

Research

The Influence of Trauma-Informed Yoga (TIY) on Emotion Regulation and Skilled Awareness in Sexual Assault Survivors

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Abstract

This study examined a Trauma-Informed Yoga (TIY) intervention created specifically for sexual assault survivors and delivered in a community-based group setting. Much of the existing research on this type of intervention has been conducted in clinical trials as opposed to community-based venues. As sexual assault is a common type of trauma and results more commonly in posttraumatic stress disorder (PTSD), the current study aimed to shed light on the potential benefits of a trauma-sensitive yoga and mindfulness intervention for survivors of sexual assault in the natural setting of a community-based organization. The intervention was developed and implemented by licensed mental health providers and registered yoga teachers and modeled on the evidence-based work of the Trauma Center at the Justice Research Institute. The study employed a traditional quantitative one-sample, pre- and posttest design. Survey items were drawn from two existing measures: (1) Five Facet Mindfulness Questionnaire and (2) Difficulties in Emotion Regulation Scale. The majority of the sample ($n = 37$) identified as White (67.6%), followed by Latina (13.5%), African American (8.1%), multiracial (5.4%), and other (2.7%). The mean age of participants was 29 years (standard deviation 8 years, range 18–56 years). All participants identified as female. Findings demonstrated statistically significant changes in participants' emotion regulation and skilled awareness, both of which have the potential to reduce PTSD symptomatology. The present discussion considers the results in light of previous research and presents study limitations. *Nicotera & Connolly. Int J Yoga Therapy 2020(30). doi: 10.17761/2020-D-18-00031.*

Keywords: Sexual assault, posttraumatic stress disorder (PTSD), Trauma-Informed Yoga, Trauma-Sensitive Yoga

Introduction

According to the National Intimate Partner and Sexual Violence Survey (NISVS),¹ approximately 22 million women and 1.5 million men in the United States will experience an attempted or completed rape during their lifetimes. When the definition of sexual violence is broadened to include being forced to penetrate someone else, being coerced into unwanted sex, experiencing unwanted sexual contact, and undergoing noncontact unwanted sexual experiences, the estimated number of victims soars to more than 75 million women and more than 26 million men.¹

According to the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5), a diagnosis of posttraumatic stress disorder (PTSD) following traumatic exposure includes experiencing symptoms in four areas: “intrusions [e.g., flashbacks], avoidance of stimuli [e.g., people, places, activities] associated with the traumatic event, negative alterations in cognition and mood [e.g., persistent belief that no one can be trusted or unrelenting negative emotions such as extreme fear or shame], and notable alterations in arousal and reactivity [e.g., a heightened startle response or trouble sleeping].”², pp. 271–272 In addition, one may experience dissociative symptoms such as feeling detached from one's body or experiences.² Among victims of rape, physical violence, and/or stalking by an intimate partner, the NISVS reports that nearly 17% of men and 63% of women will develop at least one symptom of PTSD.¹ One longitudinal study reported that 94% of 64 female participants showed symptoms of PTSD at the first assessment, an average of approximately 2 weeks following a sexual assault, and 47% displayed symptoms at the 12th assessment, an average of approximately 3 months after the assault.³

Scholars note that the nature of the crime of sexual assault as well as the societal response to rape leads to a higher incidence of PTSD among survivors of this type of violence.^{3,4} They attribute this largely to negative social reac-

tions (e.g., blaming the victim) and societal myths about rape (e.g., the belief that women lie about their experiences of sexual violence or that men cannot be victims of rape), as well as to certain characteristics of sexually violent crimes, such as the invasive nature of the crime and the perception that one's life is in danger, although this last characteristic is not unique to sexual trauma.^{3,4} The National Comorbidity Survey notes that for many survivors, experiences of interpersonal violence begin in childhood and are recurrent, resulting in a complex presentation of PTSD symptomatology as well as a high likelihood of developing other comorbid mental health disorders.⁵

Currently, a range of evidence-based Western medicine treatments are available to those experiencing PTSD, including eye movement desensitization and reprocessing (EMDR), trauma-focused prolonged exposure (PE), and cognitive processing therapy.^{6,7} These treatments are used with populations who suffer from PTSD resulting from a wide variety of traumas, including combat and police work, adult sexual assault and other crimes, motor vehicle accidents, and childhood sexual and physical abuse.⁶ Given the evidence that suggests that sexual violence leads to higher rates of PTSD than other traumatic events⁸ and that nearly 63% of women and 24% of men report experiencing rape or other types of sexual violence in their lifetimes,¹ investigating treatment interventions aimed specifically at survivors of sexual violence is important.⁸

