoga on symptoms of combat stress in deployed military personnel. *Journal of Occupational Therapy, 66*(1), 59–68.

Streeter, C. C., Jensen, J. E., Perlmutter, R. M., Cabral, H. J., Tian, H., Terhune, D.B., . . . Renshaw, P. F. (2007). Yoga asana sessions increase brain GABA levels: A pilot study. *Journal of Alternative & Complementary Medicine, 13*(4), 419-426.

Tarrier, N., Pilgrim, H., Sommerfield, C., Faragher, B., Reynolds, M., Graham, E., & Barrowclough, C. (1999). A randomized trial of cognitive therapy and imaginal exposure in the treatment of chronic posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 67*(1), 13-18.

Tjaden, P. & Thoennes, N. (2000). *Full report of the prevalence, incidence and consequences of violence against Women: Findings from the national violence against women survey.* Washington, DC: National Center of Justice, Publication NCJ 183781.

Uebelacker, L. A., Epstein-Lubow, G., Gaudiano, B. A., Tremont, G., Battle, C. L., & Miller, I. W. (2010). Hatha Yoga for Depression: Critical Review of the Evidence for Efficacy, Plausible Mechanisms of Action, and Directions for Future Research. *Journal of Psychiatric Practice, 16*(1), 22-33.

U.S. Department of Veterans Affairs (2004). *Management of posttraumatic stress.* Washington, DC: Author.

van der Kolk, B. A. (1994). The body keeps the score: Memory and the emerging psychobiology of posttraumatic stress. *Harvard Review of Psychiatry, 1*, 253-265.

van der Kolk, B.A. (2006). Clinical implications of neuroscience research in PTSD. *Annals New York Academy of Sciences, 1(2),* 1-17.

van der Kolk, B., McFarlane, A. C., & Weisaeth, L. (1996). (Eds.). *Traumatic Stress: The effects of overwhelming experience on mind, body, and society*. New York, NY: The Guilford Press.

van der Kolk, B. A., Pelcovitz, D., Roth, S., Mandel, F. S., McFarlane, A. C., & Herman, J. L. (1996). Dissociation, somatization, and affect dysregulation: The complexity of adaptation to trauma. *The American Journal of Psychiatry*, *153*(7), 83-94.

van der Kolk, B. A., Roth, S., Pelcovitz, D., Sunday, S., Spinazzola, J. (2005). Disorders of Extreme Stress: The Empirical Foundation of a Complex Adaptation to Trauma. *Journal of Traumatic Stress*, *18*(5), 389-399.

van der Kolk, B. A., Spinazzola, J., Blaustein, M.E., Hopper, J.W., Hopper, E.K., Korn, D.L., & Simpson, W.B. (2007). A randomized clinical trial of Eye Movement Desensitization and Reprocessing (EMDR), fluoxetine, and pill placebo in the treatment of posttraumatic stress disorder: Treatment effects and long-term maintenance. *Journal of Clinical Psychiatry, 68*(1), 37-46.

van der Kolk, B. A., Stone, L., West, J., Rhodes, A.M., Emerson, D., Suvak, M., & Spinazzola, J. (in press) Yoga as adjunctive treatment for chronic PTSD. *Journal of Clinical Psychiatry.*

Ware, C. J. (2007, June). Yoga and psychotherapy. *Yoga Therapy in Practice, 3*(2), 15-17.

Walker, E. A., Unutzer, J., Rutter, C., Gelfand, A., Saunders, K., Vonkorff, M., Koss, M.P., Katon, W. (1999). Costs of health care used by women HMO members with a history of childhood abuse and neglect. *Archives of General Psychiatry, 56*(7), 609-613.

Walker, L.E. (1984). *The battered woman syndrome*. New York: Springer.

West, J. Otte, C., Geher, K., Johnson, J., & Mohr, D.C. (2004). Effects of hatha yoga and African dance on perceived stress, affect, and salivary cortisol. *Annals of Behavioral Medicine, 28*(2), 114-118.

Wheeler, A., & Wilkin, L. (2007). A study of the impact of yoga Asana on perceived stress, heart rate, and breathing rate. *International Journal of Yoga Therapy, 17*(1), 57-63.

Woolery, A., Myers, H., Sternlieb, B., & Zeltzer, L. (2004). A yoga intervention for young adults with elevated symptoms of depression. *Alternative Therapies, 10*(2), 60-63.

Wylie, M. S. (2011). The limits of talk: Bessel van der Kolk wants to transform the treatment of trauma. *Psychotherapy Networker.* Retrieved December 16, 2013 from: http://www.traumacenter.org/products/pdf_files/Networker.pdf

Yoga Journal (2008). Yoga Journal releases 2008 "Yoga in America" market study. *Yoga Journal Press Releases.* Retrieved December 1, 2010 from: http://www.yogajournal.com/advertise/press_releases/10

Zayfert, C., Deviva, J. C., Becker, C. B., Pike, J. L., Gillock, K. L., & Hayes, S. A. (2005). Exposure utilization and completion of cognitive behavioral therapy for PTSD in a "real world" clinical practice. *Journal of traumatic stress, 18*(6), 637-645.

Paper 1. The Effect of Hatha Yoga in the Treatment of Symptoms of PTSD, Anxiety, and Depression among Trauma Survivors: A Meta-Analytic Review

Abstract

Trauma survivors are increasingly turning to Hatha yoga – the integrative practice of movement and postures, breath exercises, and mindfulness – to address their symptoms of PTSD, depression, and anxiety. Although there is a growing body of research literature on yoga in the treatment of mental health problems, there are no meta-analyses to date that have examined the evidence base of Hatha yoga for treating symptoms of PTSD, depression, and anxiety specifically among trauma survivors. Relevant studies on Hatha yoga as a treatment modality for trauma survivors suffering from symptoms of anxiety, depression, and PTSD were identified by searching prominent bibliographic databases, including Psychinfo, Medline, Applied Social Sciences Index and Abstracts, and Published International Literature on Traumatic Stress, and from previously published systematic reviews, and clinicaltrials.gov. Standardized mean differences and confidence intervals were calculated to evaluate the effect size of individual studies and to allow comparison across studies. Additionally, meta-analytic techniques were used to combine results into random effects models for each of the given outcomes to allow comparison across randomized control trials with the control conditions, and across the open trials utilizing an imputed control group. Ten studies (n=311) that met inclusion criteria were identified and reviewed. Among the randomized control trials, results showed that Hatha yoga was significantly better than controls for each of the outcomes under investigation. Standardized mean difference effect sizes showed that the difference between the pooled treatment and control groups were

moderate to large. Among the open trials, the pooled standardized mean effect sizes from pre- to post-treatment showed significant and large improvement for all three outcomes. However, when comparing the pooled effect sizes to imputed controls, there was only a significant difference for anxiety symptoms. This indicated that although Hatha yoga appeared to be beneficial for depression and PTSD, the true effect may be smaller than individual studies suggested. Overall, findings from this review suggest that Hatha yoga appears to be a promising treatment for trauma survivors struggling with PTSD, anxiety, and depression. However, due to the small number of high quality studies and small sample sizes of many of the studies it is important to interpret results of this study with caution. Suggestions for future research are discussed.

Introduction

Over half of the population in the United States will be exposed to a traumatic event during their lifetime (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Although many individuals recover without intervention, many others face prolonged, often co-occurring mental health problems (Kessler, Chiu, Demler, Merikangas, & Walters, 2005). Indeed, epidemiological research shows that there is high comorbidity in psychiatric problems faced by trauma survivors; the vast majority with symptoms of PTSD also struggle with depression and anxiety (Brady, Killeen, Brewerton, & Lucerini, 2006; Ginzburg, Ein-Dor, & Solomon, 2010; Kessler et al., 1995). Moreover, research shows that a significant portion of traumatized adults experience symptomology that is persistent for years and appears unresponsive to traditional talk-based treatment modalities (Bradley, Greene, Russ, Dutra, & Westen, 2005; Kessler et al., 1995). The bulk of evidence-based treatments for trauma survivors currently involve cognitive-reframing and memory processing work; in other words, they emphasize the impact of trauma on the mind, but pay little attention to the role of the body in the healing process (e.g., Bradley et al., 2005; Foa, Keane, Friedman, & Cohen, 2009). A number of experts in the traumatic stress studies field, however, have emphasized the important need to address the body directly in treatment, and have suggested that survivors of trauma may benefit from mind-body therapeutic modalities such as yoga (see, for instance, Courtois, 2004; van der Kolk, 2006). This paper considers the current evidence base of Hatha yoga in reducing symptoms of PTSD, anxiety, and depression among traumatized populations.

Yoga is an ancient system of practices aimed at controlling the body, mind, intellect, and ego—a way for an individual to pursue “an inquiry into being” aimed at

achieving “inner peace and happiness” (Iyengar, 1979, p.20). The term yoga means union, and refers to an integration of the body, mind, and spirit (Salmon, Lush, Jablonski, & Sephton, 2009). Traditionally, there are many types of yoga practices aimed at achieving this goal. For instance, Karma yoga aims to achieve this inner peace and happiness through work and service to others, Jnana yoga through study and the acquisition of knowledge, and Hatha yoga through physical exercise, breath control, and meditation (Iyengar, 1979). Hatha yoga is the most commonly practiced type of yoga in the West, and there are numerous styles of Hatha yoga that exist. For example, Iyengar yoga focuses on the alignment of the body in various poses and often involves holding poses for a certain number of breaths. Vinyasa yoga emphasizes flowing movement from one pose to another, and linking the breath to movement. What the various styles of Hatha yoga share is that it is a practice that involves the integration of physical postures and movement to link those postures (called asana), breathwork that involves controlling the rate and depth of breathing (called pranayama), and mindful attention to the present moment experience (called dharana). Variation across these styles of Hatha yoga includes factors such as differences in the rates at which one cycles through the poses, varying emphases on alignment, temperature of the practice space, and the overall physical intensity of the practice (Groessl, Weingart, Aschbacher, Pada, & Baxi, 2008).

Individuals are increasingly turning toward complementary and alternative interventions (CAM) such as yoga to address mental and physical health problems, including those stemming from exposure to traumatic stress. Birdee and colleagues (2008), for example, note that from 1997 to 2002 the number of people in the U.S. who practiced yoga at least once in the past year increased from 3.7% to 5.5% (or 10.4 million

people). This rate increased even further to 6.1% as of 2007 (Barnes, Bloom, & Nahin, 2008). Libby, Pilver, and Desai (2012) looked specifically at CAM use among trauma survivors, and found that 39% of individuals with PTSD had used a CAM treatment in the past year to address their posttraumatic stress symptoms, most commonly mind-body treatments. Individuals who practice yoga have cited numerous benefits, including its capacity to promote relaxation, health, and well-being, and to treat specific mental health problems (Birdee et al., 2008).

Although research elucidating how yoga may be an effective component of treatment for symptoms stemming from exposure to traumatic stress is quite limited, it has been suggested, for example, that yoga's focus on mindful attention to the present moment without judgment as well as breathwork may promote the ability to regulate negative affect (Arch & Craske, 2006; Coffey, Hartman, & Fredrickson, 2010). This finding speaks to the potential efficacy of yoga in the treatment of traumatic stress given that difficulty with emotional regulation is a problem commonly seen among trauma survivors (e.g., Cloitre et al., 2009). Additionally, research shows that yoga asana practice (physical postures and movement) may increase the neurotransmitter GABA, and low levels of GABA have been linked to posttraumatic stress disorder and mood disorders (Streeter et al., 2007). Hatha yoga may also work to balance the stress response system and to reduce over-activation of the sympathetic nervous system that is commonly seen in trauma survivors, which may translate into reductions in stress, anxiety, and posttraumatic stress symptoms (see Ross & Thomas, 2010; Salmon et al., 2009).

A relatively small, but growing body of research has demonstrated that yoga may be an effective component in the treatment of mental health problems. Several systematic

reviews have been conducted to evaluate the research evidence of yoga for psychiatric disorders. With the exception of one review, which examined a broader range of psychiatric disorders (Cabral, Meyer, and Ames, 2011), these reviews have focused on yoga for anxiety and depression (da Silva, Ravindran, & Ravindran, 2009; Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005; Mehta & Sharma, 2010; Pilkington, Uebelacker et al., 2010).

The aforementioned reviews suggest that yoga appears to be an effective component of treatment for anxiety and depression, and other mental health problems. However, several limitations must be noted related to these prior reviews. First, prior reviews used a very broad definition of yoga, including studies where the yoga intervention involved only pranayama or meditation, but not always asana. It is difficult to draw generalizable conclusions given the heterogeneity in the interventions. Second, since many of the studies limited their search to randomized controlled trials, they did not account for a significant portion of the research carried out to date, including a number of open trials. Although open trials are not considered to be as methodologically rigorous as randomized control studies, these studies do provide insight into the efficacy of yoga for treatment of mental health problems. It is also important to note that Cabral and colleagues (2011) meta-analysis is problematic in that it grouped outcomes from all psychiatric disorders together. Considering that the effectiveness of yoga may vary across specific psychiatric disorders, even though many of these disorders may be comorbid or share some symptomology, it is more appropriate to investigate the impact of yoga on these disorders separately.

The current review differs from prior reviews in several ways. First, this study focuses specifically on populations exposed to traumatic stress. Second, the current review includes only studies on the efficacy of Hatha yoga—i.e., interventions that integrate asana (postures and movement), pranayama (breathwork), and dharana (mindfulness) — for the treatment of symptoms of posttraumatic stress disorder, anxiety, and depression. Meta-analyses were conducted to provide estimates of effect across studies for each outcome separately. Control trials as well as open trials were included, and the current study included both published and unpublished studies.

Method

Assembling the Literature

Relevant studies on yoga as a treatment modality for trauma survivors were identified by searching prominent bibliographic databases, including Psychinfo, Medline, Applied Social Sciences Index and Abstracts, and Published International Literature on Traumatic Stress. An initial search was carried out using the following search terms: "all(yoga) AND all(trauma* OR posttrauma* OR post-trauma* OR abuse OR distress OR combat OR disaster OR assault)" yielding 123 records after removing duplicates. A second search for Mindfulness Based Stress Reduction (MBSR), a well-established program that involves yoga asana practice and other complementary mindfulness practices (e.g., meditation, body scan; see Kabat-Zinn, 1991), and trauma* OR posttrauma* OR post-trauma* OR abuse OR distress OR combat OR disaster OR assault was carried out yielding 21 additional studies. Clinical trials.gov and recent meta-analyses and systematic reviews were also consulted to identify additional literature on yoga as a treatment modality for traumatic stress yielding 115 results. These results were

narrowed to 146 articles after duplicates were removed. Figure 1 is a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) table which details the process of source extraction for this study (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009).

Inclusion and exclusion criteria. The inclusion criteria utilized to evaluate potential studies were that studies must involve yoga as a treatment for adults with exposure to traumatic stressors (e.g., childhood abuse, intimate partner violence, experiencing or witnessing violence, combat exposure, exposure to a natural disaster), and must report quantitative outcomes evaluated on psychiatric symptoms of PTSD, anxiety, and/or depression. Participants in the studies did not necessarily meet criteria for a particular psychiatric diagnosis, but to be included in the present meta-analyses, change in the severity of symptoms of posttraumatic stress disorder, depression, and/or anxiety must have been reported. "Yoga practice" in the present review referred to interventions where asana (physical postures and movement) was a key component of the intervention. Studies where the intervention utilized only pranayama (breathwork) and/or dharana (mindfulness practice) were not included to better establish homogeneity of the interventions. Studies where Hatha yoga was a key component of the intervention, even when the intervention also involved complementary mindfulness-based treatment (e.g., mindfulness meditation, body scan), were included. Only studies printed in English were included. Both published and unpublished studies (where data could be obtained) were included.

Titles and abstracts (when available) for all 146 returns were examined and 129 were discarded because they did not meet inclusion criteria. From these results, a total of

12 full-text records were assessed for eligibility (either the article appeared to meet study criteria or criteria match could not be determined based on abstract), and emails were sent to the principal investigators of 5 unpublished studies that appeared to fit the criteria based on available information to inquire about obtaining data for the present review. Seven studies were excluded because they did not report quantitative data, the intervention did not include yoga asana, did not include outcome measures related to PTSD, depression or anxiety, and/or the study PI was unable to provide data or did not respond to inquiry. Of the full text studies reviewed, eight studies met inclusion criteria and were included in this meta-analysis. Additionally, two unpublished studies were included based on data provided by principal investigators of those studies, yielding a total sample of ten studies (it should be noted that the researchers do plan to submit articles for publication based on these studies, but had not yet done so at the time of this review). Eight of the ten studies included in the meta-analysis reported changes in PTSD symptoms, seven reported on depression symptoms, and four reported on anxiety symptoms.

Data Extraction

Information on the ten studies was coded into a spreadsheet. Aspects of the study documented included: study design, symptoms assessed for, type of trauma exposure, client demographics, sample size, intervention design, and comparison design (where applicable). Study design is captured as one of three categories: open trial (pre and posttests without a comparison group), RCT (randomized controlled trial), or non-randomized controlled trial. Some studies carried out assessments at varying time points (including midway through treatment and at a long-term follow-up). The current study

drew from data that was as close to post-treatment as available in an attempt to establish as close a comparison as possible across studies. The intervention design refers to the style of Hatha yoga that participants engaged in and the length and frequency of the yoga intervention. Comparison design refers to the control group conditions or intervention. Outcomes were coded by the measure utilized and the assessment time points at which the measure was administered as utilized in the current study. For each outcome, reported statistics on pre and post intervention means and standard deviations were gathered for each group in the study for each outcome measure reported on (i.e., treatment and control or treatment only when no control group was involved). When pre and post means and standard deviations were not provided, data from inference procedures derived from these data were recorded.

Effect Size Coding and Synthesis

The software, Comprehensive Meta-Analysis (v2.2.046), developed by Biostat, Inc., and MS Excel were utilized to generate effect sizes and to carry out meta-analyses for each of the psychiatric outcomes under consideration (changes in symptom severity of PTSD, depression, and anxiety). Separate meta-analyses were run for each outcome (PTSD, depression, and anxiety), and within each outcome area separate meta-analyses were run for control trials and for the open-trial studies using imputed controls. Given that the populations varied across the studies employed in ways that could have impacted treatment effect (e.g., type of trauma exposure, time since traumatic event), random effects models (DerSimonian & Laird, 1986) were chosen over a fixed effect approach. Random effects models provide a more conservative estimate of effect size, and are

typically chosen when the average effect size could vary randomly in the population from study to study (Field & Gillett, 2010).

Control Trials. For studies that included a control condition, analyses were carried out in three steps for each outcome area. First was to calculate the standardized mean change effect size for the treatment and control groups separately for each study. Second, the random-effects mean change effect sizes between control and experimental groups for each study were calculated. The final step was estimating the difference in effect sizes pooling all studies within the outcome area using a random-effects method (Becker, 1988; Borenstein, Hedges, & Rothstein, 2008; Chow, Wieman, Cichocki, Qvicklund, & Hiersteiner, 2012; DerSimonian & Laird, 1986).

Open Trials. A similar multi-step approach was used for the open trials, but using an imputed control condition (Borenstein, Hedges, & Rothstein, 2008; Chow, Wieman, Cichocki, Qvicklund, & Hiersteiner, 2012; DerSimonian & Laird, 1986). The control statistic was the pooled standardized mean change effect size from the control conditions of the aforementioned studies. The synthetic effect sizes generated through this procedure were then inserted in the place of a control group to proceed towards the stage in which the pooled standardized mean difference effect sizes were estimated.

Results

Ten studies of yoga for traumatized populations in the treatment of symptoms of anxiety, depression, and PTSD were identified from the literature and reviewed. Table 1 shows characteristics of the study sample, the study design, a description of the intervention and control conditions, and an overview of the key findings (see Table 1). Among the ten studies, five were randomized control trials and five were open trials.

Among the randomized control trials, two had an attention placebo control, which involved lectures on health topics, and three control conditions were maintenance of daily activities/treatment as usual.

As shown in Table 1, the included studies were comprised of a total of 311 participants. The average age of participants was 41.86. The samples were predominantly female. Across all studies that provided information on the percentage of participants who were male versus female (n=9), 58% were female participants. In fact, five of the studies focused exclusively on female trauma survivors. Fifty-nine percent of participants represented in the studies were non-white. It is important to note, though, that two studies took place in Southeast Asia, so although all participants in these two studies were non-white, they were not racial minorities in their home cultures. Among studies that provided data on racial/ethnic composition and took place within the United States (n=7), 48.29% of participants were non-white.

Participants in the ten studies experienced a range of different types of traumatic exposure. Three studies focused specifically on female survivors of intimate partner violence. Three studies focused on survivors of combat related trauma (either active military service-members or veterans). Two studies focused on adults who had survived childhood trauma (e.g., sexual abuse). Two studies focused on survivors of natural disasters.

All ten studies involved some form of Hatha yoga where participants engaged in asana (postures and movement), pranayama (breathwork), and dharana (mindfulness) with instruction from a trained and experienced yoga teacher. The particular styles of yoga that were taught across the various studies included: Viniyoga, Vivekenanda yoga,

Kripalu yoga, sensory-enhanced Hatha yoga (Cimini & Stoller, 2009), gentle Hatha yoga as part of the MBSR program (Kabat-Zinn, 1991), and Trauma Sensitive Yoga (Emerson & Hopper, 2011). Key defining features of Viniyoga include adapting the practice to individual needs, including sequencing the asana practice to derive the greatest physical benefit for a particular individual (e.g., does the person need more stretching or more strength) and linking breath with movement. In addition to practicing asana, pranayama, and dharana, practitioners of Viniyoga may engage in chanting and study of yogic texts (American Viniyoga Institute, 2011). Vivekenanda yoga, as described by Telles and colleagues (2010), involved "loosening exercises (*sithilikarana vyayama*) [repetitive movements of all joints in the body moving from the toes up to the neck] for ten minutes, physical postures (*asanas*) for twenty minutes and breathing techniques (*pranayamas*) for twenty five minutes. These practices were followed by five minutes of guided relaxation in *shavasan*a (corpse pose)" (p. 4).

Kripalu yoga "incorporates not only poses and breathing strategies but also awareness-building strategies, meditative practices, and deep relaxation at the end of the pose segment of practice" (Johnston, 2011, p.58). Sensory-enhanced Hatha yoga, which was the Hatha practice utilized by Stoller and colleagues' (2012) study, was developed by Cimini in 2005 to work specifically with veterans exposed to combat stress (see Cimini & Stoller, 2009). Influenced by sensorimotor treatment approaches for autonomic nervous system dysfunction, the yoga classes involved initial centering techniques, pranayama, asana, meditation, and shavasana (final relaxation in a laying down position). Sensory enhancement was provided through deep touch pressure, emphasis on slow rhythmic

movements, specific postures chosen to induce relaxation, and breathing techniques that emphasized calming (Stoller et al., 2012).

The MBSR program integrates gentle Hatha yoga and other mindfulness techniques, including meditation, and a practice called the body scan (a guided practice where participants are asked to observe sequentially sensations in their bodies from the top of the head to the tip of the toes; see Center for Mindfulness, n.d.). Finally, trauma-sensitive yoga is a gentle Hatha yoga practice that uses invitational language (e.g., "when you feel ready," "if this feels available to you, you might try…"), and opportunities to modify the practice and encourage participants to make choices that feel appropriate for themselves (e.g., using a chair for practice rather than standing, adjusting the arm positions in specific poses so the participant feels less vulnerable; see Emerson & Hopper, 2011).

While there were differences in pacing, language, and complementary practice components (e.g., body scan, meditation, chanting), the interventions appeared to be more similar in style than distinct. All of the interventions had a common focus on the integrative practice of asana (postures and movement), pranayama (breathwork), and dharana (mindfulness). Across all studies, yoga was taught in a group class setting by a trained yoga teacher. Additionally, all were relatively short-term interventions, ranging in length and intensity from eight days of daily practice to 10 weeks of weekly or biweekly practice with class times ranging in length from 60 minutes to 2.5 hours. The classes that were 2.5 hours were MBSR interventions, so they also included complementary components such as the body scan and meditation, whereas the 60 and 90 minute classes

involved yoga only. Therefore, the length of yoga sessions in all interventions were approximately one hour to 1.5 hours.