The purpose of our study was to examine a Trauma-Informed Yoga (TIY) group intervention, which was created specifically for sexual assault survivors and delivered in a community-based setting. Much of existing research on this type of intervention has been conducted in clinical trials as opposed to community-based venues. Clinical trials provide researchers with more control over certain aspects of a study (e.g., conditions in which an intervention is delivered) than is possible in research in community-based settings. However, clinical trials do not necessarily reflect the conditions found in natural settings.⁹ For example, individuals who seek out clinical trials tend to be healthier and may be more motivated to improve their health than the broader community of individuals facing the same health challenge.⁹ In addition, contact with a research coordinator and/or principal investigator in a clinical trial may cause participants to engage more consistently with the intervention,⁹ unlike community-based settings, where participants muster their own motivations for attendance and consistency.

Thus, conditions in clinical trials do not reflect the realities of community-based practice settings,⁹ where individuals are most likely to receive treatment. Although clinical trials “provide robust evidence of the efficacy of an intervention, they do not inform us about the effectiveness of the intervention in clinical practice” settings.^{9, p. 1274} Hence,

examining TIY interventions in a natural, community-based setting is important. The intervention examined in our study was developed from the evidence-based work of the Trauma Center at the Justice Research Institute (JRI) (e.g., Emerson and Hopper¹⁰ and Emerson¹¹). Our research examined the intervention's influence on participants' emotion regulation and skilled awareness, both of which have the potential to reduce PTSD symptomatology.^{12,13}

Literature Review

The following literature review makes a case for TIY as a treatment for PTSD symptomatology and reviews the key principles of TIY interventions. First, we examine research on general interventions that aim to reduce PTSD-related symptomatology. Next, we discuss the literature specific to individuals who suffer from complex trauma and describe theoretical foundations for TIY and its emerging evidence for individuals struggling with PTSD symptoms. Finally, we cover the principles and themes of Trauma-Sensitive Yoga outlined by the Trauma Center at JRI.

General Trauma Treatments for PTSD

Bradley et al.'s⁶ meta-analysis of 26 studies found that existing trauma treatments (e.g., EMDR, exposure-based therapies, and cognitive behavioral therapies) had a success rate (defined as patients no longer meeting full criteria for PTSD) of 67% for those who completed treatment and 56% for those who completed some treatment. However, only 54% of those who completed treatment and 44% of those who completed some treatment were considered “improved according to the authors' definitions for clinically meaningful improvement.”^{6, p. 222} Bradley and colleagues⁶ caution readers in generalizing their results, noting a lack of long-term follow-up data, a suspicion arising from the data that those who do not respond to treatment may tend to drop out, and questions about whether these treatments can be applied successfully to a diverse population of PTSD sufferers (particularly survivors of chronic childhood trauma). Furthermore, data from their study indicated that many of the patients who no longer met full diagnostic criteria for PTSD after treatment remained significantly symptomatic.⁶ Those authors state that “subthreshold PTSD is associated with significant impairment in work and social functioning as well as suicide attempts,”^{6, p. 225} suggesting that even more restraint should be exercised in generalizing the success of these treatments. Other scholars also interpret the results of this meta-analysis as less positive than they initially seemed and state that one can conclude that the existing trauma therapies are ineffective for 33% to 44% of those with PTSD, signifying a need to investigate new, innovative treatments.^{14,15}

Newer studies concur with these claims, noting dropout and nonresponse rates as high as 54% and 44%, respectively, for those in treatment for PTSD.⁷ Similarly, van der Kolk et al.¹⁶ report that in a large clinical trial studying a 12-week PE therapy intervention, 59% of the participants still met criteria for a clinical diagnosis of PTSD after the intervention; at the 6-month follow-up, the percentage went up to 78%.

Complex PTSD, Treatment Resistance, and Relapse

Research suggests that dropout, nonresponse, and even worsening of symptoms following trauma treatment is most common for those who have experienced repeated trauma exposure, particularly chronic childhood abuse and neglect.^{17,18} This population of trauma survivors is often considered to have complex PTSD, a diagnosis acknowledged by some trauma experts such as Bessel van der Kolk and Judith Herman to be distinct from PTSD, but not one currently listed in the DSM-5.¹⁰ These experts note that a diagnosis of complex PTSD accounts for a “more profound and wider-ranging impact” of prolonged interpersonal trauma than is covered in the DSM-5 definition of PTSD; complex PTSD includes the following constellation of symptoms: “affect dysregulation; dissociation; somatic disturbance; negative or distorted self-image; impaired capacity to initiate, navigate, or sustain human relationships; and rupture of one’s fundamental beliefs and systems of meaning.”^{10, p. 62}

According to the literature, these more complex symptoms, particularly difficulty with emotion regulation and impulse control when reminded of the trauma, account for the high rates of dropout, nonresponse, and worsening of symptoms during talk- and exposure-based trauma treatments.^{16–19} In addition, survivors with complex PTSD presentations tend to cope by using chronic avoidance of and dissociation from reminders and memories of their traumatic past. When these survivors present to therapies that rely heavily on talk and exposure, they are likely to become flooded with trauma-related memories, emotions, and somatic experiences or become even more dissociated, rendering treatment ineffective.^{16,20}

Talk- and exposure-based trauma therapies that rely heavily on recollection and verbalization of traumatic memories fall short for many survivors of trauma, particularly those who have experienced chronic abuse.^{18,19} Brain imaging demonstrates that Broca’s area, “a major language center of the brain, can become deactivated in response to traumatic reminders, a finding that may explain why PTSD sufferers are often at a loss for words to discuss their trauma.”^{22, p. 59} Van der Kolk also notes that, “When people are reminded of a personal trauma they activate brain regions that support intense emotions, while decreasing activity of brain structures involved in the inhibition of emotions and the translation of experience into communicable language.”^{20, p. 278}

Yoga May Uniquely Address Behaviors and Experiences Related to PTSD

Yoga, which includes physical postures, breathing exercises, and skilled awareness practices, is widely becoming thought to uniquely address behaviors and experiences related to PTSD where other types of trauma treatment are falling short.^{16,21,22} Among the many behaviors and experiences related to PTSD, van der Kolk²⁰ points to four key experiences of people with PTSD: (1) automatic physical and emotional responses to present-day reminders of the past trauma; (2) impairments in memory, concentration, and engaging in the present moment; (3) experience of emotions, cognitions, and physical sensations as overwhelming and foreign; and (4) feeling helpless because of the experience of being unable to prevent the trauma from happening. He proposes that for a trauma treatment to successfully address these challenges it must support survivors to develop familiarity with their present-moment internal experiences and sensations, cultivate skills for self-regulation, and take deliberate actions to address their present-moment needs.²⁰ Van der Kolk also suggests that mindfulness-based treatments, such as yoga, that incorporate awareness of breath, movement, and physical sensations may prove more successful in treating the symptoms of trauma than traditional talk- and exposure-based techniques.²⁰

There are several hypotheses about the mechanism of change in yoga for PTSD, including supporting trauma survivors to decrease avoidance behaviors and increase distress tolerance, regulate their emotions, and process and integrate traumatic memories through nonverbal means.¹² One theory is that the mindfulness aspects of yoga, particularly emphasized in TIY, may constitute at least part of the mechanism for reducing avoidance behaviors.¹² Mindfulness can be defined as observing one’s present-moment thoughts, emotions, and somatic experiences with an attitude of open, nonjudgmental curiosity.²³ High levels of avoidance symptoms appear to prevent the resolution of PTSD, and scholars speculate that the mindfulness fostered by yoga practice allows trauma survivors to become more familiar, and in time, more comfortable, with their present-moment internal states. This awareness extends to triggered or distressed states, which “may lead to decreased experiential avoidance and increased acceptance, healthier emotion regulation strategies, and greater cognitive flexibility, in turn reducing PTSD symptoms.”^{12, p. 1171}

Yoga and mindfulness may also be a mechanism by which survivors develop emotion-regulation skills.¹³ As trauma survivors become more skilled in attending to their present-moment experiences, experts hypothesize they will also become adept at recognizing and accepting their emotions as they arise, skills that are key to regulating emotions.¹³ Mitchell et al.¹³ suggest that as survivors of trauma

become skilled in emotion regulation they will rely less on avoidance strategies, which impede the processing of trauma memories. Van der Kolk et al.^{16, p. e560} provide more detail about this mechanism:

In yoga, the focus of attention is on sensory experiences of breathing and physical sensations. The heightened body awareness fostered by yoga can help to detect physiological aspects of physical sensations (e.g., body tension, rapid heartbeat, and short, shallow breath) and provide information about the internal milieu, a prerequisite for accurate identification of the triggered emotional response (i.e., fear). The mindfulness aspect of yoga is hypothesized to foster emotion regulation by simply noticing the fear, as opposed to engaging in avoidance [of it].