Some of the studies adapted the interventions in an attempt to be sensitive to the specific needs of trauma survivors. For example, as noted above van der Kolk et al. (in press) offered trauma-sensitive yoga (see Emerson & Hopper, 2011) and Stoller et al. (2012) offered a sensory enhanced form of yoga developed based on sensorimotor treatment for trauma. Dutton, Bermudez, Matas, Haseeb, and Meyers (2013) adapted the MBSR program to be sensitive to the issues faced by low-income survivors of chronic trauma (see also Dutton, Bermudez, Matas, & Meyers, 2011). This included providing orientation sessions with the MBSR instructor; reducing the length and number of sessions; increasing logistical support; making sure participants understood the program was voluntary; modifying sequencing of the sessions; and supplementing standard MBSR with additional mindfulness practices that would help increase self-regulatory capacity. Similarly, Kimbrough, Magyari, Langenbert, Chesney, and Berman (2010) encouraged the sexual assault survivors in their study to titrate their meditative experiences, recognizing that this practice could be experienced as very stressful and potentially trigger trauma symptoms. Language used to explain class activities was also based on DBT and mindfulness-based cognitive therapy to encourage participants to stay present in their experience and make choices appropriate for themselves. Smith (2009) also adapted the MBSR program to be more sensitive to the needs of survivors of intimate partner violence. This included less focus on the body scan, which was believed to be potentially triggering for survivors, and more focus on yoga. Although Smith (2009), Kimbrough et al. (2010), and Dutton et al. (2011, 2012) made changes in the MBSR

curriculum to be sensitive to the impact of trauma, they did not describe any specific alterations to the way that the Hatha yoga was taught, such as those modifications taken in van der Kolk's (in press) study (as described in detail in Emerson & Hopper, 2011) or those taken in Stoller et al.'s (2012) study.

Psychiatric Outcomes: Meta-Analyses

PTSD. Seven studies reported on changes in PTSD symptom severity after the yoga intervention, including three randomized controlled studies, and four open trials. Table 2 shows the standardized mean difference effect sizes for the randomized control trials examining yoga for PTSD. In all three randomized control studies, yoga appeared more beneficial than the control condition with moderate effect sizes (ranging from .35 to .60). The pooled effect for the randomized control studies indicated that yoga was superior to the pooled control, and that this difference was significant (ES=.46, $p<.001$).

Table 3 shows results from the open trials that examined changes in PTSD symptom severity after a yoga intervention. Across all of the open trials, yoga was found to significantly reduce PTSD symptoms, and the effect sizes were moderate to large (ranging from .55 to 1.62). The pooled effect size was .9, $p<.001$. However, when comparing the pooled effect size to the imputed control, although results favored yoga over the control, the difference in standardized means was small, and was not significant (ES=.29, $p=.26$).

Depression. Five studies reported changes in depression symptoms, including three randomized control trials, and two open trials. Table 4 shows the results from the randomized control trials that examined depression symptoms as an outcome. As can be seen in Table 4, all three studies favored yoga over the control condition, with

standardized effect sizes ranging from small to medium (.10 to .59). The pooled effect was significant, and favored yoga (ES=.37, $p<.05$).

Table 5 shows the results from two open trials that examined yoga for depression symptoms. Both studies showed significant improvement in depression symptoms from pre to post treatment. Kearney et al. (2012) showed a moderate effect and Kimbrough et al. (2010) found a large effect. Comparing the pooled effect of the open trials to an imputed control showed that although yoga was favored, and there was a large effect size, the difference between the interventions and the imputed control was not significant (ES=.71, $p=.25$).

Anxiety. Five studies examined the impact of yoga on symptoms of anxiety, including two randomized control studies and three open trials. Table 6 shows results from the randomized control trials. Both studies favored yoga over the control conditions and the pooled effect showed a significant, large standardized mean difference between treatment and control groups (ES= .88, $p<.01$).

Table 7 shows results from the three open trials on yoga for anxiety symptoms. All three open trials demonstrated a significant standardized mean improvement in anxiety symptoms from pre- to post-yoga with large effect sizes (ranging from 1.00 to 4.62). When the pooled effect size from these three studies was compared to the imputed control, the difference was significant, and favored yoga. The standardized mean difference was 2.14, $p<.01$.

Discussion

This study considered the research evidence for the efficacy of Hatha yoga in reducing symptoms of PTSD, anxiety, and depression among trauma survivors. Overall,

results from the various studies suggest that Hatha yoga is a promising treatment modality for survivors with a range of traumatic experiences. Evidence from the randomized control trials, the most rigorous studies represented in this meta-analysis, indicates that yoga was favored over the control conditions for all three psychiatric outcomes under consideration. The largest effect was seen for yoga in the treatment of anxiety symptoms (.88). In comparison, the effects of yoga on PTSD (.46) and depression symptoms were more modest (.37). It is unclear whether this difference in yoga's efficacy for different psychiatric outcomes relates specifically to the efficacy of yoga in alleviating particular symptoms over others or whether this difference might be attributed to other factors such as differences in the study populations.

It is notable that when looking at the studies individually, in the cases of randomized control trials examining PTSD as an outcome, only van der Kolk et al.'s (in press) study showed a significant standardized mean difference between groups. Although yoga was still favored in both Dutton et al.'s (2012) and Dixon-Peters (2006) studies, the outcomes were more dispersed. Similarly, among the randomized control trials examining depression as an outcome, Dutton et al.'s (2012) study was the only one among these same three to demonstrate a significant standardized mean difference. Again, yoga performed better than the control overall in all three studies for reducing depression, but in van der Kolk et al.'s study and Dixon-Peters' study the effects were more dispersed. These findings raise questions about whether such differences might be attributed to the qualities of the participants themselves or to something about the intervention, such as the type of yoga offered. Among these three studies, all participants were survivors of more prolonged forms of trauma exposure (childhood abuse, intimate

partner violence); however we know little about individual level experiences and symptoms. It is notable that only van der Kolk et al.'s (in press) study involved a form of Hatha yoga that was specifically adapted for the needs of trauma survivors. It is also possible that differences could be related to the different measurement tools employed by the studies.

In the case of the randomized control trials examining changes in anxiety, the overall effect was found to be significant and favored yoga. However, while Stoller et al.'s (2012) study yielded a significant standardized mean difference, Telles et al.'s (2010) study did not show a significant difference, and demonstrated a much wider distribution of outcomes. In these two studies, the populations were quite different—an American military population versus survivors of the 2004 Indian Ocean tsunami. Other notable differences were the lengths of the intervention; Telles et al.'s intervention took place over a shorter period of time. Additionally, the Telles et al. study relied on a visual analogue scale as opposed to a more standardized assessment tool. Thus, it is possible changes in psychiatric symptoms were not captured as well as they would have been with a diagnostic instrument that assessed symptomology in a more nuanced way.

Among the open trials, it was found that yoga improved symptoms of PTSD, depression, and anxiety; this was true of each individual study, as well as the pooled effect for each outcome under consideration. However, when pooled outcomes of the open trials were compared to imputed controls, the difference was significant only in the case of anxiety symptoms. In the cases of depression and PTSD, while yoga appeared to be helpful to trauma survivors in improving these symptoms, the true effect may be smaller than these open trials suggest. It is also possible that bias was introduced with the

imputed control, yielding a smaller difference between the treatment and control conditions. In fact, the control group in van der Kolk et al.'s (in press) study (n=29), which comprised a major part of the imputed control statistic, may have had an unintended positive impact on participants. Although the control condition, a seminar on women's health, was intended as a placebo, results from this study showed improvements among the control group on both outcomes of PTSD (change in mean = 12.76) and depression (change in mean = 4.9). Similarly, the control group in Dutton et al.'s (2012) study (n=26), which also contributed to the imputed control statistic, showed symptom improvement in PTSD (change in mean = 12.4) and depression (change in mean = 3.9). Details on the control condition in this study could not be obtained. In addition to unintended effects of a placebo control condition, improvements in the control groups could be accounted for by a number of factors, such as recovery with the passage of time or regression toward the mean.

Overall, the results of this study support yoga as a treatment modality for trauma survivors facing symptoms of PTSD, depression and anxiety. However, it is important to interpret these findings with caution. Meta-analysis is a useful technique to estimate the effects of a particular intervention in the population by combining effect sizes from various studies. The statistic generated is a weighted mean, which takes into account the sampling accuracy of the effect sizes, which is a function of sample size (Field & Gillett, 2010). While two or more studies are considered sufficient to generate a pooled effect size (Valentine, Pigott, & Rothstein, 2010) and may provide a more reliable estimate of an intervention's effect on the population than a single study can generate, the overall *n* in each of the meta-analyses is still quite small. In addition to the limitation that few

studies currently exist that examine Hatha yoga for survivors of traumatic stress, many of the studies that exist have very small samples. Additional research (i.e., a larger total *n*), particularly from well-designed, rigorous studies which include a large enough sample to generate sufficient statistical power to detect effects of the intervention, and which involve a control condition would provide a more accurate picture of the effect of yoga on trauma survivors' symptoms of PTSD, depression, and anxiety.

Another limitation of the current study is that there was variability in the time point at which follow-up was carried out. Attempts were made to compare outcomes at similar time points—immediately post-intervention. However, the length of the interventions varied somewhat across studies, and not all studies provided data immediately post-intervention. It cannot be ruled out that time may have moderated the effects seen.

It is notable that many of the studies showed a wide distribution of outcomes. This may indicate that yoga is beneficial for some trauma survivors, while for others it may have a negligible or potentially even detrimental effect. For example, it has been proposed that for some trauma survivors, bringing awareness to the body may be distressing by making individuals more aware of negative bodily and emotional sensations (since it is thought that it can reduce avoidance or dissociative responses) and/or serve as a reminder of the trauma itself and trigger posttraumatic symptoms (Dutton et al., 2011; Emerson & Hopper, 2011). Although several studies modified the interventions to be sensitive to the issues faced by many trauma survivors, it is unclear if the modifications were helpful for addressing such issues.

Given the short-term nature of the studies, it is also unclear if longer-term yoga practice could have resolved possible short-term symptom exacerbations. The exacerbation of symptoms during treatment is not uncommon among trauma survivors. For instance, exposure based therapies can heighten certain symptoms (e.g., intrusive memories, nightmares, hyperarousal) as they decrease avoidance. These negative outcomes are usually resolved over the course of treatment, with overall decreases in traumatic symptomology at the end of the treatment, including those symptoms that showed an initial increase (see, for instance, Nishith, Resick, & Griffin, 2002). It is possible that by bringing greater awareness to the body, some trauma survivors practicing yoga could see an initial rise in some symptoms, but over time with continuing practice, these symptoms might resolve. Longitudinal research could explore possible non-linear trajectories in symptomology with continuing yoga practice. Additionally, qualitative research could help shed light on individual experiences in practicing yoga, including the complexity of symptom management over the course of recovery, and the potential role of yoga in that process.

While attempts were made to compare similar interventions, there was still some heterogeneity in the types of yoga taught, the complementary practice components, and the "dosage" (length of classes, number of classes). When more studies become available, moderator analysis in the context of a larger-scale meta-analysis could be used to compare the effects of different styles of Hatha yoga on trauma survivors, the ideal "dosage," and to better isolate components of the interventions (e.g., Hatha yoga versus complementary practice components). Moderator analysis could also be used to examine if yoga may be more or less helpful for particular populations of trauma survivors. Future

research should also attend to the question of whether the benefits derived from a short-term yoga intervention are sustained longer-term or if yoga practice needs to be continued to promote or maintain mental health benefits.

Despite the limitations of the current study, the findings speak to the inherent promise of yoga as an effective treatment modality for survivors of trauma who are struggling with symptoms of PTSD, depression and anxiety. Moreover, it is notable that these benefits were derived with relatively short-term interventions that were delivered in a group format, and the instructor did not necessarily have a mental health background. Taken together these characteristics make yoga a cost-effective treatment strategy. It is unclear from the current study whether yoga could serve as a stand-alone treatment or whether survivors of trauma's recovery would be best supported by a combination of traditional talk-based therapy and yoga. Future research could examine these issues.

Clearly, there are a number of questions which the current study cannot answer, and given the increasing popularity of yoga among individuals struggling with mental health problems (Birdee et al., 2008), additional research to evaluate yoga's efficacy as a treatment modality is warranted. However, clinicians working with trauma survivors should also not hesitate to encourage their clients to try Hatha yoga as a complement to other clinical care. While the current body of evidence suggests that yoga may not be beneficial for everyone, and clinicians, as with any type of intervention, must attend to the unique needs of individual clients, overall yoga appears to contribute to decreases in symptoms of PTSD, depression, and anxiety among traumatized populations who are practicing gentle forms of Hatha yoga with skilled yoga instructors, and often with attention to the unique needs of trauma survivors. The initial benefits shown by the

research carried out thus far, and the cost-effective nature of yoga make yoga a promising form of treatment for trauma survivors.

References

American Viniyoga Institute (2011). What is Viniyoga? Retrieved October 15, 2012, from http://www.viniyoga.com/about/what-is-viniyoga.

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 44*, 1849-1858.

Barnes, P. M., Bloom, B., Nahin, R.L. (2008). Complementary and alternative medicine use among adults and children: United States, 2007. *National Health Statistics Report, 10* (12), 1-23. U.S. Department of Health and Human Services, Division of Health Interview Statistics, Centers for Disease Control and Prevention, National Center for Health Statistics, Hyattsville, MD 20782, USA.

Becker, B.J. (1988). Synthesizing standardized mean-change measures. *British Journal of Mathematical and Statistical Psychology, 41,* 257–278.

Birdee, G. S., Legadza, A., Saper, R., Bertisch, S., Eisenberg, D., & Phillips, R. (2008). Characteristics of yoga users: Results of a national survey. *Journal of General Internal Medicine, 23*,(10), 1653-1658.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., Rothstein, H. R. (2009). *Introduction to meta-analysis.* West Sussex, UK: John Wiley & Sons, Ltd.

Brady, K. T., Killeen, T. K., Brewerton, T., & Lucerini, S. (2006). Comorbidity of psychiatric disorders and posttraumatic stress disorder. *Jounral of Clinical Psychiatry, 61*(7), 22-32.

Bradley, R., Greene, J., Russ, E., Dutra, L., & Westen, D. (2005). A Multidimensional Meta-Analysis of psychotherapy for PTSD. *American Journal of Psychiatry*, *162*(2), 214-227.

Cabral, P., Meyer, H. B. & Ames, D. (2011). Effectiveness of yoga therapy as a complementary treatment for major psychiatric disorders: a meta-analysis. *The Primary Care Companion to CNS Disorders, 13*(4).

Center for Mindfulness (n.d.). Stress Reduction Program. Retrieved October 15, 2012, from http://www.umassmed.edu/cfm/stress/index.aspx.

Chow, C. M., Wieman,D., Cichocki, B., Qvicklund, H. & Hiersteiner, D. (2012). Mission impossible: treating serious mental illness and substance use co-occurring disorder with integrated treatment: a meta-analysis. *Mental Health and Substance Use,* 6(2), 150-168.

Cimini, L., & Stoller, C. (2009). *General principles of the Yoga Warrior method.* West Boylston, MA: Lucy Cimini.

Cloitre, M., Stolbach, B. C., Herman, J. L., van der Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). Developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress, 22*(5), 399-408.

Courtois, C. A. (2004). Complex trauma, complex reactions: Assessment and treatment. *Psychotherapy, Research, Practice, Training, 41*(4)*,* 412-425.

Coffey, K., A., Hartman, M., & Fredrickson, B. L. (2010). Deconstructing mindfulness and constructing mental health: Understanding mindfulness and its mechanism of action. *Mindfulness, 11*(4), 235-253.

da Silva, T. L., Ravindran, L. N., & Ravindran, A. V. (2009). Yoga in the treatment of mood and anxiety disorders: A review. *Asian Journal of Psychiatry, 2*(1), 6-16.

Dale, L.P., Carroll, L.E., Galen, G.C., Schein, R., Bliss, A., Mattison, A., & Neace, W. P. (2011). Yoga practice may buffer the deleterious effects of abuse on women's self-concept and dysfunctional coping. *Journal of Aggression, Maltreatment & Trauma, (20)*1, 90-102.

DerSimonian, R. & Laird, N. (1986). Meta-analysis in clinical trials. *Controlled Clinical Trials*, *7,* 177-188.

Descilo, T., Vedamurtachar, A., Gerbarg, P. L., Nagaraja, D., Gangadhar, B. N., Damodaran, B., … Brown, R. P. (2010). Effects of a yoga breath intervention alone and in combination with an exposure therapy for PTSD and depression in survivors of the 2004 South-East Asia tsunami. *Acta Psychiatrica Scandinavica, 121*, 289-300.

Dixon-Peters, A. C., (2007). *The psychological effects of Hatha yoga on low-income women who are survivors of domestic violence.* ProQuest Dissertations & Theses (PQDT).

Dutton, M.A., Bermudez, D., Matas, A., & Meyers, N. (2011). MBSR for PTSD among Low-Income Women with Chronic Trauma. Paper presented at the Mindfulness Based Stress Reduction Conference.

Dutton, M.A., Bermudez, D., Matas, A., Haseeb, M. & Meyers, N. (2013). Mindfulness-Based Stress Reduction for Low-Income, Predominantly African American Women with PTSD and a History of Intimate Partner Violence. *Cognitive and Behavioral Practice, 20*(1), 23-32.

Emerson, D. & Hopper, E. (2011). *Overcoming trauma through yoga: Reclaiming your body.* Berkeley, CA: North Atlantic Books.

Field, A. P. & Gillett, R. (2010). How to do meta-analysis. *British Journal of Mathematical and Statistical Psychology, 63,* 665-694.

Foa, E. B., Keane, T. M., Friedman, M. J., & Cohen, J. A. (2009). *Effective treatments for PTSD: Practice guidelines from the international society for traumatic stress studies.* New York, NY: The Guilford Press.

Ginzburg, K., Ein-Dor, T., & Solomon, Z. (2010). Comorbidity of posttraumatic stress disorder, anxiety, and depression: A 20-year longitudinal study of war veterans. *Journal of Affective Disorders, 123*(1-3), 249-257.

Groessl, E. J., Weingart, K. R., Aschbacher, K., Pada, L., & Baxi, S. (2008). Yoga for Veterans with Chronic Low-Back Pain. *The Journal of Alternative and Complementary Medicine, 14*(9), 1123–1129.

Iyengar, B. K. S. (1979). *Light on Yoga.* New York, NY: Shocken Books.

Johnston, J. (2011). *The impact of yoga on military personnel with post traumatic stress disorder.* Counseling Psychology Dissertations. Paper 29. Retrieved August 2, 2012 from, http://hdl.handle.net/2047/d20002098.

Kabat-Zinn, J. (1991). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness*. New York: Delta.

Kearney, D. J., McDermott, K., Malte, C., Martinez, M. & Simpson, T. C. (2012). Association of Participation in a Mindfulness Program With Measures of PTSD, Depression and Quality of Life in a Veteran Sample. *Journal of Clinical Psychology, 68*(1), 101-116.

Kessler, R.C., Chiu, W.T., Demler, O., Merikangas, K.R., & Walters, E.E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*(6): 617-627.

Kessler, R.C., Sonnega, A., Bromet, E. Hughes, M., & Nelson, C.B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*(12), 1048-1060.

Kimbrough, E., Magyari, T., Langenbert, P., Chesney, M., & Berman, B. (2010). Mindfulness intervention for child abuse survivors. *Journal of Clinical Psychology, 66*(1), 17-33.

Kirkwood, G., Rampes, H., Tuffrey, V., Richardson, J., & Pilkington, K. (2005). Yoga for anxiety: a systematic review of the research evidence. *British Journal of Sports Medicine, 39*(12), 884-891.

Libby, D.J., Pilver, C. E., & Desai, R. (2012). Complementary and alternative medicine use among individuals with posttraumatic stress disorder. *Psychological Trauma: Theory, Resesarch, Practice and Policy, 5*(3), 277-285.

Mehta, P. & Sharma, M. (2010). Yoga as a complementary therapy for clinical depression. *Complementary Health Practice Review, 15*(3), 156-170.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine, 6*(7), e1000097.

Nishith, P., Resick, P.A., & Griffin, M.G. (2002). Pattern of change in prolonged exposure and cognitive-processing therapy for female rape victims with

posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 70*(4), 880-886.

Pilkington, K., Kirkwood, G., Rampes, H., & Richardson, J. (2005). Yoga for depression: The research evidence. *Journal of Affective Disorders, 89*(1-3)*,* 13–24.

Ross, A. & Thomas, S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *The Journal of Alternative and Complementary Medicine, 16*(1), 3-12.

Telles, S., Naveen, K.V., & Dash, M. (2007). Yoga reduces symptoms of distress in the Andaman Islands. *eCAM, 4*(4), 503-509.

Telles, S., Singh, N., Joshi, M., Balkrishna, A. (2010). Post traumatic stress symptoms and heart rate variability in Bihar flood survivors following yoga in a randomized controlled study. *BMC Psychiatry, 10*(18), 1-10.

Salmon, P., Lush, E., Jablonski, M., & Sephton, S. E. (2009). Yoga and mindfulness: Clinical aspects of an ancient mind/body practice. *Cognitive and Behavioral Practice*, *16*(1), 59-72.

Smith, J. D. (2009). Mindfulness-based stress reduction (MBSR) for women with PTSD surviving domestic violence. Dissertation. ProQuest LLC 3370129.

Streeter, C. C., Jensen, J. E., Perlmutter, R. M., Cabral, H. J., Tian, H., Terhune, D.B., . . . Renshaw, P. F. (2007). Yoga asana sessions increase brain GABA levels: A pilot study. *Journal of Alternative & Complementary Medicine, 13*(4), 419-426.

Stoller, C. C., Greuel, J. H., Cimini, L.S., Fowler, M. S., & Koomar, J. A. (2012). Effects of sensory-enhanced yoga on symptoms of combat stress in deployed military personnel. *American Journal of Occupational Therapy, 66*, 59–68.

Uebelacker, L. A., Epstein-Lubow, G., Gaudiano, B. A., Tremont, G., Battle, C. L., & Miller, I. W. (2010). Hatha Yoga for Depression: Critical Review of the Evidence for Efficacy, Plausible Mechanisms of Action, and Directions for Future Research. *Journal of Psychiatric Practice, 16*(1), 22-33.