Rhodes et al.¹⁷ explain that mastery over fear responses, which are known to be highly dysregulated among persons with (complex) PTSD, is key to healing. For healing to occur, survivors must become skilled in staying anchored to the present moment when reminded of their trauma and in regulating the intense trauma-related emotions that may arise.¹⁷

Neuroimaging studies on patients with PTSD provide further support for how increased mindfulness leads to greater self-regulation capacities.²⁰ These studies have shown that people with PTSD have decreased activation of the medial prefrontal cortex, a part of the brain that is able to override the “conditioned fear response” because of its role in restraining the limbic system and other stress responses in the body.²⁰ Neuroimaging has also revealed that the prefrontal cortex is thicker in people who meditate, suggesting that practicing skilled awareness may lead to greater capacity to inhibit patterned trauma-related emotional responses.^{20,24}

Yoga and mindfulness may also support the integration of traumatic memory.^{15,19,20} These practices support survivors in becoming aware that internal experiences, even uncomfortable ones, are always changing and that it is in fact safe to be present with their sensations and emotions.²⁰ Trauma experts speculate that when survivors are able to maintain dual awareness of their safety in the present moment while also recalling aspects of their trauma and using breath, movement, and awareness of physical sensations to regulate difficult emotions as they arise, they no longer experience their trauma-related memories and somatic experiences as overwhelming, out of control, and terrifying.^{15,19,20} Van der Kolk^{20, p. 12} states,

Once [trauma survivors] realize that their internal sensations continuously shift and change, particularly if

they learn to develop a certain degree of control over their physiological states by breathing, and movement, they will viscerally discover that remembering the past does not inevitably result in overwhelming emotions.

State of the Evidence

In this section, the term Trauma-Sensitive Yoga (TSY) is used. Although the terms Trauma-Informed Yoga and Trauma-Sensitive Yoga can be used interchangeably, we use TSY wherever we reference scholars who specifically apply that term to their work. The goal of TSY is for trauma survivors to build the capacity to feel safe and present in their bodies.¹⁰ According to Gurda,^{15, p. 783} existing research and meta-analyses indicate that yoga interventions have a significant positive effect on PTSD symptomatology and “could be *provisionally* [emphasis added] considered consistent with definitions for evidence-based practices.” Evidence from the studies reviewed in this section suggests support for Gurda’s statement while acknowledging that more evidence is required to move yoga interventions beyond this provisional status.

In their review of the literature, Spinazzola et al.²⁴ documented the many positive benefits of a yoga practice for PTSD, including calming the sympathetic nervous system and regulating emotions; mitigating comorbid mental health conditions such as acute stress, anxiety, depression, and substance abuse; increasing feelings of connection to self and others; and inducing positive neurochemical changes. A range of traumatized populations can benefit from yoga to reduce PTSD and acute stress, including women whose complex trauma is resistant to intervention,^{13,15,16} military personnel and veterans,²² survivors of natural disasters,^{25,26} and survivors of chronic childhood abuse.¹⁸

A small group of studies has specifically looked at the impact of a trauma-informed protocol for yoga, referred to generally as TIY or TSY.^{12,13,16,17,21,27} These studies used the principles and themes developed at the Trauma Center at JRI in Brookline, Massachusetts. The Trauma Center manualized its method of TSY as *Trauma Center Trauma-Sensitive Yoga (TCTSY)* (formerly the Trauma Center Yoga Program) and demonstrated the evidence base of TCTSY as a practice for survivors with chronic, treatment-resistant PTSD and complex PTSD.^{28,29}

The first pilot study completed on TCTSY (at the time referred to as the Trauma Center Yoga Program) randomly assigned 16 female participants with PTSD to either the TCTSY intervention (eight 75-minute weekly sessions) or a dialectical behavioral therapy (DBT) group. Participants were assessed on PTSD symptom severity, positive and negative affect, and body awareness.²¹ In that study, trauma survivors in the TCTSY group demonstrated decreases in

PTSD symptoms and increased positive affect.²¹ Additionally, compared to the DBT group, the TCTSY group experienced a “greater reduction in frequency of all PTSD symptoms and severity of hyperarousal symptoms, as well as greater gains in vitality and body attunement.”^{21, pp. 124–125} A follow-up to this initial pilot study employed another randomized control trial with a larger sample of 64 women with chronic, treatment-resistant PTSD who were randomly assigned to participate in either a TIY intervention or a “supportive women’s health education” class; that study examined changes in PTSD symptoms, emotion regulation, and depression.¹⁶ Both interventions met weekly for 1 hour for 10 weeks, and measures were given prior to starting the intervention, midway through the intervention, and postintervention. Both the TIY and control groups exhibited statistically significant decreases in PTSD symptoms from baseline to midtreatment; however, although the TIY group continued to show decreases from mid- to posttreatment, the control group relapsed. Also of interest is that in the TIY group 52% of the sample no longer met criteria for PTSD at the end of the intervention, whereas in the control group only 21% no longer met criteria for PTSD.¹⁶ Forty-nine participants from that study also participated in a long-term follow-up study conducted by Rhodes et al.¹⁷ in hopes of gaining insight into “whether the initial intervention and/or yoga practice after treatment was associated with additional changes” in PTSD, dissociative symptoms, depression, and tension-reducing behaviors. In that study, practicing yoga more often was linked with an increased likelihood of no longer meeting diagnostic criteria for PTSD when assessed roughly 1.5 years after the initial intervention concluded.¹⁷

In 2017, Price et al.²⁷ examined the potential benefits of a 20-week TCTSY intervention. Their nonrandomized study employed the same TCTSY intervention, used the same inclusion and exclusion criteria for participation, used the same teachers, and held the groups at the same site as van der Kolk and colleagues.¹⁶ However, Price et al.²⁷ chose to assess PTSD and dissociative symptoms, allowing them to test the effects of a longer TCTSY intervention (20 weeks compared to the original 10 weeks) with an added home practice component (30 minutes of TCTSY three times per week) on a population of women also with chronic, treatment-resistant PTSD. Compared to the 10-week TCTSY intervention, a higher percentage of participants (83%) no longer met criteria for PTSD 1 week after this extended treatment was complete; participants also experienced a greater decrease in PTSD symptomatology (51%).²⁷ Particularly noteworthy was a significant decrease in dissociative symptoms, suggesting that the extended intervention could be especially beneficial for survivors experiencing dissociation. (No such change was seen in the shorter-term

study.¹⁶) Although the sample was very small ($n = 9$, with 6 completing the intervention), based on the effect sizes Price and colleagues concluded that an extended TCTSY program was even more beneficial to women with complex PTSD than the previous 10-week program and that women in the study “experienced similar or higher levels of symptom reduction compared to other trauma-focused treatments (e.g., EMDR, PE, cognitive processing therapy).”^{27, p. 305}

In a pilot study examining the effect of a TSY intervention on PTSD symptoms, a sample of 38 women who met full or partial criteria for a DSM-IV diagnosis of PTSD were randomly assigned to either a yoga group or an assessment control group.¹³ That study employed a Kripalu-based style of yoga and followed the practices and principles of TCTSY. The yoga group met for 12 weekly or twice-weekly 75-minute yoga sessions and completed an assessment before each session as well as a postintervention assessment at the end of the final class and again at a 1-month follow-up. The control group met for 12 weekly sessions where they completed the same measures relating to PTSD, depression, and anxiety as the yoga group, but they did not do any yoga or other type of intervention; control-group participants did receive the same compensation as those in the yoga group. Although there were no statistically significant differences between the two groups, at posttest and 1-month follow-up the yoga group experienced clinically significant decreases in hyperarousal and re-experiencing (as measured by the PTSD Checklist–Civilian Version [PCL-C]), whereas the control group experienced decreases in anxiety (as measured by State-Trait Anxiety Inventory) and the PTSD symptoms cluster of re-experiencing (as measured by the PCL).¹³

Dick et al.¹² re-examined Mitchell et al.’s¹³ study to discover how yoga might reduce PTSD symptoms using measures that examined symptoms, emotion regulation, and mindfulness abilities. Their findings suggested that TSY had a positive effect on the emotion-regulation strategy of expressive suppression, meaning that participants were better able to manage difficult emotions when aroused.¹² In addition, at 1-month follow-up, these scholars found improvements in psychological flexibility, which they described as the ability to be present with thoughts and emotions without using avoidance strategies. These improvements were associated with changes in PTSD symptoms for the yoga group but not the control.¹²

Key Principles and Themes of Trauma-Sensitive Yoga

Several key principles central to TCTSY methods distinguish the practice from mainstream yoga. Among these principles is a strong emphasis on specific trauma-informed language and what the Trauma Center calls *invitatory language*.^{10,11,21} Invitatory language is meant to demonstrate to

students that everything the teacher or group facilitator offers is an invitation to explore, never a command or expectation.^{10,11,21} Specific qualifiers are prescribed before any yoga or mindfulness cue, for example, “If it’s comfortable for you,” “*You might* begin to notice your breath,” or “*When you’re ready, you’re welcome to fold forward any amount.*” In TCTSY, language is used to encourage interoception, choice, personal control over how one moves their body and directs their awareness, gentleness, curiosity, and nonjudgment.^{10,11,21} Given that “most traumas occur in the context of interpersonal relationships, which involve boundary violations, loss of autonomous action, and loss of self-regulation,”^{20, p. 7} the precision of language in TCTSY is of utmost importance.