Valentine, J. C., Pigott, T. D., & Rothstein, H. R. (2010). How many studies do you need? A primer on statistical power for meta-analysis. *Journal of educational and behavioral statistics, 35*(2), 215-247.

van der Kolk, B.A. (2006). Clinical implications of neuroscience research in PTSD. *Annals New York Academy of Sciences, 1(2),* 1-17.

van der Kolk, B. A., Stone, L., West, J., Rhodes, A**.**, Emerson, D., Suvak, M., & Spinazzola, J. (In press). Yoga in the treatment of chronic PTSD. *American Journal of Psychiatry.*

Figure 1: Literature Reviewed for Meta-Analyses
(adapted from PRISMA 2009 Flow Diagram)

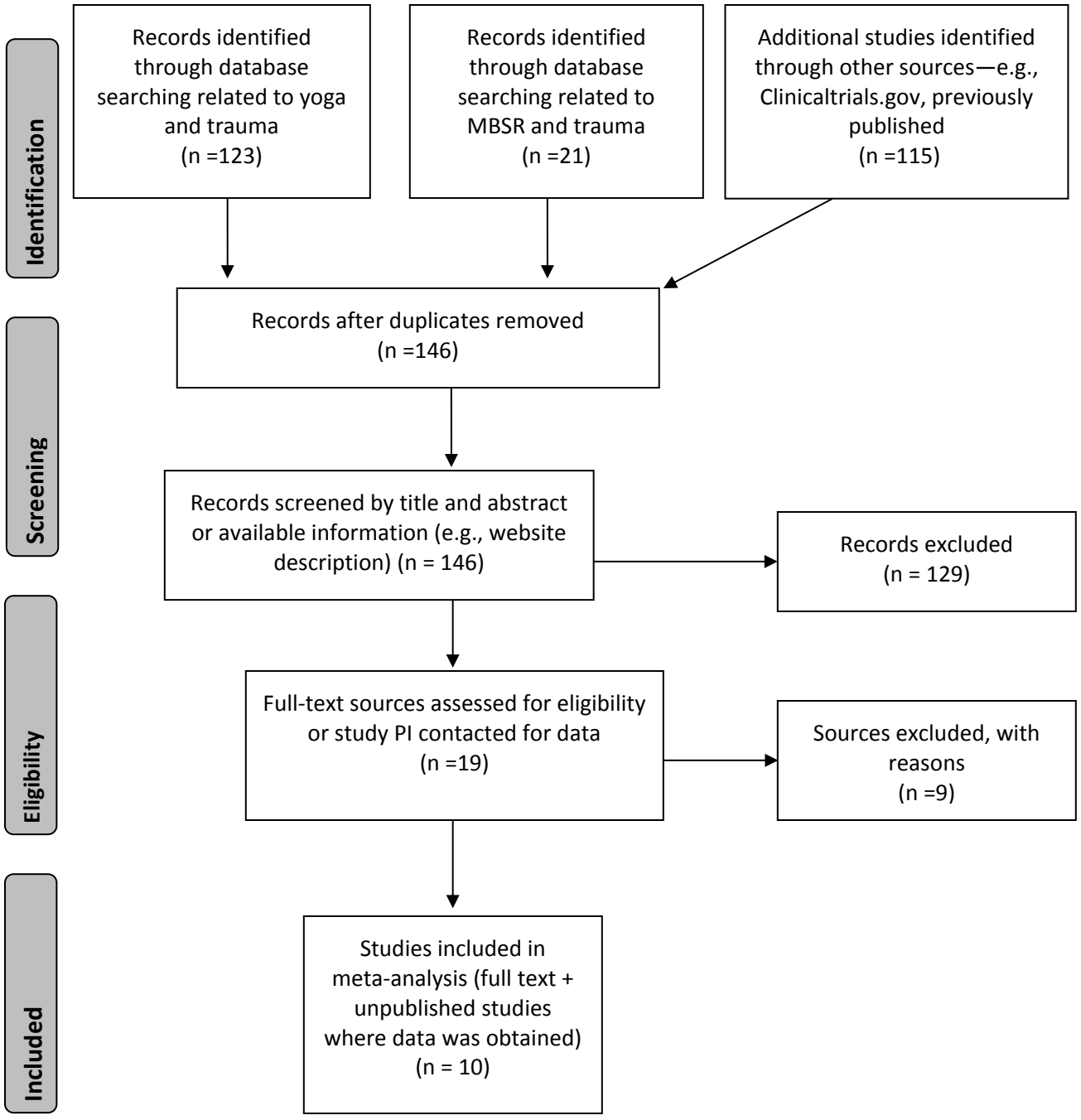

Table 1. About the studies

Study	Symptoms assessed	Type of study	mean age	% Female	% Non-white	Trauma history	Intervention	Comparison	Assessment period	Measure(s)
Dixon-Peters, 2006 (unpublished dissertation)	PTSD, depression	RCT (n=14)	38.7	100%	79%	Low-income women who are survivors of intimate partner violence	6-weeks, 90 min 1x per week of a gentle Hatha yoga class called Viniyoga (asana, pranayama, & dharana).	Attention placebo control: lecture on anatomy and stress	6 weeks	Posttraumatic stress scale for battered women; BDI
Dutton et al., 2012 (unpublished-data provided by PI)	PTSD, depression	RCT (n=61)	42	100%	77%	Low-income women with chronic trauma (all survivors of IPV, most experienced multiple traumas throughout lifetime)	Yoga as part of adapted version of MBSR: 10 90 min sessions + half day retreat. Sessions included gentle Hatha yoga (asana, pranayama, & dharana) plus other mindfulness exercises (e.g., body scan, meditation).	"Treatment as usual"/case management	10 weeks	PCL, CES-D

Table 1. About the studies (continued)

Study	Symptoms assessed	Type of study	mean age	% Female	% Non-white	Trauma history	Intervention	Comparison	Assessment period	Measure(s)
Johnston, 2011 (unpublished dissertation)	PTSD	Open trial (n=10)	50	8%	50%	Military personnel with PTSD	90 minute, 2x per wk for 10wks of Kripalu yoga (asana, pranayama, & dharana) plus 15 minute daily home practice (using CD and written instructions provided by study).	None	10 weeks	CAPS
Kearney, 2012	PTSD, depression	Open trial (n=74)	51	25%	15%	Veterans with PTSD	Yoga as part of MBSR: 2.5 hrs/wk for 8 wks; gentle yoga (asana, pranyama, & dharana) and other mindfulness exercises (20-30 participants per group), plus encouragement of daily home practice of yoga and/or meditation.	None	2 months	PCL; PHQ-9
Kimbrough, 2010	PTSD, anxiety, depression	Open trial (n=23)	45	89%	78%	Adult survivors of childhood sexual abuse	Gentle yoga taught as part of adapted MBSR (meditation instruction titrated): 2.5 hrs/wk for 8 weeks plus daily homework and day long retreat.	None	8 weeks	BDI-II; PCL; Brief Symptom Inventory
Smith, 2009 (unpublished dissertation)	PTSD	Open trial (n=15)	46.7	100%	24%	Female survivors of Intimate partner violence	Gentle yoga as part of adapted MBSR; 2 hrs/wk for 8 wks, plus 5-hr retreat.). Modification of traditional MBSR involved more focus on yoga and less on body scan.	None	8 weeks	DAPS

Table 1. About the studies (continued)

Study	Symptoms assessed	Type of study	mean age	% Female	% Non-white	Trauma history	Intervention	Comparison	Assessment period	Measure(s)
Stoller et al., 2012	Anxiety	RCT (n=70)	31.8	31%	n/a	Active military (army and air force) exposed to combat stress	"Sensory enhanced" Hatha yoga 7x per wk/3 wks (n=35). 75 min. session. Yoga involved asana, pranayama, & dharana. Enhanced sensation provided through rhythmic flow between poses, deep touch pressure in hands and feet, etc.	Continued with daily activities; no treatment	4 weeks	State Anxiety subscale (from STAI)
Telles et al., 2007	Anxiety	Open trial (n=31 living on mainland; n=16 living on island)	range: 28-50	N/A	100%	Survivors of the 2004 Indian Ocean tsunami. outcomes reported separately for two treatment groups--those living on island and those living on mainland	Vivekananda yoga: integrated yoga program combining asana, pranayama, and dharana. Carried out in small groups (~10 participants). 60 min daily for 8 days.	None	8 days	Self-rated symptoms of anxiety on a 10cm visual analog scale.

Table 1. About the studies (continued)

Study	Symptoms assessed	Type of study	mean age	% Female	% Non-white	Trauma history	Intervention	Comparison	Assessment period	Measure(s)
Telles et al., 2010	anxiety	RCT (n=22)	31.5	0%	100%	Male Bihar flood victims living in a temporarily constructed camp who all experienced loss of property. Flood was also associated with significant loss of life	Vivekananda yoga: integrated yoga program combining asana, pranayama, and dharana. Carried out in small groups (~10 participants). 60 min daily for 8 days.	Continued with daily activities; no treatment	8 days	Self-rated symptoms of anxiety on a 10cm visual analog scale.
van der Kolk et al., In press	PTSD, depression	RCT (n=60)	42.9	100%	15%	Adult women with chronic, treatment unresponsive PTSD (all had histories of multiple lifetime traumas)	1 hour trauma-sensitive yoga (gentle yoga practice that involves asana, pranayama, & dharana) 1x per week for 10 weeks. Participants provided with CD of practice and encouraged to practice at home.	Attention placebo control: 1 hour 1x per week for 10 weeks women's health education class	2 months post-treatment	CAPS; BDI-II

Table 2. Yoga's impact on PTSD severity: Randomized control trials

Study	Treated N	Control N	Measure	Effect size (standardized mean difference)	95% CI	p-value	Favors
Dutton et al., 2012	35	26	PCL	.35	-.16 - .87	.18	Yoga
van der Kolk et al., under review	31	29	CAPS	.54	.03 - 1.10	.04	Yoga
Dixon-Peters, 2006	7	7	Posttraumatic Stress scale for battered women	.60	-.47 - 1.69	.27	Yoga
Overall effect	73	62		.46	.12 - .81	.008	Yoga

Table 3. Yoga's impact on PTSD symptom severity: Open trials

Study	N	Measure	Effect size (standardized mean difference)	95% CI	p-value	Favors
Johnston, 2011	10	CAPS	.79	.08 - 1.50	.03	
Kearney et al., 2012	74	PCL	.55	.31 - .80	< .001	
Kimbrough et al., 2010	23	PCL	1.62	.63 - 1.69	< .001	
Smith, 2009	15	DAPS	1.36	.66 - 2.07	< .001	
Pooled effect size	122		.90	.49 -1.31	< .001	
Imputed control effect size	62		.61	.31 - .91	<. 001	
			Difference	**Standard error**	**Z (p-value)**	
Overall effect (with imputed control)			.29	.26	1.23 (.26)	Yoga

Table 4. Yoga's impact on depression symptom severity: Randomized control trials

Study	Treated N	Control N	Measure	Effect size (standardized mean difference)	95% CI	p-value	Favors
Dutton et al., 2012	35	26	CES-D	.59	.07 - 1.11	.03	Yoga
van der Kolk et al., under review	31	29	BDI	.21	-.30 - .72	.41	Yoga
Dixon-Peters, 2008	7	7	BDI	.10	.10 - .95	.85	Yoga
Overall effect	73	62		.37	.03 - .71	.04	Yoga

Table 5. Yoga's impact on depression symptom severity: Open trials

Study	N	Measure	Effect size (standardized mean difference)	95% CI	p-value	Favors
Kearney et al., 2012	74	PHQ-9	.50	.26 - .74	<.001	
Kimbrough et al., 2010	45	BDI	1.71	1.07 - 2.35	<.001	
Pooled effect size	241		1.07	-.11 - 2.25	.08	
Imputed control effect size	62		.36	.10 - .61	.01	
			Difference	**Standard error**	**Z (p-value)**	
Overall effect (with imputed control)			.71	.62	1.15 (.25)	Yoga

Table 6. Yoga's impact on anxiety symptom severity: Randomized control trials

Study	Treated N	Control N	Measure	Effect size (standardized mean difference)	95% CI	p-value	Favors
Stoller et al., 2012	35	35	STAI: State anxiety subscale	1.13	.62 - 1.63	<.001	Yoga
Telles et al., 2010	11	11	Self-rated symptoms of anxiety on a 10cm visual analog scale.	.46	-.39 - 1.30	.29	Yoga
Overall effect	46	46		.88	.25 - 1.51	.01	Yoga

Table 7. Yoga's impact on anxiety symptom severity: Open trials

Study	N	Measure	Effect size (standardized mean difference)	95% CI	p-value	Favors
Kimbrough et al., 2010	45	Brief symptom inventory	4.62	3.22 - 6.02	<.001	
Telles et al., 2007 (mainlanders)	31	Self-rated symptoms of anxiety on a 10cm visual analog scale.	1.04	.60 - 1.48	<.001	
Telles et al., 2007 (islanders)	16	Self-rated symptoms of anxiety on a 10cm visual analog scale.	1.00	.40 - 1.60	.001	
Pooled effect size	92		2.01	.63 - 3.40	.004	
Imputed control effect size	46		-.13	-.43 - .16	.34	
Overall effect (with imputed control)			2.14		.003	Yoga

Paper 2. Yoga for Adult Women with Chronic PTSD: A Long-Term Follow-Up Study

Abstract

Yoga—the integrative practice of physical postures and movement, breath exercises, and mindfulness—may serve as a useful adjunctive component of treatment to build skills in tolerating and modulating physiological and affective states, which have become dysregulated by trauma exposure. The current study is a long-term follow-up assessment of participants who completed a randomized control trial (RCT) to assess the efficacy of a ten week yoga intervention for their chronic, treatment unresponsive PTSD stemming from prolonged trauma exposure (van der Kolk et al., in press). At post-treatment in the RCT the Yoga Group exhibited statistically significant decreases in PTSD symptom severity and greater likelihood of loss of PTSD diagnosis, significant decreases in engagement in negative tension reduction activities (e.g., self-injury), and greater reductions in dissociative and depressive symptoms when compared to the control (a seminar in women's health). Participants from this RCT were invited to participate in long-term follow-up interviews approximately 1.5 years post-RCT to assess whether the initial intervention and/or yoga practice post-treatment was associated with greater changes in symptom severity from baseline to the long-term follow-up interview in these same problem areas and/or PTSD diagnosis at the time of the long-term follow-up interview. Forty-nine women completed the long-term follow-up interviews. Hierarchical regression analysis was used to examine whether treatment group status in the original RCT and frequency of yoga practice since the study ended predicted greater changes in symptoms and PTSD diagnosis. Results indicated that group assignment in the original

RCT was not a significant predictor of longer-term outcomes. However, frequency of continuing yoga practice significantly predicted greater improvements in PTSD symptom severity, depression symptom severity, and a greater likelihood of a loss of PTSD diagnosis. Results indicate that yoga appears to be a useful treatment modality with the greatest long-term benefits derived from longer-term yoga practice.

Introduction

Posttraumatic stress disorder (PTSD) is a common and chronic condition, impacting women at a rate over double to men (rates are 10.4% and 5.0% respectively; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Research suggests that women are more likely than men to be exposed to recurring interpersonal violence perpetrated by intimates occurring both in childhood and adulthood such as domestic violence and childhood sexual abuse (Coid et al., 2001; Kessler et al., 1995). PTSD associated with recurring trauma exposure is especially challenging to treat given that this population often faces significant problems beyond those captured in the diagnostic categories of PTSD (Cloitre et al., 2009; Courtois, 2004; van der Kolk, 1994). Indeed, research consistently links repeated trauma exposure with a complex constellation of symptoms, including, impulsive or aggressive behavior, self-injurious behaviors, anxious arousal, mood disturbances, and dissociative symptoms (Cloitre et al., 2009; Pelcovitz et al., 1997; van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005). At the core of these problems are self-regulatory deficits (Cloitre et al. 2009).

These difficulties with affect and impulse regulation pose significant challenges for survivors of repeated trauma exposure to tolerate traditional treatment modalities for PTSD (e.g., cognitive and exposure based treatments) as evidenced in high drop-out rates from treatment, PTSD symptom exacerbation during treatment, and worsening symptoms following treatment (Ford & Kidd, 1998; Ladwig et al., 2002; McDonagh-Coyle et al., 2000; Michelson, June, Vives, Testa, & Marchione, 1998; Tarrier et al., 1999; Zayfert et al., 2005). Essential to the resolution of PTSD and related mental health problems is the extinction of the conditioned fear response, and to do this requires that survivors of

recurring trauma learn to manage powerful emotions and impulsive reactions that arise in the context of trauma reminders (Jaycox & Foa, 1996). Rather than dissociate or become emotionally overwhelmed and react in fight or flight mode when confronted by trauma reminders, survivors must learn to stay oriented in the present moment, and to tolerate and modulate their distress. Only then can the conditioned fear response be resolved.

Mind-body oriented therapies such as yoga have been shown to improve self-regulation and the ability to stay oriented to present moment experiences without judgment or reaction (Ross & Thomas, 2010; Salmon, Lush, Jablonski, & Sephton, 2009). As such, they may be a useful component of treatment for survivors of recurring trauma (Courtois, 2004; van der Kolk, 2006). Moreover, mind-body practices like yoga can directly address issues that survivors of prolonged trauma exposure often experience related to body awareness. Courtois (2004) explains that survivors of prolonged trauma exposure are often disconnected from their bodies and consequently, "many ignore their bodies, are neglectful regarding wellness and medical concerns, and put themselves at unnecessary risk in a variety of ways" (p.420). Therefore, engaging in activities like yoga, which bring awareness to the body in a safe way and help calm the body and mind, may be especially helpful for this population.

Through the practice of "asana" (physical postures and movement), "pranayama" (breath exercises that involve controlling the rate and depth of breathing), and "dharana" (concentration/mindfulness of present moment experiences), yoga might allow trauma survivors to connect with their bodies in positive ways, improve their ability to stay oriented in their present moment experience rather than dissociating or avoiding thoughts and emotions related to the trauma, and develop greater capacity to tolerate and regulate

distressing thoughts and emotions (see, for instance, Evans, Tsao, Sternlieb, & Zeltzer, 2009; Salmon et al., 2009). The direct effect of yoga practice on the stress response system (including down-regulation of the HPA axis and the sympathetic nervous system; see Ross & Thomas, 2010 for review) could reduce PTSD symptoms and associated problems stemming from prolonged traumatic exposure, including depression, dissociation, and self-regulatory problems.

A number of studies have shown that yoga may be effective in the treatment of mental health problems such as depression and anxiety (see Kirkwood, Rampes, Tuffrey, Richardson, & Pilkington, 2005; Uebelacker et al., 2010 for reviews). There are also several studies showing that yoga may be useful in the treatment of PTSD (e.g., Johnston, 2011; Kimbrough, Magyari, Langenberg, Chesney, & Berman, 2010; van der Kolk et al., in press). To date, only a few studies have examined the use of yoga in the treatment of survivors of prolonged trauma exposure. For instance, a quasi-experimental study carried out by Dale and colleagues (2011) recruited participants from a local yoga studio to examine the impact of regular yoga practice on women with abuse histories. They found that frequent yoga practice reduced the impact of abuse on participants' negative self-concepts and that yoga practice was associated with improved coping skills. Kimbrough et al. (2010) found that 8 weeks of Mindfulness Based Stress Reduction (see Kabat-Zinn, 1990), a well-established program where participants practiced yoga along with other mindfulness-based exercises (e.g., meditation, body scan) was effective in reducing PTSD and depression among childhood sexual abuse survivors. Finally, van der Kolk and colleagues (in press) carried out a randomized control trial assessing the effectiveness of

ten weeks of yoga classes for adult women with chronic, treatment unresponsive PTSD[3] who all had histories of exposure to prolonged trauma (e.g., physical abuse, sexual abuse, neglect, domestic violence). They found that yoga was significantly more effective than the control (a seminar on women's health) for reducing symptom severity of PTSD and the likelihood of meeting diagnostic criteria for PTSD. The yoga group also showed greater improvements than the control group in symptoms of depression, dissociation, and engagement in negative tension reducing activities (e.g., self-injury).

While these studies show promise for yoga as a component of treatment for adults with prolonged trauma exposure, they do not address whether practicing yoga predicts longer-term improvements in traumatic stress symptoms or if a greater frequency of continuing yoga practice may be associated with greater reductions in traumatic symptomology and associated problems. The current study aimed to address these questions through a long-term follow-up with participants who completed van der Kolk et al.'s (in press) randomized control trial (henceforth referred to as the RCT). The present study considers whether there are differences in mental health outcomes (i.e., PTSD diagnosis and symptom severity, depression symptom severity, dissociative symptom severity, and engagement in tension reducing activities) for those who completed the yoga intervention as part of the RCT compared to those who only completed the control condition. Additionally, the present study considers whether the frequency of continuing yoga practice post-RCT impacted these same outcomes. More specifically, the following hypotheses were proposed:

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[3]PTSD was established in a screening assessment utilizing the Clinician Administered PTSD Scale (CAPS) and the CAPS F1/I2/Sev65 scoring rules (Weathers, Ruscio & Keane, 1999). Chronicity was based on meeting criteria for PTSD in relation to an index trauma that occurred at least 12 years prior to intake. Treatment unresponsiveness was determined by participants having had at least 3 years of prior psychotherapy treatment focused on trauma issues.

Ho1: Participants who took part in the yoga classes in the RCT intervention will show greater improvements in PTSD symptoms, dissociative symptoms, and depression symptoms, reduced problems with negative tension reducing activities, and a greater likelihood of loss of PTSD diagnosis when compared to those who did not participate in the yoga treatment. However, given that many participants in the control condition went on to practice yoga after the RCT ended (more on this below), it is expected that when controlling for yoga practice post-treatment, the group status will not be a significant predictor of longer-term outcomes.

Ho2: Greater frequency of yoga practice after the RCT ended will predict greater improvements in PTSD, dissociation and depression symptoms, reduced problems with negative tension reducing activities, and a greater likelihood of loss of PTSD diagnosis.

Method

Data Collection and Sample

Participants were recruited for van der Kolk et al.'s (in press) RCT through print and radio advertisements, flyers at mental health clinics, and referrals by mental health clinicians. Inclusion criteria for the RCT was as follows: women, ages 18-59, with three or more years of therapy, and current PTSD as determined by the CAPS interview (see below). The index trauma had to have occurred more than 12 years prior to the study. Women who were pregnant or breastfeeding, had contraindications to either treatment such as exercise against medical advice, had problems with alcohol or substance abuse/dependence in the past 6 months, severe dissociation, active suicide risk or life-

threatening mutilation, a Global Assessment of Functioning score of less than 40, or prior yoga experience of more than five classes were excluded from the study. Although this was not part of the formal inclusion criteria, all women who enrolled in the study had a history of exposure to multiple types of trauma exposure, occurring over prolonged periods of time.

Sixty-four women began the RCT and were randomized either to a 10 week, 1 hour per week Trauma Sensitive Yoga class or to an attention control group, a seminar on women's health. The Trauma Sensitive Yoga approach (described in greater detail elsewhere; see Emerson & Hopper, 2011) prioritizes gentleness in movement, invitational language (e.g., "when you feel ready," "if this feels available to you, you might try…"), and opportunities to modify the practice and encourage participants to make choices that feel appropriate for themselves. Four women dropped out during treatment leaving a final sample of 60 (31 in the yoga treatment, and 29 in the control group).

The RCT began in 2008, and there were six cohorts that completed the study over the course of 3 years (three yoga groups and three control groups). The curriculum for both the yoga course and the women's health seminar were standardized across cohorts. There were separate instructors for yoga and the women's health seminar, but instructors remained consistent across cohorts. After completing the yoga classes or the women's health seminar, participants were given the opportunity to join the following cohort in the other intervention. Seven women chose to do so. Data was gathered at several time points during the RCT—prior to treatment, midway through treatment, immediately post-treatment and 2 months post-treatment. The current study focused on data gathered at baseline (i.e., pre-treatment) and the data gathered at the long-term follow-up interview.

Data from other time points is utilized only to fill in missing data on one measure (described below).

For the long-term follow-up interview, after obtaining IRB approval, attempts were made to contact all participants who completed van der Kolk et al.'s (in press) RCT study to invite them to come in for long-term follow-up interviews. The interview included the same clinician administered and self-report measures utilized in the RCT and an additional self-report measure on the frequency of their yoga practice since they were last interviewed and any other treatment changes that may have occurred.

Forty-nine of the 60 original participants completed long-term follow-up interviews over the course of a 6 month period. The remaining 11 participants were lost to follow-up due to the following reasons: four could not be reached due to changes in contact information and inability to locate the participant via internet searches; three stated that they did not wish to come in or did not have time to come in; and four did not respond to efforts to contact them. T-tests were run to assess if there were any significant differences between those who came in for the long-term follow-up interviews and those who were lost to follow-up on demographic variables and baseline measures of severity of PTSD symptoms, depression symptoms, dissociative symptoms, and problems with tension reducing activities. There were no significant differences found between the two groups on these measures. Table 1 shows demographics for the participants who came in for the long-term follow-up interviews.

Of the 49 participants who completed the long-term follow-up interviews, 25 completed the yoga intervention only in the original randomized control trial, 17 were part of the control group only, and seven participants completed the women's health

seminar followed by the yoga intervention in a subsequent cohort. Long-term follow-up interviews were carried out over a period of 6 months. Depending on which cohort the participant had been a part of and when they were able to come in for the long-term follow-up interview, there was variability in how long the participants had been out of the RCT study at the time of the long-term follow-up interviews (ranging from .75 to 2.75 years post-RCT).

After the RCT ended, the majority (n=39) of the participants continued or began to (in the case of control group members) practice yoga. This included 23 out of 25 women who participated in the yoga treatment group only who continued to practice yoga. Nine out of 17 women from the control group went on to practice yoga, and all seven of the participants who did both the control group and the yoga group during the RCT study practiced yoga post-RCT.

Participants' yoga practices ranged in frequency from a few practices post-RCT up through approximately 275 yoga sessions. Some women practiced at home utilizing a DVD or had a self-guided practice, while others attended classes at gyms, yoga studios, etc. Participants were asked not to disclose what treatment group they were in during the RCT or whether they had practiced yoga post-treatment until measures of symptomology were completed so that the interviewer could remain blind during the assessment.

Measures

Dependent variables for all continuous measures were calculated as a measure of change from participants' scores at baseline to participants' scores at the long-term follow-up interviews on the same outcome measures as utilized in van der Kolk et al.'s (forthcoming) randomized control trial. Since all participants met diagnostic criteria for

PTSD at baseline in order to qualify for the study this measure was assessed as a dichotomous variable (1=met PTSD criteria at long-term follow-up; 0=did not meet PTSD criteria at long-term follow-up). Table 2 shows descriptive data for the measures.