Other key principles include lack of hands-on assists; co-creation of a safe, well-controlled environment with group participants; and teacher qualities such as competence with the TCTSY model, an engaging, open, and welcoming attitude, and an ability to be both directive and invitational.²¹ Lastly, the yoga forms chosen for a TSY class as well as the way they are presented can be quite distinct. In TCTSY, yoga forms (*asana*) are chosen for their accessibility to a wide range of practitioners and for their low likelihood of causing injury.¹⁰ How yoga forms are presented is also of great importance. Yoga forms are generally presented at a slow pace (although students are encouraged to move at a rhythm that works for them), variations and choices are commonly offered, and modifications with or without the use of props (e.g., chairs, blankets, blocks, bolsters) are encouraged to increase accessibility.^{10,11,21} These options are key to supporting students in moving away from physical or emotional pain or discomfort that they cannot yet tolerate. In a TSY class, it is common for every student to be doing something different.^{10,11,21}

TCTSY incorporates six themes. The first theme, *interoception*, is the backbone of TCTSY. Interoception, or the internal perception of sensation, helps survivors to: (1) become curious about and more familiar with their body sensations and cues; (2) pinpoint and describe specific physical sensations in specific areas of the body; (3) slowly increase tolerance for new and uncomfortable sensations; and (4) become aware of impulses to move or act based on sensed experience, in particular impulses to improve comfort and safety.¹¹ The second theme, *making choices*, supports survivors in restoring a sense of control over the body and aims to create a “structured, supportive and self-paced medium for survivors to make choices in relation to their bodies and their experience that are kind, gentle, and caring—all of the things that were missing during the trauma.”^{11, p. 44–45} The third theme, *safe, effective action*, provides survivors with the opportunity to: (1) regain a sense of self-efficacy, (2) notice their current experience and take action

to improve it, and (3) experiment with using the yoga practice to self-regulate.¹⁰ The fourth theme, *the present moment*, aims to help survivors find skills to access the potential freedom found in a “safe, positive, body-based present moment experience.”^{10, p. 45}

The penultimate theme of TCTSY is *muscle dynamics and breath*.¹¹ For some, trauma can lead to a feeling of disconnection or alienation from the body, such that physical sensations feel uncontrollable, confusing, or dangerous; are perceived as coming from the outside; and may feel generalized throughout the body.¹¹ This theme addresses these experiences by assisting survivors in: (1) becoming aware of muscle dynamics as internally generated, (2) experimenting with movement and breath and noticing resulting physical changes, and (3) focusing on specific parts of the body rather than on the whole body at once.¹¹ The final theme, *rhythm*, seeks to use repetitive and rhythmic movements (first independently and then in sync with other students) to help survivors restore a connection to the body’s natural biorhythms (e.g., pain, hunger, sleepiness), as well as to their internal sense of self and, ultimately, to other people.^{10,30}

Methods

The evidence suggests that TSY is a promising intervention with trauma survivors. However, we were unable to locate any published studies examining the potential benefits of TSY exclusively for survivors of sexual assault (referring here broadly to both adult and childhood sexual assault). As sexual assault is such a common type of trauma experience and results more commonly in PTSD,^{1,4} the current study aimed to shed light on the potential benefits of a TSY and mindfulness intervention for survivors of sexual assault. Additionally, as there are few studies on TSY, even in the broader trauma population, and the majority of these studies have small samples, the current study aimed to contribute valuable information on the benefits of TSY.

Context and Intervention

This study was conducted in collaboration with a community-based nonprofit that serves survivors of sexual assault and abuse in a metropolitan area. The nonprofit organization has adopted a broad definition of sexual assault and serves adolescents and adults who have experienced any type of unwanted sexual experience during their lifetimes. This organization offers a variety of direct client services, including case management, individual therapy, and group therapy.

One of the groups offered at this organization is “Being in Your Body: Yoga Therapy and Mindfulness Group” (BIB), a TIY group with a curriculum that follows the principles of TCTSY² and Judith Herman’s³¹ three-stage model

of trauma therapy. The group addresses each stage of the model, beginning with building safety by developing skills to manage dysregulation before moving on to the second stage of processing thoughts, emotions, and memories associated with the trauma, and concluding with the third stage of integration, where focus is on the present moment, reconnecting to self and others, and returning to a more expansive experience of life outside of the trauma.³¹

The curriculum used for the BIB group was created by registered yoga teachers who also hold master's degrees in social work and counseling. The elements of the BIB group are regularly updated to align with findings from research being conducted on the group. The present study examined the effect of the BIB group on survivors of sexual assault, specifically in the areas of mindfulness and emotion regulation, as changes in these abilities are believed to be a possible mechanism for change in symptoms related to PTSD.^{12,13,15,16}