Dependent variables.

Clinician Administered PTSD Scale (CAPS). The CAPS is a structured interview designed to assess the frequency and intensity of the 17 symptoms of PTSD as outlined by the DSM-IV. Each question contains separate 0-4 frequency and intensity ratings for the symptom under question. Symptoms and functioning can be determined for the past week or the past month. In the current study, only past month ratings were utilized. The scale demonstrates high inter-rater reliability, high internal consistency and correlates highly with other measures of PTSD symptoms (Blake et al., 1995). In this study, total CAPS score was utilized as the measure of PTSD symptom severity. Additionally, the CAPS can be scored to determine whether the participant meets criteria for PTSD diagnosis. In this study the CAPS F1/I2/Sev65 scoring rules were utilized to determine whether the participant qualified for PTSD diagnosis at the time of the long-term follow-up, as noted above (Weathers et al., 1999).

Dissociative Experiences Scale (DES). The DES is a 28-item self-report instrument which measures a variety of dissociative experiences such as "highway hypnosis," derealization, and lack of clarity about whether memories actually happened. For each item, the participant notes how often this happens to them on a scale of ten point increments ranging from 0 (never) to 100 (always). To obtain the DES score, the items are totaled and divided by 28. The measure shows good test-retest reliability, high internal consistency, and excellent construct validity (Dubester & Braun, 1995).

Beck Depression Inventory (BDI). The BDI, the most widely used measure of depression, is a 21-item self-report measure that assesses the severity of depressive symptoms. The scale includes items assessing symptoms such hopelessness and irritability, negative cognitions like guilt, and physical symptoms of depression such as fatigue. Each item has an answer choice ranging from 0 to 3, on a spectrum of less severe to more severe. The measure is scored as the sum of the answers with higher scores indicating greater depression severity. This measure has high internal reliability, construct validity, and test-retest reliability (Beck, Steer & Carbin, 1988)

Inventory of Altered Self Capacities Tension Reducing Subscale (IASC-TRA). The IASC is a 63-item self-report measure assessing psychological functioning along seven subscales such as interpersonal conflicts, abandonment concerns, and identity impairment. The IASC as a whole and its subscales demonstrate good internal consistency, reliability and validity (Briere, 2000). The Tension Reduction Activities subscale, which is utilized in the present study, identifies the tendency to respond to internal stress with problematic externalizing behaviors that distract, soothe or reduce negative internal experiences (i.e. self-injury, sexual, food binging).

Independent variables.

Stressful Life Events Screening Questionnaire (SLESQ). Given that research shows an association between the number of trauma types experienced and symptom complexity and severity (see, for instance, Briere, Katman, & Green, 2008; Green et al., 2000), it was important to control for cumulative trauma exposure in the current study. The current study utilized the SLESQ as a measure of trauma exposure. This measure is a 13-item questionnaire administered by the interviewer that assesses for lifetime exposure

to traumatic events. Events such as experiencing a life-threatening accident, physical and/or sexual abuse, and witnessing another person being killed or assaulted are examined. The measure demonstrates good test-retest reliability and adequate convergent validity (Goodman, Corcoran, Turner, Yuan, & Green, 1998). For each question, the respondent indicates whether the event occurred (yes or no), their age at the time of event and specific items related to the event such as frequency, duration, whether anyone died or was injured, etc. For the current study a total score of event exposure (including only the "yes" or "no" responses to the 13 items) was included.

Treatment group status. A dummy coded variable for treatment group status (i.e., whether the participant was part of the yoga or control group during the RCT) was included in the present analysis. As noted above, seven participants completed both the women's health seminar and the yoga intervention as part of the original RCT. For the present study, if the participant did the yoga intervention (even if they also completed the women's health seminar), the variable was coded as 1, and for those who only completed the control it was coded as 0.

Treatment changes. During the long-term follow-up interview, a questionnaire was administered to gather information on potential treatment changes since the RCT ended, including questions on whether the participant began seeing a new therapist; attended a support group; started new medication; or received any other new type of treatment or body work (e.g., acupuncture, massage, neurofeedback, EMDR, etc.). If the participant answered yes to any the questions, the variable was coded as 1. No treatment changes were coded as 0.

Frequency of yoga practice. As part of a questionnaire administered at the long-term follow-up interview, participants self-reported the number of times they had practiced yoga since the RCT ended. Since they were not asked to track this after the RCT ended it should be noted that this is an estimate of practice experiences. Because frequency of yoga practice post-RCT was partially dependent on how long the participant had been out of the RCT, and since there were several cohorts that participated in the original RCT study whose time in the study had ended at various time points (ranging from 39 to 143 weeks), a ratio variable was created (number of times the participant practiced yoga divided by the number of weeks that had passed since the woman ended her participation in the RCT). Due to the variable being positively skewed, it was recoded into an ordinal variable (1=no practice post RCT; 2=did practice, but practice frequency was less than an average of one time per week post RCT; 3=practiced more than one time per week on average post-RCT). This new ordinal variable was normally distributed.

Analysis

Bivariate correlation analyses among study variables were calculated (see Table 3). Hierarchical linear regression analysis was used to examine whether treatment group status in the original RCT and frequency of yoga practice since the study ended predicted changes in dissociative symptoms, PTSD symptoms, PTSD diagnosis, and tension reducing activities from baseline measures (pre-treatment assessment in the RCT) to the time of the long-term follow-up assessment while controlling for extent of trauma exposure and treatment changes. Variables were entered in blocks in the following order: 1) lifetime exposure to traumatic events (SLESQ); 2) whether the participant had any treatment changes since the study ended; 3) treatment group status in the RCT (i.e., yoga

or control only); and 4) frequency of yoga practice post-treatment. Hierarchical logistic regression was utilized to test whether group status and frequency of yoga practice post-treatment predicted PTSD diagnosis based on CAPS scoring rules (Weathers et al., 1999). Variables were entered in the same blocks as carried out for the linear regression models.

Missing data. There was a small amount of missing data that appeared at random. To evaluate the effect of missing data, missing values were imputed based on the average of the participant's responses to the specific item at baseline (i.e., pre-treatment in the RCT) and at midway through treatment. If only one of those time points was available, that score was utilized as opposed to an average of scores. If an entire measure was missing for a given participant (occurred in one case for the DES) or if more than five items within a given measure were missing (occurred in one case for the BDI), no data was imputed for that participant and the participant's responses were not included in the analysis for that specific outcome measure. The approach taken was considered the most conservative way to impute missing data, but could have underestimated potential change. The results obtained with imputed data were very similar to results found with original data in terms of direction, magnitude, and statistical significance for all models and key predictors, with the exception of the model examining predictors of changes in depression symptoms. In the case of the depression model, limitations in power associated with missing data appeared to impact the overall significance of the model. As such, the original data was utilized in the final analyses for predicting all outcome measures except the depression model where missing data was imputed prior to analysis.

Table 2 shows descriptive data for each study variable without missing data imputed, and also includes the descriptive statistics for depression with missing data imputed.

Results

As indicated in Table 3, bivariate correlation analysis showed that group status in the original RCT was not significantly associated with any of the outcome variables. Bivariate analysis also indicated that a greater frequency of yoga practice post-RCT was significantly associated with loss of PTSD diagnosis (r= -.283, p<.05) and with improvements in depression symptom severity (r = .348, p<.05).

Hierarchical regression analysis yielded three significant models: changes in PTSD symptom severity, likelihood of loss of PTSD diagnosis, and changes in depression symptom severity. For the models predicting dissociation and tension reducing activities, none of the predictors were found to be significant. Table 4 shows the results hierarchical regression analysis for changes in PTSD symptom severity from baseline to the long-term follow up interview. It was found that none of the variables entered in steps 1, 2, or 3 were significant predictors, but frequency of yoga practice post-RCT significantly added to the model (change in R^2 was .11, p < .05). Greater frequency of yoga practice was associated with greater improvements in PTSD symptom severity from baseline to the long-term follow up (b=12.24, p<.05). Additionally, when frequency of yoga practice was added to the model RCT group status became significant. Results showed that when frequency of yoga practice post-treatment was factored into the model, the control group showed greater improvements in PTSD symptom severity.

Table 5 shows the results of hierarchical logistic regression for predictors of PTSD diagnosis. In steps 1, 2, and 3 it was found that none of the variables significantly

predicted PTSD diagnosis. However, in step 4 when frequency of yoga practice was added to the model, the model was significant ($\chi^2(4) = 9.87$, $p<.05$). It was found that those who practiced yoga more frequently were less likely to meet diagnostic criteria for PTSD (b = -1.579, OR=.21, $p<.05$).

Table 6 shows the results of hierarchical regression analysis for changes in depression symptom severity. Similar to predictors of PTSD symptom severity, the extent of the participant's trauma history, treatment changes, and group status in the RCT were not significant predictors of changes in depression symptom severity from baseline to the long-term follow-up. It was found, however, that frequency of yoga practice post-RCT significantly added to the model (change in R^2 was .15, $p < .01$), with greater frequency of practice associated with a greater improvement in depression symptom severity (b=7.84, $p<.01$).

Discussion

A small, but growing body of research literature suggests that yoga may be a useful component of treatment for trauma survivors (e.g., Dale et al., 2011; Johnston, 2011; Kimbrough et al., 2010; van der Kolk et al., in press). The present study builds on van der Kolk et al.'s (in press) RCT study to assess the longer-term effects of a ten week yoga intervention and/or continuing yoga practice on traumatic symptomology.

Results from this long-term follow-up study suggest that the more one practices yoga over time, the greater the improvements they will experience in PTSD and depression. In particular, this study found that a greater frequency of continuing practice had the capacity to produce greater reductions in PTSD and depressive symptom severity, and that those individuals with more frequent practices had an increased likelihood of no

longer meeting criteria for PTSD diagnosis. These findings are particularly promising given that the study population reported persistent traumatic symptomology related to traumatic stressors occurring at least twelve years prior to involvement in the RCT despite having been in in trauma-focused psychotherapy for at least three years. Many participants had little relief from their symptoms prior to participation in yoga.

Contrary to the proposed hypotheses, results indicate that the particular treatment group that the participant was assigned to during the RCT did not have an independent effect on longer-term outcomes. This is not entirely surprising given that a large portion of the participants who were in the control group went on to practice yoga, making it difficult to isolate effects of the initial intervention. Interestingly group status was significant in predicting changes in PTSD symptom severity, but only when frequency of yoga practice post-RCT was factored into the model. In this case, those in the control group showed greater changes in PTSD symptom severity than the treatment group. This could indicate that there was some interaction between the treatment group status and continuing practice post-RCT, however, the small sample size did not allow for interaction effects to be tested. It is possible that those in the control group in the RCT were particularly motivated to practice yoga after the RCT ended, and as a result may have practiced more frequently than those who were in the treatment group. It is also possible that going from no yoga practice to some practice would lead to greater changes in symptom severity than seen among those with some practice experience as part of the RCT who then continued to practice yoga.

Limitations

It was found that the extent of trauma exposure (as measured by the SLESQ) and treatment changes did not significantly predict changes in symptomology from baseline to the long-term follow-up assessment. However, it is important to note that these measures may not have been robust enough to detect change. Although the number of traumatic events a person is exposed to has been shown to predict symptom complexity and frequency, it may not be as important as factors such as who perpetrated violence (e.g., parent versus stranger) or the type of trauma that the individual was exposed to (e.g., interpersonal violence versus car accident; Briere, Katman, & Green, 2008; Green et al., 2000). Given the small sample size in the current study, and the associated need to limit the number of control variables that were included in the analysis, it was impossible to include a more complex representation of trauma history. Similarly, some treatment changes may have had a greater effect on symptomology than others, but this level of complexity was not possible to control for in the current analysis.

Given that frequency of yoga practice only accounted for a relatively small proportion of variance in PTSD symptoms, depression symptoms, and PTSD diagnosis, it is likely that other factors not included in the model impacted outcomes. However, as with the prior limitations, the small sample size and the subsequent need to limit the number of control variables made it impossible to control for additional factors.

Another limitation in the current study is that a number of measures were based on self-report, and therefore may have been subject to validity problems. In particular, since participants had not been asked to record their ongoing yoga practices there may have been some error in their reports of how frequently they continued to practice.

Altering this variable into an ordinal measure that considered frequency as an estimation of average practice over time (as opposed to being run as a specific number of practices) likely helped address some inflation or underestimation of reporting that occurred. However, additional research that more systematically documents the frequency of participants' yoga practices over time is needed to substantiate the findings of the current study.

Future Research

Despite these limitations, the current study suggests that practicing yoga can be beneficial to survivors of prolonged trauma. Although the modest effect sizes found in the current study indicate that yoga is unlikely to serve as a stand-alone treatment for traumatic stress and related problems, it appears to be a useful component of treatment. Perhaps combining yoga with current evidence based treatments (see, for examples, Foa, Keane, Friedman, & Cohen, 2009) would be a useful approach. Indeed, an emerging body of research shows that survivors of more prolonged trauma exposure benefit significantly from treatments that combine efforts to improve self-regulatory capacity with more standard treatment approaches that emphasize processing and desensitizing to traumatic memories and other triggering external and internal stimuli (see, for instance, Cloitre et al., 2010; Cloitre, Koenen, Han, & Cohen, 2002; Harned, Jackson, Comtois, & Linehan, 2010). Additional research is needed to further assess such combined approaches, and should consider whether combined treatments are best offered at the same time or might be better suited to a phased approach--for instance, offering yoga first to build affect regulation skills, followed by an exposure or cognitive processing treatment.

The current study also raises questions about why a greater frequency of yoga practice contributes to symptom improvements in PTSD and depression, but not in dissociation and engagement in tension reducing activities. It is unclear whether yoga is most beneficial in addressing certain types of symptoms or if there are other factors that may account for this finding. Perhaps individuals who struggled more with these particular problems were less likely to engage in an ongoing way with yoga. Certainly, this would be consistent with prior studies documenting higher treatment dropout rates among trauma survivors who struggled more with affect dysregulation (e.g., Ford & Kidd, 1998). Additional research, including qualitative studies that explore survivors experiences of practicing yoga and reasons for sustaining or ending their engagement with yoga, could help shed light on this issue.

It remains unclear how much yoga practice is needed to achieve or maintain benefits. More systematic, controlled research should explore different length interventions, and what may be the necessary "dosage" of practice to achieve optimal functioning. It would also be useful to consider whether the "dosage" may be somewhat dependent on the extent or nature of the participants' trauma history. It is also important to recognize that this study did not take into consideration the variations in lengths of practice sessions that participants engaged in post-RCT. For instance, some participants may have practiced for an hour whereas others practiced for 20 minutes in a given session. It is unclear if the length of practice matters, and additional research would be needed to assess this.

Furthermore, this study did not account for variations in the type of yoga practiced. For instance, it is unclear if there are differing effects of a gentle practice

versus a more vigorous practice. It may be that the most beneficial practice for a trauma survivor would be tailored to their specific needs. For instance, for the chronically hypoaroused client, a more vigorous practice may be useful, while for a hyperaroused client a slower-paced yoga practice could be the most beneficial. Future research should consider whether the type of practice matters, and whether certain styles of yoga or even certain postures may be of particular benefit for the varying symptom profiles that arise after trauma. Future research should also tease out whether it is the combination of asana, pranayama, and dharana that provides the most benefits or if it is a particular component of a yoga practice that supports improvements in traumatic symptomology.

While additional research is clearly needed to further substantiate the use of yoga in the treatment of trauma survivors, and how it might best be offered in treatment (e.g., length of intervention, style of yoga, etc.), the current study supports encouraging traumatized clients to give yoga a try. Given the low cost of offering yoga classes combined with its wide popularity (Barnes, Powell-Griner, McFann, & Nahin, 2002) providing opportunities for traumatized clients to try yoga seems to be a cost-effective and easily accessible treatment option that would offer potentially substantial benefits.

References

Barnes, P. M., Powell-Griner, E., McFann, K., & Nahin, R. L. (2002). Complementary and alternative medicine use among adults: United States, 2002. *Advance Data,* 1-19.

Beck, A.T., Steer, R.A. & Carbin, M.G. (1988). Psychometric properties of Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review, 8*(1), 77-100.

Blake, D.D., Weathers, F.W., Nagy, L.M., Kaloupek, D.G., Gusman, F.D., Charney, D.S., & Keane, T.M. (1995). The development of a clinician-administered PTSD scale. *Journal of Traumatic Stress, 8,* 75-90.

Briere, J. (2000). *Inventory of Altered Self-Capacities professional manual.* Odessa, FL: Psychological Assessment Resources.

Briere, J., Kaltman, S., & Green, B. L. (2008). Accumulated childhood trauma and symptom complexity. *Journal of Traumatic Stress, 21*, 223–226.

Cloitre, M., Koenen, K. C., Cohen, L. R., & Hart, H. (2002). Skills training in affective and interpersonal regulation followed by exposure: A phase-based treatment for PTSD related to childhood abuse. *Journal of Consulting and Clinical Psychology, 70*, 1067-1074.

Cloitre, M., Stolbach, B. C., Herman, J. L., van der Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). Developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress, 22* (5), 399-408.

Cloitre, M. Stovall-McClough, C. K., Nooner, K., Zorbas, P., Cherry, S. Jackson, C. L., Gan, W. & Petkova, E. (2010). Treatment for PTSD related to childhood abuse: a randomized controlled trial. *American Journal of Psychiatry, 167* (8), 915-924.

Coid, J., Petruckevitch, A., Feder, G., Chung, W., Richardson, J., & Moorey, S. (2001). Relation between childhood sexual and physical abuse and risk of revictimisation in women: a cross-sectional survey, *358,* 450–45.

Courtois, C. A. (2004). Complex trauma, complex reactions: Assessment and treatment. *Psychotherapy, Research, Practice, Training, 41,* 412-425.

Dale, L.P., Carroll, L.E., Galen, G.C., Schein, R., Bliss, A., Mattison, A.M., & Neace, W.P. (2011). Yoga practice may buffer the deleterious effects of abuse on women's self-concept and dysfunctional coping. *Journal of Aggression, Maltreatment, & Trauma, 20*(1), 90-102.

Dubester, K.A. & Braun, B.G. (1995). Psychometric properties of the Dissociative Experiences Scale. *Journal of Nervous Mental Disorders, 183*(4), 231-235.

Emerson, D. & Hopper, E. (2011). *Overcoming trauma through yoga: Reclaiming your body.* Berkeley, CA: North Atlantic Books.

Evans, S., Tsao, J. C. I., Sternlieb, B., & Zeltzer, L. K. (2009). Using the biopsychosocial model to understand the health benefits of Yoga. *Journal of Complementary and Integrative Medicine*, *6*(1), Article 15, 1-22.

Foa, E. B., Keane, T. M., Friedman, M. J., & Cohen, J. A. (2009). *Effective treatments for PTSD: Practice guidelines from the international society for traumatic stress studies.* New York, NY: The Guilford Press.

Ford, J. D., & Kidd, P. (1998). Early childhood trauma and disorders of extreme stress as predictors of treatment outcome with chronic PTSD. *Journal of Traumatic Stress, 18,* 743–761.

Goodman, L., Corcoran, C., Turner, K., Yuan, N., & Green, B. (1998). Assessing traumatic event exposure: General issues and preliminary findings for the Stressful Life Events Screening Questionnaire. *Journal of Traumatic Stress, 11*(3), 521-542.

Green, B. L., Goodman, L. A., Krupnick, J. L., Corcoran, C. B., Petty, R. M., Stockton, P., & Stern, N. M. (2000). Outcomes of single versus multiple trauma exposure in a screening sample. *Journal of Traumatic Stress, 13*(2), 271-286.

Harned, M. S., Jackson, S. C., Comtois, K. A., & Linehan, M. M. (2010). Dialectical Behavior Therapy as a precursor to PTSD treatment for suicidal and/or self-injuring women with borderline personality disorder. *Journal of Traumatic Stress*, *23*, 421–429.

Jaycox, L.H., & Foa, E.B. (1996). Obstacles in implementing exposure therapy for PTSD: Case discussions and practical solutions. *Clinical Psychology and Psychotherapy, 3,* 176-184.

Johnston, J. (2011). *The impact of yoga on military personnel with post traumatic stress disorder* (Doctoral Dissertation). Counseling Psychology Dissertations. (Paper 29). Retrieved July 23, 2012 from, http://hdl.handle.net/2047/d20002098.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Delacorte Press.

Kessler, R.C., Sonnega, A., Bromet, E. Hughes, M., & Nelson, C.B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*(12), 1048-1060.

Kimbrough, E., Magyari, T., Langenberg, P., Chesney, M., & Berman, B. (2010). Mindfulness intervention for child abuse survivors. *Journal of Clinical Psychology, 66*(1), 17-33.

Kirkwood, G., Rampes, H., Tuffrey, V., Richardson, J., & Pilkington, K. (2005). Yoga for anxiety: a systematic review of the research evidence. *British Journal of Sports Medicine, 39*(12), 884-891.

Ladwig, K.H., Marten-Mittag, B., Deisenhofer, I., Hofmann, B., Schapperer, J., Weyerbrock, S.,…Schmitt, C. (2002). Psychophysiological correlates of peritraumatic dissociative responses in survivors of life-threatening cardiac events. *Psychopathology, 35*(4), 241-248.

McDonagh-Coyle, A., Friedman, M., McHugo, G., Ford., J., Sengupta, A., Mueser, K., … Descamps, M. (2005). Randomized trial of cognitive-behavioral therapy for chronic posttraumatic stress disorder in adult female survivors of childhood sexual abuse. *Journal of Consulting and Clinical Psychology, 73*(3), 515-524.

Michelson, L., June, K., Vives, A., Testa, S., & Marchione, N. (1998). The role of trauma and dissociation in cognitive-behavioral psychotherapy outcome and maintenance for panic disorder with agoraphobia. *Behaviour Research and Therapy, 36*(11), 1011-1050.

Pelcovitz, D., van der Kolk, B. A., Roth, S., Mandel, F. S., Kaplan, S., & Resick, P. A. (1997). Development of a criteria set and a structures interview for disorders of extreme stress (SIDES). *Journal of Traumatic Stress, 10,* 3-17.

Ross, A. & Thomas, S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *The Journal of Alternative and Complementary Medicine, 16,* 1, 3-12.

Salmon, P., Lush, E., Jablonski, M., & Sephton, S. E. (2009). Yoga and mindfulness: Clinical aspects of an ancient mind/body practice. *Cognitive and Behavioral Practice*, *16*, 59-72.

Tarrier, N., Pilgrim, H., Sommerfield, C., Faragher, B., Reynolds, M., Graham, E., & Barrowclough, C. (1999). A randomized trial of cognitive therapy and imaginal exposure in the treatment of chronic posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology, 67*, 13-18.

Uebelacker, L. A., Epstein-Lubow, G., Gaudiano, B. A., Tremont, G., Battle, C. L., & Miller, I. W. (2010). Hatha Yoga for Depression: Critical Review of the Evidence for Efficacy, Plausible Mechanisms of Action, and Directions for Future Research. *Journal of Psychiatric Practice, 16*(1), 22-33.

van der Kolk, B. A. (1994). The body keeps the score: Memory and the emerging psychobiology of posttraumatic stress. *Harvard Review of Psychiatry, 1*, 253-265.

van der Kolk, B.A. (2006). Clinical implications of neuroscience research in PTSD. *Annals New York Academy of Sciences, 1*(2), 1-17.

van der Kolk, B. A., Roth, S., Pelcovitz, D., Sunday, S., Spinazzola, J. (2005). Disorders of Extreme Stress: The Empirical Foundation of a Complex Adaptation to Trauma. *Journal of Traumatic Stress*, *18*(5), 389-399.

van der Kolk, B. A., Stone, L., West, J., Rhodes, A. M., Suvak, M., Emerson, D. & Spinazzola, J. (in press). Yoga as complementary treatment for adult women with chronic, treatment unresponsive PTSD. *Journal of Clinical Psychiatry.*

Weathers, F., Ruscio, A.M. & Keane, T.M. (1999). Psychometric Properties of Nine Scoring Rules for the Clinician Administered Posttraumatic Stress Disorder Scale. *Psychological Assessment, 11*(2), 124-133.

West, J. Otte, C., Geher, K., Johnson, J., & Mohr, D.C. (2004). Effects of hatha yoga and African dance on perceived stress, affect, and salivary cortisol. *Annals of Behavioral Medicine, 28(2),* 114-118.

Zayfert, C., Deviva, J. C., Becker, C. B., Pike, J. L., Gillock, K. L., & Hayes, S. A. (2005). Exposure utilization and completion of cognitive behavioral therapy for PTSD in a "real world" clinical practice. *Journal of traumatic stress, 18*(6), 637-645.

Table 1. *Demographic information*

Variable	
Race –White, %	71.4
Marital status – Single, %	46.9
College graduate, %	71.4
Annual income <40k, %	46.9
Employment-Full-time, %	38.8
Age, mean (SD)	42.8 (11.8)

Table 2. *Measures*

	N	Mean	SD	Range
SLESQ	49	8.4	2.3	2-15
Weeks since RCT	49	82.7	26	39-143
Estimated # of times pt. practiced yoga post-RCT	49	41.1	57.2	0-275
Average Frequency yoga practice post-RCT	49	1.9	.61	1-3
Baseline CAPS (PTSD)	49	73.8	12.9	52-101
LTFU CAPS	49	50.8	24.6	11-105
Change in CAPS	49	23	21	-17-59
Baseline DES (Dissociation)	48	16.9	12.1	1.4-60.4
LTFU DES	48	15.5	12.2	2.1-46.1
Change in DES	47	2	11.4	-35.7-20.4
Baseline BDI (Depression)	47	23	11.6	6-51
LTFU BDI	47	14.9	11.8	0-46
Change in BDI (with missing data)	45	7.9	11.6	-13-39
Change in BDI (missing data imputed)	48	8.6	11.6	-13-39
Baseline IASC-TRA (tension reducing activities)	44	16.1	4.1	10-29
LTFU IASC-TRA	45	13.2	3.5	9-24
Change in IASC-TRA	45	3	3.5	-4-9
	N	**%**		
Treatment changes	49	100		
Yes	29	59		
No	20	41		
Participated in yoga group during RCT	49	100		
Yes	32	65		
No	17	35		
LTFU PTSD diagnosis present	49	100		
Yes	21	43		
No	28	57		

Notes: *LTFU=measure at long-term follow-up interview; All measures reported here do not have missing data imputed with the exception of the change in BDI as noted.*

Table 3. *Correlations*

	1	2	3	4	5	6	7	8
1. SLESQ	1							
2. Treatment changes	-.042	1						
3. RCT group status	-.086	-.136	1					
4. Frequency yoga post-RCT	.147	-.056	.313*					
5. Change in CAPS	-.109	-.205	-.169	.236	1			
6. Change in DES	-.209	-.068	-.111	-.019	.258	1		
7. Change in BDI	.014	-.234	-.050	.348*	.455**	.085	1	
8. Change in IASC-TRA	.047	-.440**	.030	.021	.192	.480**	.453**	1
9. LTFU PTSD diagnosis present	.134	.216	-.013	-.283*	-.624**	-.217	-.208	-.149

*p<.05, **p<.01

Table 4. *Hierarchical Linear Regression Analysis: Predictors of Changes in PTSD Symptom Severity (CAPS)*

	Step 1				Step 2			
	b	***β***	***SEB***	***P***	***b***	***β***	***SEB***	***P***
(Constant)	29.43		9.15	.002	35.23		9.87	.001
SLESQ	-.766	-.109	1.022	.457	-.829	1.010	-.118	.416
Treatment changes					-8.898	6.077	-.210	.150
		R^2=.01				R^2=.06		
		R^2_{adj}= -.01				R^2_{adj}=.02		
		F(1/47)=.56, *p*=.46				F(2/46)=1.4, *p*=.27		

	Step 3				Step 4			
	b	***β***	***SEB***	***P***	***b***	***β***	***SEB***	***P***
(Constant)	43.50		11.22	.000	26.66		12.62	.040
SLESQ	-.966	-.137	1.002	.340	-1.41	-.199	.966	.153
Treatment changes	-10.155	-.240	6.059	.101	-10.09	-.238	5.74	.086
RCT group status	-9.449	-.213	6.368	.145	-14.61	-.329	6.38	.027
Frequency yoga practice post-RCT					12.24	.355	4.94	.017
		R^2=.1				R^2=.21		
		R^2_{adj}=.04				R^2_{adj}=.14		
		F(3/45)=1.7, *p*=.19				F(4/44)=2.92, *p*<.05		

Table 5. *Hierarchical Logistic Regression Analysis: Predictors of PTSD Diagnosis (CAPS)*

	b	***SEB***	***OR***	***P***
Step 1				
SLESQ	.092	.099	1.097	.354
(Constant)	-1.072	.899	.342	.233
χ^2=.878, df=1, *p*=.35				
Step 2				
SLESQ	.106	.104	1.112	.310
Treatment changes	.967	.624	2.630	.121
(Constant)	-1.778	1.058	.169	.093
χ^2 (2)=3.39, *p*=.183				
Step 3				
SLESQ	.108	.105	1.114	.303
Treatment changes	.985	.631	2.678	.118
RCT group status	.135	.643	1.145	.834
(Constant)	-1.896	1.200	.150	.114
χ^2 (3)=3.44, *p*=.329				
Step 4				
SLESQ	.200	.126	1.222	.113
Treatment changes	1.227	.702	3.409	.081
RCT group status	.912	.789	2.488	.248
Frequency yoga practice post-RCT	-1.579	.695	.206	.023
(Constant)	-.327	1.426	.721	.819
χ^2 (4) = 9.87, *p*<.05				

Table 6. *Hierarchical Regression Analysis: Predictors of Depression Symptom Severity (BDI)*

	Step 1				Step 2			
	b	***β***	***SEB***	***P***	***b***	***β***	***SEB***	***P***
(Constant)	8.164		5.088	.115	11.782		5.485	.037
SLESQ	.055	.014	.571	.924	.002	.001	.563	.997
Treatment changes					-5.442	-0.234	3.383	.115
		R^2=.00				R^2=.06		
		R^2_{adj}=-.02				R^2_{adj}=.01		
		F(1/46)=009, *p*=.92				F(2/45)=1.3, *p*=.28		

	Step 3				Step 4			
	b	***β***	***SEB***	***P***	***b***	***β***	***SEB***	***P***
(Constant)	13.705		6.411	.038	3.058		6.999	.664
SLESQ	-.035	-.009	.570	.952	-.326	-.084	.538	.547
Treatment changes	-5.761	-0.247	3.450	.102	-5.784	-.248	3.196	.077
RCT group status	-2.141	-.088	3.620	.557	-5.512	-.226	3.553	.128
Frequency yoga practice post-RCT					7.841	.417	2.727	.006
		R^2=.06				R^2=.21		
		R^2_{adj}=-.002				R^2_{adj}=.14		
		F(3/44)=.97, *p*=.42				F(4/43)=2.9, *p*<.05		

Paper 3. Claiming Peaceful Embodiment in the Aftermath of Trauma

Abstract

The purpose of this study was to describe the experiences of practicing yoga and its potential role within processes of healing for adult women with complex trauma histories. Using a hermeneutic phenomenological method, data were analyzed from interviews with 39 women. The core meaning of participants' experience of healing through yoga was *claiming peaceful embodiment.* This was an ongoing process that occurred on a continuum whereby women experienced improved connections with and sense of ownership and control over their bodies, emotions and thoughts, and a greater sense of well-being and peace in their bodies and minds. A number of interconnected essential themes related to this core process were also identified. Three interrelated essential themes that supported the process of *claiming peaceful embodiment* through yoga included: *new, present-oriented, positive embodied experiences*; *interoceptive exposure, desensitization, and taking effective action;* and *yoga as a tool to cope with stress and trauma triggers.* Three other interconnected identified essential themes spoke to new capacities enabled by *claiming peaceful embodiment*, including: *practicing pause and grounded response (instead of impulsive reactivity); improved priority and capacity for self-care; and improved capacity for emotional and physical intimacy.* Finally, several other essential themes were identified highlighting the factors that facilitated or impeded participants' engagement with yoga and their experiences of *claiming peaceful embodiment* through yoga, including: *internal and external barriers to practice*; *characteristics of yoga that supported healing;* and *greater frequency of practice leads to greater benefits*.

Introduction

Posttraumatic Stress Disorder (PTSD) is one of the most common psychiatric disorders, and lifetime prevalence of PTSD among women is over double that found in men (10.4% and 5.0% respectively; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Among men, a range of types of trauma exposures account for the development of PTSD (e.g., combat exposure, natural disasters, accidents, witnessing or experiencing violence; Kessler et al., 1995). Among women with PTSD, however, childhood sexual and physical abuse and neglect account for a significant portion of cases (Kessler et al., 1995). Not only is childhood maltreatment associated with a greater likelihood to develop PTSD than traumas that occur in adulthood, but women who are survivors of childhood maltreatment are more likely to have experienced multiple types of trauma in both childhood and adulthood, including sexual assaults, physical assaults, emotional abuse, neglect, and domestic violence (Coid et al., 2001; Dong et al., 2004). This type of trauma exposure that is repeated or cumulative is often referred to as complex trauma (Courtois, 2004).

Trauma that takes the form of interpersonal violence or severe adversity (e.g., neglect) over a developmental epoch, particularly when that period includes childhood, has a profound impact on the individual's sense of self and her ability to function in a number of life domains. Women with complex trauma histories have a high likelihood not only to develop PTSD, but also a range of other psychiatric (e.g., depression, anxiety, substance abuse) and physical health problems (e.g., obesity, heart disease, chronic pain syndromes; Chapman et al., 2004; Corso, Edwards, Fang & Mercy, 2008; Edwards, Holden, & Felitti, 2003; Felitti et al., 1998; Kessler et al., 1995; Walling et al., 1994; Walker et al., 1999). Additionally, complex trauma exposure is associated with emotional

lability, difficulties in affect- and impulse-regulation, poor interoceptive awareness, somatic complaints, struggles with attentional capacities, dissociation, poor self-perception, and difficulties in interpersonal relationships (Briere & Spinazzola, 2005; Courtois, 2004).

Experientially, women with complex trauma histories often feel disconnected from their bodies and struggle to feel safe in their own skin. This type of trauma exposure inhibits the development of a basic sense of security and trust in oneself and others. It is a challenge to hold a coherent and positive sense of self that is not based in self-doubt or shame (Herman, 1997). Consequently, tasks of basic self-care are often neglected (Courtois, 2004). Survivors of complex trauma fluctuate between extremes of intrusive reliving of trauma symptoms in their bodies and minds, and conscious or unconscious avoidance of these overwhelming emotions, sensations and thoughts (Herman, 1997). The conditioned fear response that is the legacy of living with trauma for a prolonged period leads them to react to new stimuli in ways that are at best irrelevant, and at worst seriously harmful; they tend to overreact to innocuous stimuli, underreact to danger, and shut down in the face of challenges (van der Kolk, 2006). As van der Kolk explains, traumatic stress "interfere[s] with the capacity to engage in the present: traumatized individuals 'lose their way in the world" (p. 277).

Effectively treating survivors with complex trauma histories is challenging due to the myriad of problems they face. In particular, research indicates that the treatment modalities typically prescribed for PTSD, which demand sustained attention during exposure to traumatic memories or other triggers, are often problematic for survivors of complex trauma. For instance, these treatments are often associated with a high rate of

incomplete response, treatment drop-out, and worsening trauma symptoms following treatment (e.g., Ford & Kidd, 1998; Jaycox & Foa, 1996; Pitman et al., 1991). This likely relates to the inability of this population to effectively manage the intense emotion that arises when confronted with traumatic stimuli (Cloitre et al., 2009; Lanius et al., 2010). Without the capacity to self-regulate and stay present, exposure to traumatic memory or other related triggers (including both external stimuli and internal bodily sensations and emotions) leads to emotional flooding and subsequent avoidant or dissociative responses that remove the opportunity for habituation, resulting in ineffective treatment (Jaycox & Foa, 1996).

Clinicians and scholars who specialize in the treatment of traumatic stress reactions among survivors of complex trauma claim that mind-body treatments such as hatha yoga—an integrative practice of physical postures and movement, breathing exercises and mindful attention to the present moment—may be a useful component of treatment to build skills in self-regulation, create priorities for self-care, and to address the disconnection between body and mind that these survivors struggle with (Courtois, 2004; van der Kolk, 2006). Indeed, there is a growing body of research that supports the use of yoga in the treatment of symptoms of posttraumatic stress and related mental health problems such as depression and anxiety among trauma survivors (see Paper 1, this dissertation, for review). There is also research demonstrating the efficacy of yoga in treating numerous physical health problems that are common among trauma survivors such as chronic pain (Evans, Subramanian, & Sternlieb, 2008), gastrointestinal problems (Kuttner et al., 2006), and insomnia (Khalsa, 2007), and for improving the body's response to stress (Ross & Thomas, 2010), which is often dysregulated among trauma

survivors. Moreover, a growing body of research shows associations between yoga and numerous mental health indicators, including improved quality of life, emotional well-being, positive affect, stress management, self-concept, and body awareness and responsiveness (e.g., Dale et al., 2011; Granath, Ingvarsson, von Thiele, & Lundberg, 2006; Impett et al., 2006; Moadel et al., 2007).

There is also research demonstrating benefits of hatha yoga specifically for survivors with complex trauma histories. For instance, Dale et al. (2011) conducted a quasi-experimental study with participants recruited from a local yoga studio, focusing specifically on the impact of regular yoga practice on women with abuse histories. They found that frequent yoga practice reduced the impact of abuse on participants' negative self-concepts and that yoga practice was associated with improved coping skills. van der Kolk and colleagues (in press) carried out a randomized control trial assessing the effectiveness of a ten week Trauma Sensitive Yoga intervention (see Emerson & Hopper, 2011) for adult women with chronic, treatment unresponsive PTSD[4] who all had histories of exposure to prolonged trauma (e.g., physical abuse, sexual abuse, neglect, domestic violence). They found that yoga was significantly more effective than the control (a seminar on women's health) for reducing symptom severity of PTSD and the likelihood of meeting diagnostic criteria for PTSD, and that participants who practiced yoga were less likely to engage in negative tension reducing activities (e.g., self-injury) compared to those in the control condition.

[4]PTSD was established in a screening assessment utilizing the Clinician Administered PTSD Scale (CAPS) and the CAPS F1/I2/Sev65 scoring rules (Weathers, Ruscio & Keane, 1999). Chronicity was based on meeting criteria for PTSD in relation to an index trauma that occurred at least 12 years prior to intake. Treatment unresponsiveness was determined by participants having had at least 3 years of prior psychotherapy treatment focused on trauma issues.

The aforementioned studies speak to the promise of hatha yoga for addressing mental health problems faced by survivors with complex trauma histories and for improving their day-to-day functioning and quality of life. However, given the quantitative methods employed by prior research, it does little to illuminate what experiences underlie these changes in survivors' mental and physical health or, in other words, how survivors experience yoga's role within their coping and healing processes over time. The present study addresses this gap in the literature. Using a hermeneutic phenomenological methodology, this study aimed to examine adult women's lived experiences of yoga, and the meaning that practicing yoga had for them over time within the context of healing from the effects of prolonged exposure to traumas.

Philosophical Orientation and Method

Background on Phenomenology

The hermeneutic phenomenological method is rooted in the idea that the meaning of experiences is intricately connected to the individual's *lifeworld*—the corporeal, temporal, relational, and spatial dimensions through which humans experience their existence as situated within larger historical, social, political, and cultural contexts (see Heidegger, 1962; Husserl, 1970; Merleau-Ponty, 1962; van Manen, 1990). A hermeneutic phenomenological approach begins from the recognition that meaning is contextualized in the lifeworlds, and it goes beyond description by identifying "meanings embedded in common life practices" (Lopez & Willis, 2004, p.728). Although these meanings may not be conscious for the research subject, she expresses these meanings through the narratives she produces. The researcher's role then is to interpret this meaning in relation to the lifeworld context (Lopez & Willis, 2004). Common uses of

phenomenological inquiry are for answering questions that rely on an understanding of subjective human experience. Practice oriented fields, such as social work, depend on such knowledge for understanding the lived experiences of the clients they serve and for developing effective interventions.

Data Collection

This study was part of a long-term follow-up assessment of participants who completed van der Kolk et al.'s (in press) aforementioned randomized control study examining the efficacy of yoga for women with "chronic, treatment unresponsive PTSD." In the parent study women ages 18 to 58 were recruited from the Boston, MA area through print and radio advertisements, flyers at mental health clinics, and referrals by mental health clinicians. PTSD was established in a screening assessment utilizing the Clinician Administered PTSD Scale (CAPS) and the CAPS F1/I2/Sev65 scoring rules (Weathers, Ruscio & Keane, 1999). Chronicity was based on meeting criteria for PTSD in relation to an index trauma that occurred at least 12 years prior to intake. Treatment unresponsiveness was determined by participants having had at least 3 years of prior psychotherapy treatment focused on trauma issues (van der Kolk et al., in press). Participants were randomized to a ten week Trauma Sensitive Yoga intervention or to a control group (a seminar on women's health topics).

Sixty participants completed the study. This included six cohorts over the course of three years beginning in 2008: three yoga groups (n=31) and three control groups (n=29). The curriculum for both the yoga course and the women's health seminar were standardized. The yoga cohorts completed 10 weeks of Trauma Sensitive Yoga classes (one hour of class per week). The Trauma Sensitive Yoga approach (described in depth in

Emerson & Hopper, 2011) prioritizes gentleness in movement (including offering some chair based postures for those with limited mobility or limited capacity to do more vigorous standing postures or postures on the floor); invitational language (e.g., "when you feel ready," "if this feels available to you," "you might try…"); and opportunities and encouragement for participants to modify the practice and make choices that felt appropriate for themselves ("you are welcome to modify this form in any way you like," "you might take the next few minutes to try any forms that you feel your body needs right now"). The teacher was also mindful to not give physical assists since they may have been triggering for participants (physical assists are a common practice in community classes). After completing the yoga classes or the women's health seminar, participants were given the opportunity to join the following cohort in the opposite intervention. Seven women chose to do so.

After the last cohort had completed the study, it was decided by the research team that all participants would be invited back to complete long-term follow-up assessments. Following IRB approval, phone calls and/or emails were sent to all participants to invite them to come in for these assessments. Depending on the cohort, participants time out of the study varied somewhat, but on average participants had completed the original randomized control study 1.5 years prior to the long-term follow-up assessment. Forty-nine participants came in for the long-term follow-ups. They were provided $100 for completing the same measures on traumatic symptomology administered in the original randomized control trial, and an additional self-report measure on the frequency of practicing yoga and any treatment changes since they were last interviewed (quantitative findings are reported elsewhere; see Paper 2, this dissertation). All participants who had

yoga experience—either as part of the parent study and/or after it ended— participated in a semi-structured phenomenological interview focused on their experiences of yoga and the potential role of yoga within their processes of coping and healing (n=39). These interviews were the data for the current study.

All interviews were carried out by the author who is a social worker, long-term yoga practitioner, and a yoga teacher. Interviews ranged in length from twenty minutes to one hour. A semi-structured interview guide was utilized (see Appendix A), and clarifying questions were employed to help participants articulate their experiences more fully and to affirm that the interviewer was understanding the meanings conveyed by participants accurately. Interviews were recorded with a digital audio recorder.

Data Analysis

The current study drew on van Manen's (1990) approach to hermeneutic phenomenological analysis. The interviews were recorded with a digital audio recorder, and transcribed verbatim. Each interview was checked against the recording for accuracy. Next the data was examined in three ways, following van Manen's (1990) suggestion for isolating thematic aspects of a phenomenon. A sententious approach to the data was used to gain a sense of participants' "holistic" experience of healing through the practice of yoga. Transcripts of each participant were listened to and read in entirety with consideration of the "main significance of the text as a whole" (van Manen, 1990, p.93). Second, a detailed line-by-line approach was used to identify and code sentences or sentence-clusters, and ask "what does this sentence or sentence cluster reveal about the phenomenon or experience being described?" (p.93). Statements that were pulled out and coded were those that seemed "particularly essential or revealing about the phenomenon

or experience being described" (van Manen, 1990, p.93). This second phase was carried out with twenty-one interviews until it was clear that saturation had been achieved (i.e., it appeared that no new significant codes were emerging). The final code list was further confirmed through careful reading of the additional 18 interviews.

During the process of coding, a memo was written for each participant. These memos defined and described codes and themes, and included salient excerpts from the interviews (Crist & Tanner, 2003). The memos were compared and contrasted across participants to identify what van Manen (1990) calls "essential themes" (p.106). Essential themes are the qualities that make a phenomenon what it is, and enable the researcher to "develop narrative elaborations of the lived meaning" of that quality (p.109). Essential themes were those that appeared particularly salient for the participants (i.e., mentioned several times, described with intense affect or detail), significantly reflected the lifeworlds, and were recurrent across the interviews (Willis, 2008). Memoing was used to identify, define, describe and provide salient excerpts from interviews for essential themes that cut across the interviews.

Ongoing introspection on the part of the researcher was also an important piece of the analysis (van Manen, 1990). Crist and Tanner (2003) explain that the process is often described as a "hermeneutic circle" where the forward arc of data collection involves the researcher in questioning her assumptions that could influence the process of interviewing and analysis, and the interpretation is the return arc (p.203). In line with van Manen's phenomenological method, engaging in a process of introspection (e.g., through journaling, talking with mentors and interraters) about a priori understandings, values, and assumptions was an important part of the research process.

The researcher also engaged in a process of "immersion" throughout the phenomenological research process (Munhall, 2007; van Manen, 1990). This included immersion in the data (reading and rereading transcripts), and the broader subject of inquiry, for example, participating in groups or events related to the phenomenon under investigation. Throughout the analysis the researcher continued to be involved in teaching Trauma Sensitive Yoga, leading workshops on the subject for clinicians, and taking yoga classes in the community.

Qualitative Rigor and Validity

A number of strategies were used to ensure a rigorous process and to validate findings. Memoing, ongoing introspection on the part of the researcher, reflexively dwelling with data and writing the final paper helped ensure rigor of the study. Additionally, two research assistants (a PhD Social Work student who specializes in trauma studies and a researcher who holds a BA in Psychology) each coded a subset of interviews to establish interrater reliability. These research assistants also participated in ongoing dialogue with the researcher on codes and essential themes to consider the validity, or "truth value" of the findings. A qualitative methodologist and a content expert also each reviewed six transcripts and consulted with the researcher. Finally, member checking was carried out with a subset of participants to elicit feedback on the findings; their endorsement of the identified core meaning and essential themes further validated the findings.

Findings

Sample Characteristics

Table 1 provides information on participant demographics and the frequency of their yoga practice since the parent study ended. As can be seen in Table 1, the group was quite homogenous in terms of race (76% self-reported that they were white) and education (74% had college degrees). The group is a bit more diverse on other demographic items (e.g., income is more distributed; 48% married, 23% single, 15% divorced or separated). Trauma history was obtained through the clinician administered Stressful Life Experiences Questionnaire. This measure shows good test-retest reliability and adequate convergent validity (Goodman, Corcoran, Turner, Yuan, & Green, 1998). All participants reported experiencing some form of childhood maltreatment as well as other acute stressors throughout their lives (e.g., sudden loss of a loved one, accidents, intimate partner violence during adulthood). Seventy-seven percent reported experiencing childhood physical abuse, 87% reported emotional neglect by a caregiver, 38% reported physical neglect (e.g., not having enough food, clothing, or access to doctors when sick), 74% reported parental substance abuse that inhibited their caretaking abilities, and 51% reported separation from a caregiver that caused acute stress. Seventy-four percent of the women said they had experienced a sexual assault at some point during their lifetime, and 39% reported emotional abuse during their life. Other examples of the types of traumas participants experienced included life threatening illnesses (33%), experiencing a serious accident (35%), physical assault or abuse in adulthood (28%), and witnessing violence (48%). The average number of stressful life experiences that participants endorsed was eight (SD=2.97).

Information on the participants' engagement in yoga as part of the parent study and/or after that study ended is also depicted in Table 1. Thirty-two of the 39 women who participated in the long-term follow-up interviews had completed the ten weeks of Trauma Sensitive Yoga as part of the parent study. Seven women were only part of the control group (the seminar on women's health topics) during the parent study, but went on to practice yoga after the parent study ended. The women's engagement in yoga after the parent study ended varied quite widely from no practice to daily practice. Since the length of time that participants had been out of the parent study varied somewhat depending what cohort the participant was in (ranging from .75 to 2.75 years at the time of this interview), to better quantify the frequency of practice a ratio variable was created to capture the average frequency of participants' practices per week since the study ended. Results showed that 5% had not practiced at all since they finished the yoga intervention as part of the parent study, 74.4% had practiced, but their practices were less frequent than one time per week, and 20.5% practiced at least one time per week.