The BIB intervention is a 9-week closed group that includes an orientation session followed by eight yoga and mindfulness sessions. Each yoga and mindfulness session is focused on a TCTSY theme such as "getting curious," "making choices," or "the present moment." Sessions last for 1.5 hours and are structured to include time for group members to complete a check-in/check-out worksheet, a brief verbal check-in and check-out with the group, brief discussion of the theme, and approximately 1 hour of yoga and mindfulness. Each session includes a directed mindfulness exercise, often related to the theme of the session, such as using five-sense awareness to ground in the present moment, skilled awareness of making choices to be more comfortable, breath training related to increasing or decreasing arousal in the body, and managing thoughts and emotions.

For this study, BIB group sessions were conducted by a pair of facilitators that always includes at least one Yoga Alliance Registered Yoga Teacher (200 hours or above) and at least one licensed clinician (i.e., licensed social worker or licensed clinical social worker). The group was typically run by one senior staff therapist and one intern therapist or new staff therapist; one took the primary role of teaching, while the other took the primary role of providing additional emotional support if needed, such as stepping out of the yoga room to check in verbally or provide support to regulate arousal for any of the group members. Intern therapists were always in their second year of graduate studies or beyond. All facilitators had completed a minimum 30-hour training on trauma-informed care with sexual assault survivors, which consisted of small-group lecture, discussion, practice sessions, and required outside readings from the seminal works on TSY.^{10,11,21}

Design, Recruitment, and Consent

This study employed a traditional quantitative one-sample pre- and posttest design. All study procedures were approved by the university's institutional review board (IRB). To maintain research participant anonymity and to allow group members to access the BIB group intervention without having to participate in the research, the principal investigator did not recruit or ever have contact with BIB group members. Instead, to facilitate sound clinical practice, participation in the BIB group is dependent on an individual's readiness as assessed between them and the clinician they work with at the agency.

Research participants entered the study in one of two ways. Prior to initiating the collaboration with the researchers, the community partner agency had collected administrative data as its standard practice for quality improvement. The agency partnered with the principal investigator as a means to access her analytic skills for gaining a more sophisticated understanding of the quality improvement data it collects. IRB approval allowed for the use of these existing, de-identified data for research. Subsequent BIB group attendees were invited to the research and completed informed consent procedures for anonymous use of their responses on the same pre-post measures that the agency employs as standard practice for its administrative data collection. The agency regularly administers the instruments used for this study as part of its internal quality improvement. Therefore, participants in the research study were not asked to do anything beyond what they already do and consent to at the agency, other than giving an additional informed consent for the researcher's use of their anonymous responses to the measures. Agency practitioners and staff entered the data from the measures to further ensure anonymity.

The principal investigator trained agency staff in procedures for recruitment and informed consent for the research. This maintained the privacy of the BIB group members and research participants, as only agency staff would know their identities and names and the investigator would only have access to the anonymous responses to the pre- and posttest measures. Recruitment of these research participants occurred at the initial informational meeting of the BIB group, when the facilitators explained the research and group members had the option to consent or not consent to allowing the investigator to access their de-identified data. Thus, access to the BIB group was not contingent on consenting to participation in the research. The vast majority of the BIB attendees consented to the anonymous use of their survey data for the research. However, to collect the data with the minimum possible infringement on the therapeutic process for the women in the group, we did not take

attendance or follow up to query women if they chose to not fill out the measures.

Participants were drawn from a total of 63 women who attended BIB groups between April 2013 and June 2017. Thirty-five of those women comprise the administrative data set the agency collected between April 2013 and August 2015, which was de-identified and provided to the researcher as noted above. Another 28 women who attended BIB groups between January 2016 and June 2017 were recruited and consented to participate in the study.

Measures

The survey items were drawn from two existing measures, which were chosen by the community partner prior to engaging with the principal investigator for this study: (1) Five Facet Mindfulness Questionnaire (FFMQ)³² and (2) Difficulties in Emotion Regulation Scale (DERS).³³ The

FFMQ comprises five subscales with a total of 39 items. Items are rated on a 5-point Likert scale, where 1 = never or rarely true and 5 = very often or always true; higher scores indicate a greater capacity for mindfulness. Baer et al.³² demonstrated the measure's internal consistency and construct validity in samples of meditators and nonmeditators. The DERS comprises six subscales with a total of 36 items. Items are rated on a 5-point Likert scale, where 1 = almost never and 5 = always; higher scores indicate less capacity for emotion regulation. Gratz and Roemer³³ validated the scale, demonstrating its test-retest reliability, internal consistency, and construct and predictive validity.