Participants reported practicing yoga in a range of different settings: home self-guided practices, using DVDs to guide their practices, going to drop-in Trauma Sensitive Yoga classes at the Trauma Center (where the parent study was carried out), and going to classes in the community at gyms and yoga studios. While all yoga practices integrated the key components of postures and movement, mindful attention to the present moment, and breathwork (i.e., controlling the rate and depth of breathing), participants engaged in a range of different styles of yoga after the parent study ended. Most seemed to indicate preferences for "gentle" styles of yoga (more on this below), but some noted that they enjoyed vigorous practices. The length of participants' practices also ranged. Most

participants described each yoga practice as lasting from about an hour to hour and a half in length, but many also described engagement in "mini-yoga breaks" throughout their day—e.g., practicing a few poses here or there.

Core phenomenon: Claiming Peaceful Embodiment

Hermeneutic phenomenological analysis revealed the core meaning of participants' experiences of practicing yoga as a multidimensional process of *claiming peaceful embodiment*. Participants experienced an improved connection with and sense of ownership and control over their bodies, emotions and thoughts. This was marked by a growing sense of self-efficacy, and feelings that they were no longer defined by their trauma history, living in the past or reacting based on the past. Instead they felt empowered to transcend experiences of being held captive to the dialectical extremes of trauma: fluctuations between states of intrusions (e.g., overwhelming memories, negative thought patterns, feelings of fear, shame, rage and sadness, and impulsively reactive behaviors) and constrictions (e.g., detachment, disconnection, numbing and avoidance; Herman, 1997). They began to understand themselves and define themselves in a new, more positive way with a greater focus on their experiences in present-moment time and a greater sense of well-being in body and mind.

> *I think with trauma, me in particular, there are times where you didn't feel like you had control. You don't have control, you don't know what you can and cannot do with your own body, with your own self and I think that through yoga you get that back. You realize, like, oh wait I do have control over my body, I do have*

control of what I do or don't do, and then also your body surprises you of what it can and cannot do. You build a healthy relationship between you and your body.

With yoga, I reclaimed my body. That is a gift because I so hated my body. Or I claimed it, I probably claimed it--not reclaimed because I was so young. I claimed it. It was a long process to consider myself not an outline. I was working even prior to the yoga of filling myself in, this outline. I think yoga helped define me.

Through establishing a greater sense of connection and control over their bodies, thoughts, emotions, and behaviors, participants experienced movement toward an *embodied sense of peace*, which included growing feelings of *"safety," "okay-ness," "calmness," "groundedness," "presence," "inner strength,"* and *"self-confidence."* In contrast to feelings that the *"mind and body are separate things that have to fight with each other,"* participants described feeling more *"whole."* The sense of peace that women claimed through yoga was also marked by feelings of *"self-acceptance" and "authenticity."* Participants articulated that because of their extensive trauma history, it was difficult for them to be in the present moment and feel like they could be authentic. Becoming more connected with their minds and bodies in present moment time, and feeling that they had power to be who they wanted to be, in greater control of their thoughts, feelings, and bodies meant that they could be their true selves. Their emotions no longer felt so overwhelming that they had to shut down. As one participant explained, *"having a more normal range and expression of emotion has made me feel more normal*

and made me feel like a real person." They developed a greater sense of contentment, serenity, and a greater appreciation of everyday things.

> *Just inhabiting my own skin is a major step forward. [It allows me to] be in my life. Be in my life now, like, you know, be attentive as I'm driving, to be present with my family, like in lots of different ways. I think the practice of being more in tune with my body and being able to develop some tools to sort of control my internal energy and just the calmness that can come is significant. I spent my whole life trying to do good to prove that I wasn't just bad. And now, I don't. It's not something that I have to prove. It's just who I am. You know, I am who I am, and I'm generally a really good person. Things feel more connected. I'm more real. I feel less like I have to put one face on for the outside world and that's not really who I am. I feel more authentic than I think I ever have. My not being able to get into my own skin was something that I did early on just to survive, and I just carried it forward. And now, I don't need to do that in the same way. Like I can recognize I don't need to that. [It brings] an appreciation that if you haven't been there you couldn't possibly imagine. It would be like somebody who had been blind and then at a certain point in time gained their vision back and could see colors and could see the beauty in the world and had not been able to before. The okay-ness is from within.*

In contrast to feelings of hopelessness, *claiming peaceful embodiment* offered survivors a sense of hope—hope for their futures, hope that they could heal and had the

tools to do so, and a hope and belief that they were good people, capable of living a better, more enjoyable, and more meaningful life.

> *I think practicing yoga has given me hope. I think because it's allowed me to have more control over breathing and decision making and allowing me to have that gap in thinking, to pause before acting or reacting, that it's been a useful practice and tool to develop those things which has led me to think I don't have to be that person that I always thought I was just destined to be, that I could actually change some things, that has bettered my life, and become the person that I've wanted to be. The trauma doesn't have to define me, although the trauma will always be part of me, and that I can change, I can change how I work, how I want to be.*

> *It helped me understand that it didn't have to be that way. There is a gentle way to approach life period. So, I make conscious decisions now about my son, to raise him differently than how I was raised. So I can see that there are choices and options. You can be gentle in the world and it helps you see that, or you can be some other way. There are choices.*

The experience of *claiming peaceful embodiment* is an ongoing process and the experience appeared to occur on a continuum. Not every participant articulated the experience of a profound sense of inner peace, but overall there was movement toward greater peace in the ways described above. Many participants noted that they still

struggled day to day, but yoga has enabled them to feel more at ease, more relaxed, and that they had new tools to support their ongoing processes of healing in body and mind after trauma. It is also important to note that within any one individual's experience, she may have better days and worse days, but overall yoga practice supported movement toward a greater sense of peace in body and mind and greater sense of self-efficacy geared toward healing from trauma.

Essential themes

In addition to the core phenomenon of *claiming peaceful embodiment* through yoga in the aftermath of trauma*,* hermeneutic phenomenological analysis revealed a number of interconnected essential themes related to this core process. Three interrelated essential themes were identified that supported the process of *claiming peaceful embodiment* through yoga, including: *new, present-oriented, positive embodied experiences*; *interoceptive exposure, desensitization, and taking effective action;* and *yoga as a tool to cope with stress and trauma triggers.* Three other interconnected identified essential themes spoke to new capacities enabled by *claiming peaceful embodiment*, including: *practicing pause and grounded response (instead of impulsive reactivity); improved priority and capacity for self-care; and improved capacity for emotional and physical intimacy.* Finally, several other essential themes were identified highlighting the factors that facilitated or impeded participants' engagement with yoga and their experiences of *claiming peaceful embodiment* through yoga, including: *internal and external barriers to practice*; *characteristics of yoga that supported healing;* and *greater frequency of practice leads to greater benefits*.

Supporting the process of claiming peaceful embodiment.

New, present-oriented, positive embodied experiences. Because participants' trauma experiences initiated in childhood, the women often had no other reference point for what their physical and mental experiences could be. In addition to chronic PTSD, participants also struggled with ongoing problems with anxiety and depression. The women often experienced their bodies as "*constricted*," *"unsafe"* or *"in pain,"* or they experienced a complete "*disconnect*" with their bodies and minds. As one participant noted, "*I was always disconnected from my body. I was always on auto-pilot. I wasn't able to feel if I was injured. I would completely ignore being hungry. If I was tired I wasn't able to rationalize going to bed. All those things seemed reasonable because they were normal."*

Participants explained that by *"focusing on your body in yoga and doing new things with your body"* there was an opportunity to experience *new, present-oriented, positive embodied experiences*. These new embodied experiences contrasted starkly with their prior sense of self: "*[In the past] I would be the type of person, I would spend some time on the beach and I knew I was there because I saw my foot prints or else I would not have known I was there. Yoga grounded me—because the breath and movement. It just grounded me."*

New, present-oriented, positive embodied experiences were physical, mental, and emotional. They included the sense of *"calmness."* As one participant articulated, *"The yoga kind of made my brain relax a little bit and not worry so much about every little particular detail and then I wouldn't so much have to kind of dissociate which I usually do when I'm overwhelmed."*

Positive embodied experiences also extended well beyond feeling less anxious and more relaxed, and included experiences such as *"energy," "expansion, "lightness," "freedom," "strength,"* and "*connection*." As one participant stated: "*When I would leave yoga classes my whole body just felt energized and I mean I felt so good. I just felt all of me at once and there was a bounce in my step or something."* Another participant described her experience in yoga, saying, "*Certain poses where you move in a certain way where you don't move in your everyday life, and you stretch in a certain way, or you hear a certain phrase that you don't hear every day. Child's pose is just relieving and freeing and mountain pose is very strong."* Someone else explained, "*My stance is different, I stand taller. I breathe I think which I hadn't done in a long time. I feel more connected with my body."* Other examples of positive embodiment included: *"feeling lighter, less tense, not so weighted down by everything, like my brain is lifted up somewhere," "feeling more expansiveness," "creating positive energy; it's like a breath of fresh air [in contrast to] so much negative energy because I went through negative stuff," "having this calm and kind of like you know walking on clouds."*

Additionally, participants spoke about *"feeling good about myself,"* having a sense of "*accomplishment*" and greater *"confidence"* and agency that emerged in the context of learning new poses or making choices for themselves to modify the practice in a certain way that was essentially an act of self-care.

> *The nice thing is that she'll [the teacher] still challenge you to do like a head stand and here you have these people that--I mean, like I said there's people in their sixties--and all of us are like really? We're going to do a headstand today?*

She does it in a simple way that you feel, at the end you feel like oh my gosh I reached this goal that I'd see on the cover of you know, yoga magazine, you know so you have this sense of accomplishment, so I think that's the nice part too.

Having [a yoga teacher] accept and believe that you can't do something or you don't want to do something and then making changes around that is a really good environment. I think that that was probably the main thing that gave me freedom to step back from situations and regain a certain control. It was actually the first time that I started looking inward for what I needed rather than mimic what everyone else was doing.

Through *new, present-oriented, positive embodied experiences* participants had during their yoga practices, they began to understand that the conceptualizations of their minds and bodies based on prior trauma experiences did not have to be the norm. Participants began to "remap" their embodiment, replacing negative experiences of self and negative symptomology with more positive experiences. In other words, because of the new, positive physical, emotional, and cognitive experiences participants had in yoga, they began to reconceptualize themselves based on these present-oriented, positive experiences. "*It sometimes feels like my brain is using a map of my body from back when I was eight and not the one from now. Every time after I go to a yoga class I feel better for just more presence, more confidence, more secure in my body, for two days afterwards."*

Participants noted that others observed and responded to their shifts in embodiment, and it impacted their interactions with others in positive ways. Being less physically restricted translated not only into more openness in the body, but more openness to connecting with others.

> *When you are abused you feel small. You feel even smaller than you are. You feel like you want to make yourself smaller so you are not as visible. That is my experience was a child. I wanted to be small and invisible if possible. I wanted not to be seen and I constricted. As a child I didn't play very much. I couldn't do hopscotch or jump rope because I was restricted and inhibited. I'd say the sense of being able to open up in this way physically, as simple as it sounds, especially the upper part of my body—heart, lungs, diaphragm, shoulders—all the parts that I had scrunched down, that seemed to make a difference. It allowed an overall expansion and that is probably why not only have I dated a few time in the last year or so, but as I said there must be some difference because people are noticing it clearly. I have been invited to do more things. People seem interested in me in a differential way. There is something that has changed because people are coming closer to me. I am able to tolerate that better. I am reaching out more in ways that I couldn't have done.*

Interoceptive exposure, desensitization, and taking effective action. While the vast majority of participants described experiences of *present-oriented, positive embodiment* through yoga as a contributor to healing, these positive experiences in body

and mind were not necessarily automatic or immediately experienced by all participants. In fact, for a number of participants, yoga made them much more aware of the disconnection between their minds and bodies, and the negative sensations and emotions that were a legacy of their trauma history. Because yoga encouraged them to come into the present moment, they actually became more aware of uncomfortable or painful mind-body experiences, which they had previously been avoiding or dissociating from.

The concept of interoception is helpful to explain this phenomenon. As neurologist Clare Fowler (2003) explains, interoception refers to the "the physiological condition of the entire body and the ability of visceral afferent information to reach awareness and affect behaviour, either directly or indirectly. The system of interoception as a whole constitutes 'the material me' and relates to how we perceive feelings from our bodies that determine our mood, sense of well-being and emotions" (p.1505). Increased interoceptive awareness cultivated through practicing yoga was common among all the women. However, while for some the experience in the body and mind while practicing yoga was immediately an overall positive experience (i.e., *new, present-oriented, positive embodied experiences*), for others the experience was initially quite terrifying.

> *I was listening to the instructor and trying to turn inward and really feel what I was supposed to be feeling and holding the poses, then all of the sudden, it was really scary. There were a few times that I had body memories to the point where I yelled out in class. It's like a flashback, but you don't have any thoughts or visions that go along with it. So your body, it's like having a flashback and only*

having half the story. It made me realize how out of my body I've been all these years and how not attached [I was].

In itself the *interoceptive exposure* that occurred during yoga did not facilitate the process of *claiming peaceful embodiment* when the experience was negative. In fact, it could be a deterrent to practicing yoga when participants became overwhelmed by discomfort or pain of which they were newly or increasingly aware. However, exposure to these bodily sensations did offer opportunities for healing when participants could stick with their yoga practices and the feelings it drew attention to. This was often supported by a teacher who attended to this very challenge by encouraging or supporting participants to make postural modifications so they could better tolerate the practice. By bringing awareness to the mind and body in present-moment time combined with opportunities to *take effective actions* (i.e., modify the practice to make it tolerable) participants could continue to stay present instead of dissociating or avoiding as they might have done in the past. This allowed them to begin to *desensitize* to painful or distressing interoceptive experiences and to gain a greater sense of control over the mind and body.

I was more aware of my body and what things triggered my body where everybody feels with what triggered your mind. And, this was a totally different thing. I can't sit on the floor or lay on the floor, but sometimes I'd try to do movements of my legs to get myself less sensitized. It helped. It may not be a big thing for other people, but I can sit like this, which I couldn't do before. [She

> demonstrated sitting with her legs open, shoulders relaxed, arms by sides in contrast to everything being held in very tightly, arms crossed, legs crossed, tense].

While it was not necessarily a quick or easy process, participants who faced similar challenges noted that over time it got easier not only to tolerate uncomfortable embodied experiences such as body memories, but they learned that if they could sit with those feelings, they would pass. They also came to realize that not all of their experiences in yoga were negative—some were more neutral and some were even positive. "*Because I was in the yoga class experiencing all different experiences, from nothing to something really scary and all different levels, then it just kind of reminded me that you know, I will have a lot of different experiences and that if I just wait long enough it will pass."* Over time, they developed a greater capacity to remain in the present moment, coping with difficult sensations and emotions. More than that, they realized that they could transcend the negative experiences and even find some relief and sense of control over experiences of being triggered, and work to reduce the disconnect between their bodies and minds.

> *At first yoga was just uncomfortable, but just sticking with it, I started to like it a lot more and I found that I got comfortable with myself and it was relieving and relaxing, and that it's okay to be in just this moment and to be able to sit with myself to breathe. I learned that. It was a positive thing, to just let go, to not get lost in memories or the past or the future or to not just go back and forth and relive things and it's just okay to be here, right now.*

I definitely feel more connected to my body in that I don't run on autopilot all the time. I think it allowed me to be patient in my anger, to sit with it. Practicing yoga definitely has allowed me to, not only with anger, but with a lot of things given me the ability to sit with things for longer periods of time. So, I have more capacity for file folders that I can use. There's just so much more I can accomplish. There's so much more energy that I have because my energy isn't spent in a dissociated place or keeping emotions or parts [of myself] down.

The growing ability to feel connected to internal experiences and to stay rooted in the present moment propelled participants into new opportunities for healing.

Through yoga, I learned something so important about myself that it really started me down a different road in my recovery, and that was to start connecting a lot of the triggering moments I was experiencing on a constant chronic basis, to try to connect them to feelings in my body. It kind of brought the two major pieces together — the mind and the body. I started to be able to make sense of my childhood which I'd forgotten — probably 99% of my childhood, you know up until 12. I knew that I had to kind of figure out what was going on because I was more aware of how much I had missed of my life, and so I think just starting down that road of discovery, you know trying to connect, trying to understand how disconnected I was, how to connect, what it's going to feel like, how to cope with

it, and to kind of explore, you know to start to explore, and try to put some of the pieces together from my past.

Yoga as a tool to cope with stress and trauma triggers. Analysis revealed that yogic practices (e.g., breathing exercises, postures) could be utilized as tools to better cope with stress and trauma triggers as they continued to arise in their day-to-day lives. This further supported the process of *claiming peaceful embodiment* by sustaining and continuing to build participants positive embodied experiences. Whereas in the past the participants might have been significantly impacted by even small stressors in their environment, they could practice yoga and regain their composure, reconnect with their growing sense of peace. For instance, one participant explained that before she practiced yoga, after a slight altercation with her husband she would have likely overreacted: *"I would have to call my therapist maybe. I might just go home and just shut down. I might cry all day. I might end up throwing up, I might, you know, really, really difficult."* Instead, however, she was able to draw on her breathing practice and calm herself down: *"I started to feel a lot of physical stuff, I was having all the effects of a reaction, a triggered reaction so I breathed, I did some breathing and just trying to refocus and a little self-talk. But that's a lot different than the way I used to have to deal with that stuff."* As exemplified by this participant, and the following quote, the women would often use small components of a yoga practice—a breathing exercise or a physical posture—to cope with triggers or stressors. It didn't need to be a full or long yoga practice.

I have some pretty serious health issues and I can think of times when I have been in situations where I have been very tense in doctors' offices, so waiting for a doctor to come in or waiting for the results of a test and just being able to breathe. Sometimes I will sit in a chair and I just do my twisting like this and this to try to relax my body and my shoulders, because I'm tense and stuff like that.

In addition to evoking a greater sense of calm, yoga practices offered a much needed break from the situation that provided the women with a new perspective on the stressor at hand. *"If I have an extremely stressful day or lots of work to do and then I do yoga, it didn't really bother me as much. Before I'd be kind of paranoid or obsessed about it but then after the yoga I think I'd be like, well you know in the grand scheme of things it's not really so bad so just take a break for a bit."*

In contrast to having a very limited capacity to cope with traumatic stress reactions, participants realized that there was the potential to cope in positive ways and to circumvent more extreme reactions, such as panic or hypervigilance. Because yoga offered them new tools to deal with stress and triggers in their day-to-day lives, they felt greater control over their responsiveness, a belief in their ability to cope, and a subsequent reduction in traumatic stress symptoms and improved sense of safety and peace.

If I were to compare how I coped with the traumatic events before and then using yoga as a tool for kind of coping with them, I'd definitely say that yoga would be the better option than letting things go and having a panic attack and all the other

things that would come with it. Yoga kind of just showed me that there are other ways out there of dealing with things, and kind of nipping the reaction in the bud.

Sometimes when I felt triggered, it was like somebody else used this body and it doesn't feel good and I will never feel good. And now I can stretch and feel good that can be really helpful. If I feel like I am dissociating to be like okay these are my hands this is my body and even that there are things that my body can do. Instead of feeling like my mind and body are aliens to each other being like well look I can stretch and touch my toes now, who would have thought that possible and I feel like I have more ownership of my body and feel more of a part of it.

I think [yoga] allowed me to have control over something, and see that I could control my breathing or that I didn't have to believe something was happening again and feel safe myself and I think the breath work and the yoga provided that, to me provided that additional level of feeling that I was in control and could slow the thought processes down for certain things. So I wouldn't have to feel like I needed to watch everybody on the subway or something like that and get all worried about it because more often than not the subway is fine--you know anything like that. [Yoga] allowed me to feel like I had power over something.

New capacities enabled by claiming peaceful embodiment. *Claiming peaceful embodiment* through yoga offered participants opportunities to *"build something bigger."*

Participants took the shifts in their self-perception and newfound strengths and capacities off their yoga mats and into the rest of their lives in several ways.

Practicing pause and grounded response (instead of impulsive or habitual reactivity). First, rather than impulsively or habitually reacting (often overreacting) to events in their lives, participants learned to slow down, pause, and choose how they wanted to respond. As a result, participants noted that rather than overreacting to innocuous stimuli (that was often in some way reminiscent of their trauma experience), they could respond in a centered way that was more appropriate to the situation as it was occurring in the present moment.

> *I think yoga's helped allowing there to be space between when something happens and my reaction. Because for a long time I didn't have that space to sort of make what I call a rational judgment, it was just based on sort of an emotional--or a habit. It's allowed me to sort of pause and have that moment to say okay well I don't have to react this way or this person didn't mean it this way and have that little bit of time to think about [my] reaction.*

> *The way that that entered into my day to day life would be the pausing and just allowing myself to relax and I think being able to locate, being a little more aware of how am I feeling. Cause sometimes I can just get very tense and not realize I'm being tense, but during the yoga instruction I remember thinking, you know, just taking inventory of your body, like okay, how are you feeling. It gives you a power I think. I'll just say okay you know what, something's happening to me right now*

> *how do I respond? And how do I want to respond. The simple thing is just let me breathe in and out, make sure no parts of our bodies are tense, and you're able to respond a little bit more clearly. Because there were times when I was very angry, you know and would respond in a way that later I was like oh, why did I respond that way? So lately I haven't been doing that, I try to not respond that way.*

This theme is intricately related to the above theme of using yoga as a tool to cope with stressors or triggers, but it extends beyond. *Pausing and having a grounded response* speaks to a broader shift in consciousness toward greater mindfulness and an internalized sense of self-control and greater peacefulness that enabled greater choice over their behavior. The women could also use the improved interoceptive capacities they had cultivated during this pause time to have a better sense of their own feelings and needs in the present moment (in contrast to more habitual responses based on their trauma history), and use this information to support a more grounded and authentic response to current situations. The practice of pausing and having a more grounded response also extended into various situations beyond stressful experiences or encountering trauma triggers, including everyday tasks at work or at home, and in interactions with others.

Improved priority and capacity for self-care. The second dimension of change enabled by *claiming peaceful embodiment* was an *improved priority and capacity for self-care.* This theme speaks to the shift that occurred for participants from experiences of disconnection, shame, and hopelessness toward believing that they were deserving of self-care, and deserving and capable of healing. "*[I've begun to] take better care of*

myself, [to believe] that I'm important or that I'm worthy of that, to be more connected with how I'm feeling, to not be as disconnected."

For many, the practice of taking care of themselves on the yoga mat was one of the first times they had really focused on themselves in a meaningful way and took time to address their own needs. In turn, this practice of self-care and the greater sense of agency and peace that emerged in the yoga practice led participants to practice self-care outside of the yoga studio.

> *Yoga was one of the first things that I started to do within my body. It started to make me feel strong and balanced and like this body is mine and I do have control over it. It helps me just be in my body more so when I feel hungry, for example, being able to notice that okay I'm going to take care of that because I care about this body.*

> *Beforehand I'd be more focused on everyone else's needs, like my work, my family, what not, and I kind of forgot about taking care of myself. So I think with the yoga it kind of forced me to spend that hour or so, you know with myself, centering myself and then even afterwards, um since I'd be more calm, I'd be more outgoing and doing other things and just generally trying to treat myself better.*

Self-care manifested in a number of areas of survivors lives, from how they dealt with their trauma symptoms to setting and achieving new goals for themselves. The

gentle and choice oriented approach of practicing "Trauma Sensitive Yoga" became a broader framework to view challenges and trauma triggers, and practice greater self-care in this context. One participant articulates how she was able to let go of judgment of herself when she did feel triggered and just be more gentle with herself in general through her healing process:

> *Being more gentle with myself and instead of, often when I had a symptom, not only would I be reacting to the trigger but also judging myself for reacting to the trigger and thinking, I am an adult I should be over this by now and stuff like that. [The practice in yoga of] making your way slowly there and just being really gentle with yourself, whenever I am ready, that has helped me so that when I do feel triggered I feel like I can judge myself less and be like alright so this is how I feel right now and when I am ready to not feel that way anymore that will happen without pushing myself so hard. So that has been good.*

Participants explained that the greater capacities and priorities for self-care that emerged in the context of *claiming peaceful embodiment* enabled them to think more about their futures and set goals. In contrast to not having much of a sense of self at all or not believing they were deserving of a future, now participants had a belief that they were deserving of something better, and that they were capable of achieving goals.

> *With the whole mind-body connection thing that really became the focus of my work, and my outlook I'd have to say I never was, I never made any goals you*

know, as if I didn't have a future, I guess because I didn't have a self. I have made some goals and I've had some accomplishments so I think it's helped with that.

Another dimension of self-care relates to the participants' improved sense of their own needs and having a newfound ability to articulate this in their interactions with others. They explained that the greater sense of peace and control over their own bodies and lives translated into an ability to establish clearer boundaries with others, to feel that it was okay to say no sometimes, or to advocate for their own needs. In turn, these acts of self-care supported their ongoing process of healing.

A couple of days after I go to class every time I go to class, is being more comfortable just in other situations saying what I want and not feeling like I have to sort of read the other person and do what they want, that I can just go, I want to do this and that it makes me more able to even be aware that you know of what I want.

[My body] it's mine and I have control over you know, I can say to someone no don't touch me, I don't want you near me or something, and I do think the yoga helped me with that because you know, one of the last things we did was you know we would go on the ground and sometimes we'd, you could get into any position that you'd like, you could get in the fetal position, you could you know do more stretches or so, but throughout that entire time you were like almost communicating with your body, you know can I balance on one foot and

> *everything so you're being much more aware of what it is rather than you know feeling like it's not necessarily all a part of you especially since it had all these bad things happening to it, you know, now it's a part of me and I'm taking control of it and it's helping me heal me.*

Improved capacity for emotional and physical intimacy. *Claiming peaceful embodiment* allowed the women to better connect with others and open up to others. As one participant explained, "*It's a whole lot easier to feel connected to others when you're in your own skin."* For many survivors of complex trauma, being close to others physically (including sexually as well as other forms of physical contact) and emotionally can be a significant challenge because it often feels unsafe based on prior abuse. With greater comfort and safety established within their own bodies and minds, the women felt safer in their relations with others. They noted feelings of greater emotional intimacy and a greater capacity for physical intimacy. Often the physical and emotional intimacy were linked.

> *I think the most important was being able to connect. And, not being fearful to connect. Because there were times when I couldn't. One example is that [the yoga teacher] got me to stretch my arms out even with my shoulders, which I had not be able to do it; it was a fear. And the thing that I notice the most is because I was able to extend my arms out I was able to hug people, to invite someone to have a hug. [This made me feel] happy.*

> *I think because it's body work, I could learn to accept being touched by others in a different way. And that has enhanced some relationships especially the one with my husband. Because sexual intimacy has been messed up for me either I was over active but really emotionally withdrawn--like acting out but not wanting to have sex once I had gotten their attention. I was a mess, but now I can actually be intimate with someone I want to be intimate with. Even if it's just cuddly, and I don't need to be afraid of his touch or threatened by it, and actually enjoy it--not numb out or shut down because that was the other thing.*

Facilitators and barriers to claiming peaceful embodiment. Several additional themes speak to the factors that facilitated and impeded *claiming peaceful embodiment* and participants' ability or willingness to practice yoga more generally.

Facilitators. Participants spoke about the *characteristics of their yoga practices*, that is the types or qualities of yoga, teacher qualities, teacher approaches, features of the space, and so on that supported *claiming peaceful embodiment*. The majority of participants emphasized how they preferred a *"gentle approach"* as opposed to a more vigorous or rigid practice, what one participant termed the *"drill sergeant approach."* Gentleness involved the actual quality of the physical movements—e.g., moving slowly, not forcing one's body into extreme positions that participants weren't ready for—and also to the teacher's approach. The woman really appreciated teachers who encouraged them to tune in to themselves and make modifications that felt appropriate for their bodies when they were ready.

> *The constant reminders to go at your own pace and to listen to your body for what it needs and when it's ready to turn or how far it wants to turn that was super helpful and has extended in so many other places in my life. Yoga classes I have taken other places ya know I have heard people say of you can push yourself, you don't realize what your body can do. Just push it. I feel like that's the kind of thing I have been doing my whole life, and what is so valuable about this yoga class is that it was not about pushing yourself, it was about letting yourself get there in your own time.*

The gentle, choice-oriented approach is a cornerstone of the Trauma Sensitive approach (see Emerson & Hopper, 2011) that many experienced during the "parent study." While often the approach of Trauma Sensitive classes could not be found in the wider community, some women did find teachers in the community with a similar approach, or they were able to take what they learned in the parent study in terms of choice and self-care into other classes or in their self-guided home practices: "*Even taking yoga classes at other places I feel like I try to hear that voice [of the Trauma Sensitive teacher] even when they are not saying it. Often they are saying hold this pose, you scan stay in it longer and I'm like no I'm ready to leave [this pose] so I am going to move into a different pose."*

Regardless of whether a yoga teacher has specifically been trained to use a Trauma Sensitive approach, participants emphasized the importance of finding a teacher that made them feel safe: "*The teacher is very important. I needed to be safe with the instructor, number one, so I could experience the yoga positively."* This was particularly

true for those who found yoga to be uncomfortable or triggering. Some participants found that the only way they were able to continue to practice was by meeting with the teacher in a one-on-one setting and getting specific support around modifications to the practice and working on desensitizing to triggers with the teacher's support.

> *I had a great deal of difficulty in doing the yoga because the positions I was asked to be put in gave me a lot of physical reactions. So, the yoga teacher told me I didn't have to get on a mat on the floor--that I could do things sitting in a chair, and if I felt uncomfortable with those things than to just sit in a chair, just be there. And when she found out I had great difficulty she would meet with me for 15 minutes after the yoga to see if I was all right and to see if it brought up any flashbacks or whatever. So that was real great. Some [of our meetings] were debriefing, some were trying to desensitize me to be able to not be so afraid. Like we would try a position, and if I later felt uncomfortable, she stopped it. She would try new positions thinking that I would be better able to handle some things than the other things.*

Another facilitator of *claiming peaceful embodiment* was the *importance of maintaining or engaging in more frequent yoga practice.* As noted previously, the process of *claiming peaceful embodiment* appeared to be ongoing and not all participants were at the same place in this process at the time that the interviews were carried out. Some participants noted more profound experiences of inner peace and the major ways that their life had been transformed through practicing yoga, including, for example, a

significant reduction in their traumatic stress symptomology, a greater sense of control over their lives, optimism about the future, a greater appreciation of life, and improved connections with others. Typically, these women who articulated these gains had the most committed ongoing practices (e.g., attending classes one or two times a week or even having created a yoga room in their house where they engaged in daily self-guided practices). Others observed smaller changes in this same positive direction, but simultaneously with more continual struggles. Typically, participants with less profound changes had only engaged in yoga sporadically since the 10 week intervention of the parent study had ended, there had been a long break since they last practiced, or they hadn't practiced at all since the parent study ended. Although nothing conclusive can be drawn in terms of how often it is necessary to practice to achieve the greatest benefit, and while some gains appeared to be more permanent, participants spoke about the *importance of maintaining their yoga practices* to sustain their sense of well-being and other newfound capacities cultivated through their yoga practices.

> *For someone like me and a lot of the people who have trauma from very young, you're so heavily programmed with these certain sort of behaviors and mind patterns that you have to be constantly working to do things a different way. The effects dissipate when you're not practicing regularly. I mean there is some improvement that sticks even though I haven't been practicing regularly. But I think for this and other therapy techniques that I've done, like I've sort of had this exposure therapist I worked with that I made a ton of improvement with, and then I wound up getting out of the habit of doing the work and then backsliding. This is*

sort of similar to other kinds of skill-building practices: if you don't keep practicing the skills, you'll maintain some of your gains, but you'll lose more than half of them if you don't stay in practice.

I would say that during the practice when there was regularity to it I felt better about being inside this particular flesh. I felt a little more in control and a little more bizarrely enough I cared for it more. Just in the sense of self-care stuff. I think the further away I get from yoga and not just yoga but physical activity in general, the more disconnected I feel. So when it was practiced with regularity I definitely saw some marked changes in my patterns of self-care.

Barriers. Given that participants derived greater benefits from more regular practices, it was interesting that some participants had not kept up their practices to the degree that they would have liked to (discontinuing their practices or only practicing sporadically). Participants described both *internal* and *external* factors that inhibited their ability or willingness to practice yoga. *External barriers* included factors such as the prohibitive cost of attending classes (around $10 to $15 per class), and feeling like they wanted a teacher as opposed to self-guided practice, which several participants noted was more challenging than teacher led practices. Some participants also noted that it was difficult accessing classes that felt safe (e.g., a teacher who was sensitive to trauma triggers or was open to participants modifying poses as they liked). For instance, they would have liked to take Trauma Sensitive Yoga classes at the Trauma Center (drop in

classes at the mental health clinic where they completed the parent study), but these classes were far from where they lived or not at a time that was convenient.

Internal barriers related to motivation and overcoming fears. As one woman stated, *"I was afraid to open up this part of my body."* Participants explained that because yoga heightened their interoceptive awareness, when they were facing a particularly challenging time or more stressors in their lives, it was hard to practice because it heightened their awareness of suffering.

> *One of the things I find happens is that when I go to try to ground myself, the first thing I become mindful of is really intense pain and then if I get through to the other side and get to sort of a more grounded state then I can feel a little bit better. But there's this sort of barrier that can make it very hard to get into. It's just hard to make yourself do it. I mean it's like physical therapy if you're recovering from an injury or surgery or something. And those are often the times when it would be most helpful are the times when you most don't want to do it.*

Fears were not just about encountering pain in yoga, but participants articulated fears of feeling better because it could be taken away. Sometimes it was hard to change their way of being; they were used to their trauma symptoms and although they were unpleasant there was a fear that feeling better and having it taken away might be worse than simply remaining in the status quo. Because of this, it was challenging to establish *"inertia"* toward healing.

> *I know I will feel better when I do this [practice yoga], but I can't do it. I suspect that I am just more comfortable with [my current experiences] because that is what I've been doing for the last eleven years. I am scared of feeling better because that means it can be taken away or I could get hurt again somehow. So I think there is just inertia and a little bit of fear about feeling better.*

Participants also spoke about motivation problems when they were feeling good. When things were going well they sometimes got out of the habit of practicing. However, without the continuing practice, the benefits could diminish. As one participant articulated, *"Over time I think it's kind of like after you like have like a good experience, and you feel like kind of like you're coasting for a while, so you're kind of like, oh yeah I'm fine I can deal with it. Then later on it's kind of like, oh crap things are going bad again, and then sometimes you forget you have the tools that you can use."*

Discussion

This hermeneutic phenomenological study sought to understand the experiences that women with complex trauma histories ascribed to practicing yoga. The core meaning of their experience is *claiming peaceful embodiment.* This phenomenon involves improved connection with and sense of ownership and control over their bodies, emotions and thoughts. The women redefined their senses of selves and their being in the world; no longer victim to extreme states of flooding or constriction, they felt like they could remain more present to their lives, with greater calmness and a growing sense of well-being in bodies and minds. *Claiming peaceful embodiment* is also marked by a sense of agency, a belief that one is deserving of healing and that she has the ability to enact

positive changes both inwardly in body and mind and outwardly in behavior and interactions with others. Survivors noted newfound capacities for self-care, more optimism about their futures, and a growing ability to feel connected to others and to experience greater physical and emotional intimacy.

While prior research has shown that yoga can be effective for reducing psychiatric problems related to trauma (e.g., Stoller et al., 2012; Telles, Singh, Joshi & Balkrishna, 2010; van der Kolk et al., in press), and for improving coping and well-being (Dale et al., 2011; Granath, Ingvarsson, von Thiele, & Lundberg, 2006; Impett et al., 2006; Moadel et al., 2007), these studies did not offer insight into how survivors themselves experienced positive change or how they conceptualized yoga within their processes of healing more broadly. The findings from the current study indicate experiences of healing in the context of practicing yoga that go well beyond symptom reduction, toward more profound positive change akin to the phenomenon of posttraumatic growth, that is the experience of positive changes following acutely stressful events (Joseph & Linley, 2006; Tedeschi & Calhoun, 2004). There are three broad dimensions of growth that are typically described, including changes in views of oneself such as a greater sense of personal strength and more compassion toward oneself; shifts in life philosophy such as a greater appreciation of their life, increased sense of meaning, and a shift in life priorities, and committing oneself more fully to what one believes really matters; and changes in relationships such as increased valuing of relationships and a heightened sense of closeness with others (Joseph & Linley, 2006). Each of these dimensions of growth were articulated by participants, and attributed to the healing that occurred through the practice of yoga. This is not to say that the participants did not still struggle, but similar to

findings from other studies on posttraumatic growth, positive changes appeared to coexist with continuing challenges associated with a traumatic past (Tedeschi & Calhoun, 2004).

Beyond identifying some of the positive outcomes or newfound capacities associated with practicing yoga, findings from this study expand on prior understandings of yoga for trauma survivors by revealing some of the key processes that support positive change through practicing yoga. In particular, it appears that healing was related to the interoceptive awareness promoted by yoga—both in the context of having opportunities for positive embodied experiences, and through a process of exposure, desensitization, and opportunities to take effective action related to more disturbing mind-body experiences. Yoga also served as a tool for survivors to use in their day-to-day lives to cope with new stressors or trauma triggers, thus sustaining and continuing to build the growing sense of peace they experienced, and their increased sense of control over their lives.

This study offers empirical support to prior theories proposing that yoga could address mental health problems and improve well-being because of its calming effect, as well as through opportunities to reflect on choices and behavior and take effective action (Evans, Tsao, Sternlieb, & Zeltzer, 2009; Ware, 2007). Evans and colleagues (2009), for instance, put forward a biopsychosocial model to explain yoga's therapeutic potential. In terms of biological systems, they argued that yoga could create physical health benefits akin to any kind of exercise and at the same time help quiet the body by improving regulatory functioning of the autonomic nervous system. Psychosocially, Evans et al. explained that the non-competitive nature of yoga combined with the mindfulness practice promotes self-efficacy, coping, social support, positive mood, compassionate

understanding, acceptance, and mindful awareness. Ware (2007) suggested that yoga shares much with psychotherapy in that yoga facilitates self-awareness and introspection, behavioral change, cognitive change and self-acceptance, and a sense of connection to others. For example, she explained that in the same way that psychotherapy helps clients focus on present thoughts and feelings, ways in which their awareness may be limited, and promotes the client to engage in healthy thoughts, choices and behaviors, yoga encourages practitioners to be present to their immediate experience. In doing so, the yoga practitioner has opportunities to reflect on intentions, choices, and take actions within the practice (e.g., modifying a pose if it causes physical pain, or intensifying a stretch if it feels good), and these practices "on the mat" may carry over and expand into daily life (e.g., being aware of feelings and experiences in the present moment and taking actions to facilitate well-being). Indeed, participants from the current study spoke extensively on these same ideas.

The current study also expands on prior theories with the finding that interoceptive exposure, desensitization to disturbing internal sensations (e.g., "*body memories," "anger," "fear"*), and opportunities to take effective actions toward self-care are an important component of healing through yoga. While Ware (2007) did propose that taking effective action within yoga could extend beyond the practice, she was not speaking specifically about the types of experiences and opportunities that might be present for trauma survivors. The potential challenges associated with increased interoception for survivors of complex trauma, and some of the ways that participants were able to stick with yoga and transcend painful or upsetting mind-body experiences are new insights offered by this research**.** Interestingly, participants described similar

challenges that they might have experienced in some of the current gold-standard talk-based therapies (e.g., prolonged exposure therapy; Jaycox & Foa, 1996). However, unlike these talk-based therapies, practicing yoga does not focus specifically on traumatic memories, external triggers, or maladaptive thought patterns, but instead on the body and breath in present-moment time.

When practicing yoga in a safe setting and with the support of a teacher who was sensitive to potential challenges trauma survivors might face, or when survivors themselves were armed with the know-how and sense of agency to adapt their practices on their own, the women were able to modify their yoga practices and practice self-care. This allowed them to find options in their yoga practices that they could tolerate and thus stay present to their experience, and eventually realize that they were safe in the present moment, even when upsetting feelings or sensations arose. In this way, it is the opportunities for choice and action within the context of yoga that differs quite significantly from traditional exposure treatments. Moreover, as noted previously, even when participants experienced terrifying body memories during yoga, they were aware that not all experiences in yoga were so frightening or unpleasant, and in fact, they experienced a wide range of emotions and physical sensations. This often depended on the particular postures being practiced—for example, lying on the floor might be triggering in a negative way while practicing a standing warrior pose could offer a feeling of strength. It was this variability of the experience of the practice, combined with the opportunities to modify the practice for oneself that yielded a sense of empowerment, and more specifically a growing sense of control over reactivity to trauma triggers, and allowed survivors to be more present, connected, and feel more whole.

Although survivors of complex trauma may find yoga challenging because it heightens awareness of some painful emotions or physical sensations, the practice of yoga appears to be quite powerful in supporting healing among this population. It is notable that participants in the current study had been struggling with their trauma symptoms for most of their lives and all had done at least three years of prior psychotherapy (many had been in therapy for decades), often with limited movement toward healing. For many participants, yoga offered a new source of strength and hope and sense of self-efficacy because it offered new insights about themselves, and perhaps more importantly new ways to experience the self and make choices for oneself. For many in this study, the time spent practicing yoga was the first time in their lives where they would spend an hour or so doing something aimed at feeling good, practicing self-care. In doing so, not only did participants feel better in their own skin, but they felt more control over their lives more broadly, including positive shifts in their behavior and connections to others.

Notably, yoga as an approach to treatment for trauma differs radically from current standards of care. Instead of a focus on symptom reduction by focusing on negative thought patterns, troubling memories or feared stimuli (see, for instance, Foa, Keane, Friedman, & Cohen, 2009), yoga does not ask survivors to focus on the trauma or the problems in their lives related to the trauma history. The practice of yoga is simply about being with oneself and taking care of oneself in the present-moment—whatever arises. For a population who struggles to be present in their lives, to feel connected to their bodies and minds, and to be able to manage stress or practice self-care, yoga appears to offer a way to improve upon these very issues without having to engage directly with

the traumatic past, which is often overwhelming and challenging for survivors of complex trauma. This is not to say that yoga would serve as a replacement for traditional treatment modalities that have a rich evidence base (Foa et al., 2009), but rather that it may serve as an effective adjunctive component of talk-based therapy. In fact, numerous participants noted that their talk-therapy was enriched by their yoga practices (e.g., they were able to make new connections, bring the body into talk therapy, sit with emotions more comfortably in talk therapy, etc.).

The numerous benefits participants ascribed to their yoga practices suggest that mental health providers should consider encouraging their traumatized clients to pursue opportunities to practice yoga as a complement to psychotherapy. As seen among participants from this study, there are many different ways that survivors might engage in yoga—in community classes, in "Trauma Sensitive" classes if they are offered locally, in self-guided practices, using DVDs at home, or even as part of psychotherapy sessions if the clinician has experience with yoga and comfort in guiding the practice. Regardless of the particular setting in which the survivor chooses to engage in yoga, however, issues of safety should be on the forefront of the clinician's mind, and the clinician should prepare their clients sufficiently for some of the challenges they might face. For example, participants in the current study emphasized the importance of gentle classes, teachers who were open to students modifying the practice as they liked, and teachers who respected personal space and did not give physical assists without asking. These are not always the types of experiences offered in community classes. The clinician should also be prepared to support clients if they get triggered in a negative way by yoga, perhaps helping the survivor to figure out modifications that help them feel safe or using

psychotherapy as a place to process some of the difficult emotions or sensations that come up during yoga. Clinicians might also explore classes in the community to see where clients might find a more Trauma Sensitive teacher, and have a list of recommended classes or teachers.

Given that maintenance of practice was identified as an important facilitator of change, clinicians should also encourage their clients to stick with yoga practices—both when it is challenging and when the client feels better and may have less motivation to engage in healing modalities. That being said, it is unclear how frequently participants should aim to practice. Although maintenance of practice was identified by participants as an important dimension of sustaining and increasing the benefits derived from yoga, few had practices that were more frequent than one time per week. This indicates that significant gains could be made with fairly infrequent practices. Future research might explore the ideal "dosage" of yoga to derive the greatest benefits, and whether or to what extent benefits are maintained without continuing practice.

It is notable that the sample in this study is somewhat homogenous, particularly in terms of racial composition and education level. Moreover, the demographic makeup of this study is in line with the characteristics of yoga users within the United States, who tend to be female, white, and college educated with an average age of 39 (Birdee et al., 2008). This raises questions about self-selection bias; for instance, was it the interest in yoga or the expectation that yoga would support healing that led to some of the experienced benefits. However, the sample still included a subset of individuals who did not fit the characteristics of the typical yoga user, and these participants still endorsed the identified themes. Furthermore, the nuance captured by open-ended qualitative inquiry

reduces the possibility that the identified experiences could simply be attributed to participant expectations. Future research should continue to explore whether similar benefits might be derived among more diverse samples, including individuals of color, individuals who are not college educated, and populations not represented at all in the current study such as men and survivors of more time-limited forms of trauma. It is likely that many findings from this study are generalizable, while others may be unique to the specific struggles faced by survivors of complex trauma (such as the challenges associated with newfound interoceptive capacities). There might also be additional barriers to practicing yoga among other populations (e.g., men might feel there is a stigma associated with practicing yoga since classes are often predominantly women). Despite these limitations and remaining questions, this study included a large sample of adult women who had survived numerous traumas in their lives, both in childhood and adulthood. For these women, yoga offered new opportunities for coping with the legacy of their traumatic past, and new opportunities for healing in body and mind.

References

Birdee, G. S., Legadza, A., Saper, R., Bertisch, S., Eisenberg, D., & Phillips, R. (2008). Characteristics of yoga users: Results of a national survey. *Journal of General Internal Medicine, 23*, 1653-1658.

Briere, J., & Spinazzola, J. (2005). Phenomenology and psychological assessment of complex posttraumatic states. *Journal of Traumatic Stress*, *18*(5), 401-412.

Chapman, D.P., Anda, R.F., Felitti, .J., Dube, S.R., Edwards, V.J., & Whitfield, C.L. (2004). Adverse childhood experiences and the risk of depressive disorders in adulthood. *Journal of Affective Disorders, 82*(2), 217–225.

Cloitre, M., Stolbach, B. C., Herman, J. L., van der Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). Developmental approach to complex PTSD: Childhood and adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress, 22*(5), 399-408.

Coid, J., Petruckevitch, A., Feder, G., Chung, W., Richardson, J., Moorey, S. (2001). Relation between childhood sexual and physical abuse and risk of revictimisation in women: a cross-sectional survey. *Lancet, 358*(9280)*,* 450–454.

Corso, P. S., Edwards, V. J., Fang, X., & Mercy, J. A. (2008). Health-related quality of life

among adults who experienced maltreatment during childhood. *American Journal of*

Public Health, 98(6), 1094-1100.

Courtois, C. A. (2004). Complex trauma, complex reactions: Assessment and treatment. *Psychotherapy, Research, Practice, Training, 41*(4), 412-425.

Crist, J.D. & Tanner, C.A. (2003). Interpretation/analysis methods in hermeneutic interpretive phenomenology. *Nursing Research, 52* (3), 202-205.

Dale, L.P., Carroll, L.E., Galen, G.C., Schein, R., Bliss, A., Mattison, A.M., & Neace, W.P. (2011). Yoga practice may buffer the deleterious effects of abuse on women's self-concept and dysfunctional coping. *Journal of Aggression, Maltreatment, & Trauma, 20(1),* 90-102.

Dong, M., Anda, R. F., Felitti, V. J., Dube, S.R., Williamson, D. F., Thompson, T.J., Loo, C.M., Giles, W.H. (2004). The interrelatedness of multiple forms of childhood abuse, neglect, and household dysfunction. *Child Abuse and Neglect, 28*(7), 771–784

Edwards, V. J., Holden, G. W., Felitti, V. J., & Anda, R. F. (2003). Relationship between multiple forms of childhood maltreatment and adult mental health in community respondents: Results from the adverse childhood experiences study. *American Journal of Psychiatry, 160*(8), 1453-1460.

Emerson, D. & Hopper, E. (2011). *Overcoming trauma through yoga: Reclaiming your body.* Berkeley, CA: North Atlantic Books.

Evans, S. Subramanian, S., & Sternlieb, B. (2008). Yoga as treatment for chronic pain conditions: a literature review. *International Journal on Disability and Human Development, 7*(1), 25-32.

Evans, S., Tsao, J. C. I., Sternlieb, B., & Zeltzer, L. K. (2009). Using the biopsychosocial model to understand the health benefits of Yoga. *Journal of Complementary and Integrative Medicine*, *6*(1), Article 15, 1-22.

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V…. Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine*, *14(*4), 245-258.

Foa, E. B., Keane, T. M., Friedman, M. J., & Cohen, J. A. (2009). *Effective treatments for PTSD: Practice guidelines from the international society for traumatic stress studies.* New York, NY: The Guilford Press.

Ford, J. D. & Kidd, P. (1998). Early childhood trauma and disorders of extreme stress as predictors of treatment outcome with chronic PTSD. *Journal of Trauma Stress*, *11*(4), 743-761.

Fowler, C. (2003). Visceral sensory neuroscience: Interoception. *Brain, 126* (6), 1505-1506.

Goodman, L., Corcoran, C., Turner, K., Yuan, N., & Green, B. (1998). Assessing traumatic event exposure: General issues and preliminary findings for the Stressful Life Events Screening Questionnaire. *Journal of Traumatic Stress, 11*(3), 521-542.

Granath, J., Ingvarsson, S., von Thiele, U., & Lundberg, U. (2006). Stress management: A randomized study of cognitive behavioural therapy and yoga. *Cognitive Behaviour Therapy, 35,* 3-10.

Heidegger, M. (1962). *Being and time.* (J. Macquarrie & F. Robinson, trans.). New York, NY: Harper and Row.

Herman, J. (1997). *Trauma and recovery: The aftermath of violence - from domestic abuse to political terror.* New York, NY: Basic Books.

Husserl, E. (1970). *The crisis of European sciences and transcendental phenomenology* (D. Carr, Trans). Evanston, IL: Northwestern University Press.

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

Jaycox, L.H. & Foa, E.B. (1996). Obstacles in implementing exposure therapy for PTSD: Case discussions and practical solutions. *Clinical Psychology and Psychotherapy, 3*(3),176-184.

Joseph, S. & Linley, P.A. (2006). Growth following adversity: Theoretical perspectives and implications for clinical practice. *Clinical Psychology Review, 26*(8), 1041-1053.

Kessler, R. C., Sonnega, A., Bromet, E. Hughes, M., & Nelson, C.B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*(12), 1048-1060.

Khalsa, S. B. (2007). Treatment of chronic insomnia with yoga: A preliminary study with sleep-wake diaries. *Applied Psychophysiology & Biofeedback, 29*(4), 269-278.

Kuttner, L., Chambers, C. T., Hardial, J., Israel, D. M., Jacobson, K., & Evans, K. (2006). A randomized trial of yoga for adolescents with irritable bowel syndrome. *Pain Resolution Management, 11*(4), 217-223.

Lanius, R. A., Vermetten, E., Loewenstein, R. J., Brand, B., Schmahl, C., Bremner, D., & Spiegel, D. (2010). Emotion modulation in PTSD: Clinical and neurobiological

evidence for a dissociative subtype. *American Journal of Psychiatry, 167*(6), 640-647.

Lopez, K.A. & Willis, D.G. (2004). Descriptive versus interpretive phenomenology: Their contributions to nursing knowledge. *Qualitative Health Research, 14*(5), 726-735.

Merleau-Ponty, M. (1962). *The phenomenology of perception* (translated by C. Smith). London: Routledge and Kegan Paul.

Moadel, A. B., Shah, C., Wylie-Rosett, J., Harris, M. S., Patel, S. R., Hall, C. B., & Sparano, J. A. (2007). Randomized controlled trial of yoga among a multiethnic sample of breast cancer patients: Effects on quality of life. *Journal of Clinical Oncology, 25*, 4387-4395.

Munhall, P.L. (2007). A Phenomenological method. In P.L. Munhall (Ed.), *Nursing research: A qualitative perspective, 4th ed.* (pp. 143-210). Boston: Jones and Bartlett.

Pitman, R., Altman, B., Greenwald, E., Longre, R.E., Macklin, M.L., Poire, R.E., Steketee, G. (1991). Psychiatric complications during flooding therapy for Post Traumatic Stress Disorder. *Journal of Clinical Psychiatry, 52*(1), 17-20.

Ross, A. & Thomas, S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *The Journal of Alternative and Complementary Medicine, 16*(1), 3-12.

Stoller, C. C., Greuel, J. H., Cimini, L.S., Fowler, M. S., & Koomar, J. A. (2012). Effects of sensory-enhanced yoga on symptoms of combat stress in deployed military personnel. *American Journal of Occupational Therapy*, *66*(1), 59–68.

Tedeschi, R.G. & Calhoun, R.G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*(1)*,* 1-18.

Telles, S., Singh, N., Joshi, M., Balkrishna, A. (2010). Post traumatic stress symptoms and heart rate variability in Bihar flood survivors following yoga in a randomized controlled study. *BMC Psychiatry, 10*(18), 1-10.

van der Kolk, B.A. (2006). Clinical implications of neuroscience research in PTSD. *Annals New York Academy of Sciences, 1*(2), 1-17.

van der Kolk, B. A., Stone, L., West, J., Rhodes, A.M., Emerson, D., Suvak, M., & Spinazzola, J. (in press). Yoga as adjunctive treatment for chronic PTSD. *Journal of Clinical Psychiatry.*

van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy.* New York: State University of New York Press.

Walker, E. A., Unutzer, J., Rutter, C., Gelfand, A., Saunders, K., Vonkorff, M., Koss, M.P., Katon, W. (1999). Costs of health care used by women HMO members with a history of childhood abuse and neglect. *Archives of General Psychiatry,*56(7), 609-613.

Walling, M.K., O'Hara, M.W., Reiter, R.C., Milburn, A.K., Lilly, G., & Vincent, S.D. (1994). Abuse history and chronic pain in women: II. A multivariate analysis of abuse and psychological morbidity. *Obstetrics and Gynecology, 84*(2)*,* 200–206.

Ware, C. J. (2007). Yoga and psychotherapy. *Yoga Therapy in Practice, 3*(2), 15-17.

Weathers, F., Ruscio, A.M. & Keane, T.M. (1999). Psychometric Properties of Nine Scoring Rules for the Clinician Administered Posttraumatic Stress Disorder Scale. *Psychological Assessment, 11*(2), 124-133.

Willis, D.G. (2008). Meanings in adult male victims' experiences of hate crime and its aftermath. I*ssues in Mental Health Nursing, 29*(6), 567-584.

Table 1. *Participant characteristics*

	N	%
Race/Ethnicity		
White	30	76
Black	4	10.3
Other	2	5
Did not report	3	7
Marital status		
Single	19	48.7
Married/engaged	9	23.1
Divorced/separated	6	15.4
Did not report	5	12.8
Level of education		
College graduate	29	74.4
Not college graduate	9	23.1
Did not report	1	2.6
Employment		
employed	24	35.9
not employed	14	61.5
Did not report	1	2.6
Annual income		
<15k	12	30.8
16k-39k	6	15.4
40k-59k	3	7.7
60k-79k	7	17.9
>80k	3	7.7
Did not report	8	20.5
Treatment or control in parent study		
Completed yoga intervention	32	82.1
Control group only	7	17.9
Average frequency of practicing yoga after parent study ended		
Stopped practicing after parent study	2	5.1
Continued practicing, but less than 1x per week	29	74.4
Yoga at least 1x per week	8	20.5
	Mean	**SD**
Age	41	13
Total # of times practiced yoga after parent study	50	60

Appendix A: Qualitative interview guide

Interviewer: In the final part of this interview, we would like to get a sense of where things are at for you now in relation to the impact of your trauma experiences and the potential role of yoga in your healing process. There are no right or wrong answers here; our goal is really to understand how, if at all, yoga has impacted your experiences of healing from trauma.

1. Please describe how your experience of yoga or your practice of yoga has changed over time? (*if participant stopped practicing after intervention ended, ask:* How did your experience of yoga change during your time in the intervention? Can you describe any lingering effects or continuing changes?)

2. Please describe any influence the yoga intervention (and/or your ongoing yoga practice) has had for you within the context of your experiences of healing from trauma—either positive or negative.
    a. *follow-up*: can you describe that experience (or experiences) further? What was that like for you? *If ideas are very abstract:* Can you provide an example of when that happened?)

3. Please describe any influence of your yoga practice on your experience of trauma symptoms day to day or the way you manage your trauma symptoms in your day to day life.

Interviewer: The next set of questions are designed to ask you more specifically about several aspects of your life where your experiences of yoga may or may not have had an impact. Although you may have touched on some of these issues in relation to the previous questions, we hope this can be a space to elaborate further, and try to make sure we are covering everything.

4. Please reflect for a moment on your experiences over time of being connected or disconnected from your body, the way you have felt or feel now about your body, and any influences your yoga practice may have had on this dimension of your life. Please describe how your yoga experiences have shaped your relationship with your body or your experiences in your body. What stands out about these experiences in relation to your healing process?
    a. *follow-ups*: can you describe that experience further? Are there additional experiences you have had where yoga has influenced your experiences of your body? Has this changed over time?

5. Can you describe a time when your yoga practice influenced the way you feel, express, tolerate, or have control over your emotions? What was that (or those) experience(s) like for you? What stands out about the experience(s) in relation to your healing?

   a. *follow-ups*: can you describe that experience further? Are there additional experiences you have had where yoga has influenced your experience of your emotions? Has this changed over time?

6. When you reflect on your experiences of yourself as a person, and the influence of the yoga intervention (and/or your practice of yoga) has had on your notion of who you are or your sense of self, please describe these experiences. What does this (*participants' answers)* mean for you in terms of your healing?
   a. *if participant struggles with this question, might try reframing as:* Has your "relationship with yourself"—for instance, how you view yourself, what you see as your strengths or limitations—changed at all in the context of your yoga experiences? Please describe these experiences, and what they mean for you in terms of your healing.

7. Can you describe any experiences where your yoga practice influenced your relationships with others, or your feelings of being connected to or disconnected from others? Please describe how your yoga experiences have impacted this dimension of your life. What do these experiences mean for you in terms of your healing?

8. Has your practice of yoga influenced your ability to make meaning from the struggles you have faced related to your trauma history? If so, please describe this experience further.

9. Has your practice of yoga influenced your priorities or outlook more generally in any way? If so, please describe this impact. What does this mean for you in terms of your healing? (*if participant doesn't understand question might say:* for instance, has it influenced your sense of what is possible, your sense of hope for the future, or your sense of optimism/pessimism, etc.)

10. Has your yoga practice impacted your spirituality, your sense of meaning in life, or your sense of feeling connected to something greater then yourself? If so, please describe that experience. What does that experience mean to you in terms of your healing?

11. Are (were) there particular components of a yoga practice that you felt were more helpful than others to the changes you mentioned above—for instance, breathing exercises, meditation, the physical postures or certain specific postures, the group class format, the teaching style, or was it everything together? (If participant mentions specific aspects ask her to elaborate).

***If the participant did not attribute positive/negative changes to yoga but continues to practice nevertheless, interviewer should inquire*: Given that you have not seen changes in the areas we've discussed above, why do you continue to practice yoga?

***If the participant has not practiced yoga post-intervention, interviewer should inquire:* Can you tell me more about your experiences within the yoga intervention and/or factors in your life outside of the intervention that led you to not continue to practice yoga?

12. Is there anything I have not asked you that you think would be important for me to know? Any areas of difficulty or sources of strength that we haven't talked about? Anything you'd like to ask?

13. Have there been any significant life changes since we last saw you that may account for some of these changes we've discussed? For example, in addition to yoga, can changes be attributed to: other mind or body practices, life stressors, positive life events, change in therapy or medication regimen, etc.?

Conclusion to the Dissertation

Several factors coalesce in supporting the use of yoga as a component of treatment for trauma survivors. First, practicing yoga is popular within the general population, and individuals with mental health problems are increasingly turn to yoga as a means to cope and heal (Barnes, Bloom, & Nahin, 2008; Birdee et al., 2008; Libby, Pilver, & Desai, 2012). Second, yoga is highly accessible—widely available and relatively low cost. Third, recent advances in the understanding of traumatic stress disorders show an inextricable connection between body and mind, and that trauma survivors benefit from treatment modalities that promote affect tolerance and regulation in conjunction with traditional cognitive behavioral or exposure based therapies (Cloitre et al., 2010; van der Kolk, 2006). Yoga may be a useful component of treatment for trauma survivors because unlike traditional talk-based therapies, it directly addresses the body. Moreover, there is quite extensive research showing that mind-body modalities like yoga can improve physiological and affective regulation capacities (e.g., Ross & Thomas, 2010), and as such could serve as a useful complement to more traditional talk-based therapies. Finally, there is a growing body of research evidence that yoga can reduce a range of mental health problems and increase well-being and quality of life among a variety of clinical populations, including trauma survivors. The current dissertation adds to this research evidence.

In addition to the three papers herein offering general support for yoga as a treatment modality for trauma survivors, the findings from the papers align around several more specific themes. This dissertation also raises some important questions that should be considered in future research.

Frequency of Practice

One new insight offered by this dissertation is that it appears that more regular, longer-term yoga practice contributes to greater positive change. This dissertation demonstrates direct relationships between greater frequency of practice and greater improvements in traumatic symptomology, as well as a more nuanced picture of some of the reasons why regular yoga practice may be particularly important. For instance, for some trauma survivors, yoga may be initially quite triggering, and deriving benefit from the practice demands facing this challenge and continuing to practice longer-term. For others, yoga may be immediately pleasurable, but continuing practice likely increases benefits. Furthermore, some benefits derived from yoga may erode when the survivor does not engage in regular practice.

While an ongoing commitment to practicing yoga appears to be important, these papers do not answer questions about how much yoga is necessary (e.g., how often, how long each session should be), or whether the ideal "dosage" might vary across different populations of trauma survivors or be dependent on the severity of the trauma history or nature of the specific presenting symptomology. Additionally, it is unclear if a "saturation point" would ever be reached where no continuing benefit is derived. Future research should investigate these questions further.

Yoga and Complex Traumatization

The promise shown by yoga in this dissertation is particularly meaningful given that the studies included a specific focus on yoga for survivors with complex trauma histories—a population who often faces persistent traumatic symptomology, severe functional impairments, and difficulty engaging in traditional talk-based therapies.

Overall the women with complex trauma histories considered in this dissertation experienced powerful positive shifts in their mental health. However, the road toward recovery was not necessarily straightforward.

Indeed, many of the complex trauma survivors considered in the current study struggled with practicing yoga. For example, some survivors found ongoing participation in yoga challenging related to increased interoceptive capacities triggering what felt like intolerable intrusive symptoms, including body memories. Persevering through these challenges appeared to lead to substantial improvements in mental health, but this dissertation highlighted how it can be challenging to maintain one's practice in the context of the discomfort and terror that might be evoked with this newfound awareness of being in the body (in contrast to, for instance, chronic dissociation).

In addition to illuminating some of the particular challenges associated with practicing yoga for some complex trauma survivors, this study demonstrates that the relationship between yoga and symptom improvements, particularly for those who struggle with more severe dysregulation, may not be linear. Future research should further explore whether yoga might lead to an initial rise in certain types of traumatic symptomology (e.g., intrusions) while reducing other symptoms (e.g., hyperarousal, dissociation). Additionally, future research should continue to explore whether and how trauma survivors who tend to struggle more with dissociation or other manifestations of more severe affective and physiological dysregulation might benefit from yoga, and how to keep them engaged longer-term in the practice.

Characteristics of the Yoga Practice

A variety of styles of hatha yoga may be useful for improving mental health among a diverse sample of trauma survivors. However, findings herein also support the idea proposed in a number of prior investigations that mind-body practices may be particularly beneficial if they can be modified to be sensitive to the particular needs and challenges that may arise for trauma survivors (e.g., Dutton et al., 2011; Stoller et al., 2012; van der Kolk et al., in press).

As discussed above, yoga does not appear to be immune to some of the same challenges survivors face when engaging in more traditional talk-based therapies such as flooding and difficulty staying in treatment (e.g., Jaycox & Foa, 1996). However, it is possible that yoga may be better tolerated than those treatments that focus so explicitly on trauma memories or related triggers, particularly when the yoga instructor can create a feeling of safety and an opportunity for survivors to practice self-care and make choices within the yoga practice that feel good for their own bodies and minds. This feeling of safety and choice can be cultivated by instructors who offer postural modifications, and encourage participants to pay attention to what is going on in their own bodies and make choices within the practice that feel appropriate for themselves. Additionally, participants must take ownership over the process, learning what feels tolerable or even enjoyable, and making the changes to the practice that support their own healing.

The Trauma Sensitive Yoga approach utilized in van der Kolk et al.'s (in press) study emphasizes gentleness, choice, and safety, and in doing so, appears to be an approach that works well for many trauma survivors. However, it is not the only style of

hatha yoga that appears to support recovery among trauma survivors. To some extent the "ideal" style of yoga may be up to an individual's preferences.

It is also possible that certain symptoms may be best addressed by certain practices (e.g., particular postures, breathing practices, or styles of yoga). For example, for someone who is struggling primarily with hyperarousal, a gentler, relaxing practice could be best whereas someone who is more hypoaroused may benefit more from a stronger practice that increases energy and makes the person feel more grounded. Future research might consider whether different styles of yoga are better suited for different populations of trauma survivors or how practices might be tailored to better address particular symptoms.

This dissertation focused specifically on the integrative practice of Hatha yoga, which combines physical postures and movement, breathing exercises, and mindful attention to the present moment. It is unclear from the present study whether the effects identified depend on the combination of these component elements. It is possible that particular dimensions of the yoga practice on their own might yield similar benefits or particular component elements might yield specific benefits. Additional research could explore such questions. If it is found that certain components of the practice yield specific benefits, this information could also contribute to developing practices better tailored to meet the needs of specific individuals.

Survivors considered in this dissertation engaged in yoga in a wide variety of settings (e.g., home practice using DVDs or self-guided, practicing in the community in gyms and yoga studios, practicing Trauma Sensitive Yoga within a mental-health clinic with fellow survivors). It was unclear if certain settings or instructional formats might

lead to better outcomes. However, feeling safe in one's practice appeared to be a universal need, and it seemed that safety could be established in a range of settings. One of the greatest strengths of yoga as a treatment modality is that it is widely available, and survivors can find opportunities to learn and practice safely in a broad range of settings.

Yoga as Complementary Treatment

Although it appears that yoga can contribute significantly to improvements in traumatic symptomology, findings from the current study do not support using yoga as a stand-alone treatment for trauma survivors. Rather, it seems that yoga best serves as an adjunctive component of care. The exact relationship between yoga and other treatment modalities is an area ripe for exploration. For instance, as noted previously, yoga might be useful as a precursor to traditional treatment modalities, helping clients learn to modulate their reactivity prior to engaging in exposure or cognitive behavioral treatments. Additionally, survivors' talk-based therapies may be enhanced, deepened, or sent in a new direction based on their experiences in yoga. At the same time, being in concurrent psychotherapy might enable some trauma survivors to engage more fully in their yoga practices, and psychotherapists can support trauma survivors in meeting and overcoming some of the challenges that might arise within their practices of yoga.

Implications for Practice, Policy and Education

The promise of mind-body treatment modalities is beginning to be recognized within mental health fields such as social work, psychology, and psychiatry, and within political institutions. For example, the International Society for Traumatic Stress Studies annual conference (which brings together practitioners and scholars from a variety of clinical fields) featured a number of workshops on yoga for trauma over the past few

years. The National Center for Complementary and Alternative Medicine was also created relatively recently. This is a division of the U.S. Department of Health and Human Services and the National Institute of Health that supports research and provides information on complementary health modalities and products. This includes information and research on the efficacy of yoga for a variety of mental health problems (see, for example, clinicaltrials.gov). It will be important for these efforts to continue within these professional settings, and for funding institutions to continue to support research in this area given the numerous questions that still exist on yoga's impact and best practices.

Schools of Social Work should stay abreast of the ongoing work in this area, and curriculum should reflect cutting edge knowledge related to the impact of traumatic stress and current developments in treatment. More specifically, coursework should cover knowledge about the impact of traumatic stress on mind and body, and how anatomical and physiological changes to the brain and body underscore the broad range of physical and mental health problems that are tied to traumatic stress exposure. It is also imperative that clinicians in training come to understand some of the limitations of current gold-standard treatments for traumatic stress disorders, particularly for survivors with complex trauma histories. Related to this, it is essential that our future social workers come to understand survivors' needs for healing in mind *and body*, and the promising role of yoga in addressing these needs.

Although it is probably beyond the scope of social work education to train social workers to lead full yoga classes, teaching students small ways to integrate mind-body work into treatment is feasible, and could benefit clients greatly. Additionally, clinicians in training should be made aware of some of the potential challenges clients might face in

engaging in mind-body treatment modalities and be prepared to support clients in meeting these challenges in a sensitive and client-centered manner.

Conclusion

In summary, the three papers that compose this dissertation examine the efficacy of yoga in promoting healing among trauma survivors. They contribute to a growing body of research literature considering mind-body practices in the treatment of mental health problems, and for improving the quality of individuals' lives. While practicing yoga is not without its challenges, the papers herein reaffirm previous research demonstrating that yoga can help traumatized individuals recover.

More specifically, it was found that trauma survivors can take an active role in their own healing as they practice mindfulness and safely exercise their bodies and breath. Through the integrative mind-body practice of yoga, survivors experienced transformative insights, and improved their capacities for self-regulation and self-care. In doing so, they reduced problematic symptomology stemming from exposure to traumatic stress, improved their capacities to cope with trauma symptoms and new stressors, and increased their experiences of well-being and growth.

Although more research is needed to further validate the use of yoga as a treatment modality for trauma survivors and the specific ways that this practice can best be used, the promise shown by yoga implicates the need for a broader paradigm shift in the way treatment for trauma survivors is conceptualized. Rather than focusing exclusively on the mental imprint of traumatic stressors, the body's needs for healing must be addressed more directly. Yoga seems to be one approach that could meet this need. Serving as a complement to existing psychotherapy approaches, yoga has the

potential to contribute to survivors' experiences of healing as whole people—minds, bodies, and spirits.

References

Barnes, P. M., Powell-Griner, E., McFann, K., & Nahin, R. L. (2002). Complementary and alternative medicine use among adults: United States, 2002. *Advance Data,* 1-19.

Birdee, G. S., Legadza, A., Saper, R., Bertisch, S., Eisenberg, D., & Phillips, R. (2008). Characteristics of yoga users: Results of a national survey. *Journal of General Internal Medicine, 23*, 1653-1658.

Cloitre, M. Stovall-McClough, C. K., Nooner, K., Zorbas, P., Cherry, S. Jackson, C. L., Gan, W. & Petkova, E. (2010). Treatment for PTSD related to childhood abuse: a randomized controlled trial. *American Journal of Psychiatry, 167*(8):915-924.

Dutton, M.A., Bermudez, D., Matas, A., & Meyers, N. (2011). MBSR for PTSD among Low-Income Women with Chronic Trauma. Paper presented at the Mindfulness Based Stress Reduction Conference.

Jaycox, L.H., & Foa, E.B. (1996). Obstacles in implementing exposure therapy for PTSD: Case discussions and practical solutions. *Clinical Psychology and Psychotherapy, 3,* 176-184.

Libby, D.J., Pilver, C. E., & Desai, R. (2012). Complementary and alternative medicine use among individuals with posttraumatic stress disorder. *Psychological Trauma: Theory, Resesarch, Practice and Policy, 5* (3), 277-285.

Ross, A. & Thomas, S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *The Journal of Alternative and Complementary Medicine, 16* (1), 3-12.

Stoller, C. C., Greuel, J. H., Cimini, L.S., Fowler, M. S., & Koomar, J. A. (2012). Effects of sensory-enhanced yoga on symptoms of combat stress in deployed military personnel. *American Journal of Occupational Therapy*, *66*, 59–68.

van der Kolk, B.A. (2006). Clinical implications of neuroscience research in PTSD. *Annals New York Academy of Sciences, 1(2),* 1-17.

van der Kolk, B. A., Stone, L., West, J., Rhodes, A.M., Emerson, D., Suvak, M., & Spinazzola, J. (in press) Yoga as adjunctive treatment for chronic PTSD. *Journal of Clinical Psychiatry.*