Data Collection

Pre- and posttest measures were administered by agency staff at the initial informational BIB group and again at the final group meeting. Measures took about 10 to 15 minutes

Table 1. FFMQ Pre- and Posttest Means, Standard Deviations, and Cronbach Alphas^a ($n = 37$)

		Pretest Mean (SD)	Posttest Mean (SD)	Pretest α	Posttest α
All items		42.77 (6.19)	49.34 (7.35)	0.835	0.815
Subscale: Describe experiences	I'm good at finding words to describe my feelings. I can easily put my beliefs, opinions, and expectations into words. I can usually describe how I feel at the moment in considerable detail.	9.35 (2.96)	10.72 (2.35)	0.901	0.852
Subscale: Not judge experiences	I criticize myself for having irrational or inappropriate emotions. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.	5.13 (2.07)	6.30 (2.09)	0.901	0.859
Subscale: Capacity to observe self	When I'm walking, I deliberately notice the sensations of my body moving. When I take a shower or bath, I stay alert to the sensations of water on my body. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing. I pay attention to how my emotions affect my thoughts and behavior.	15.18 (2.94)	17.51 (2.35)	0.543	0.625
Subscale: Act with awareness	When I do things, my mind wanders off and I'm easily distracted. I do jobs or tasks automatically without being aware of what I am doing. I'm easily distracted.	7.69 (2.01)	8.40 (2.06)	0.620	0.581
Subscale: Not react to inner experiences ^b	When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it. In difficult situations, I can pause without immediately reacting.	5.81 (1.35)	6.94 (0.90)	0.482	0.398

^aHigher scores = greater mindfulness.

^bNot used in analysis because of low Cronbach alpha.

FFMQ = Five Facet Mindfulness Questionnaire; SD = standard deviation.

Table 2. DERS Pre- and Posttest Means, Standard Deviations, and Cronbach Alphas^a (*n* = 37)

		Pretest Mean (SD)	Posttest Mean (SD)	Pretest α	Posttest α
All items		40.33 (10.62)	34.23 (9.78)	0.901	0.905
Subscale: Not accept emotions	When I'm upset, I become embarrassed for feeling that way. When I'm upset, I become angry with myself for feeling that way. When I'm upset, I feel like I am weak. When I'm upset, I feel guilty for feeling that way.	11.35 (4.46)	10.12 (4.09)	0.909	0.889
Subscale: Engage with goals	When I'm upset, I have difficulty getting work done. When I'm upset, I have difficulty thinking about anything else.	6.91 (1.87)	5.85 (1.83)	0.733	0.744
Subscale: Limited strate- gies to regulate emotions	When I'm upset, I believe that I'll end up feeling very depressed. When I'm upset, it takes me a long time to feel better.	6.33 (2.72)	5.38 (2.41)	0.563	0.819
Subscale: Lack of emo- tional clarity	I am clear about my feelings. I am confused about how I feel. I pay attention to how I feel.	5.9 (1.8)	5.08 (1.72)	0.626	0.618
Subscale: Lack of emotional awareness	When I'm upset, I acknowledge my emotions. When I'm upset, I believe that my feelings are valid and important. I care about what I am feeling.	10.58 (3.76)	8.47 (2.90)	0.883	0.813

^aLower scores = greater emotion regulation.

DERS = Difficulties in Emotion Regulation Scale; SD = standard deviation.

to complete. To reduce the burden of data collection on BIB group members, the agency, in collaboration with a previous researcher, chose to use 15 items from each of the measures for a total of 30 items. The survey items the agency chose cover each of the subscales for each measure and are noted in Tables 1 and 2.

The 15 items from the FFMQ showed strong reliability in the study sample ($\alpha = 0.835$ at pretest and $\alpha = 0.815$ at posttest). The majority of the subscale alphas for the FFMQ showed strong to acceptable reliability, with the exception of the “not react to inner experiences” subscale, which showed weak reliability and therefore was not used in the analysis. The 15 items from the DERS showed strong reliability in the study sample ($\alpha = 0.901$ at pre-test and $\alpha = 0.905$ at posttest). The majority of the subscale alphas for the DERS showed strong to acceptable reliability (Tables 1 and 2).

Note that typical guidelines for strength of Cronbach's alpha suggest the following: unacceptable = less than 0.60; poor = 0.60–0.69; acceptable = 0.70–0.79; good = 0.80–0.89; and excellent = greater than 0.89.³⁴ However, Cronbach's alpha near 0.60 is acceptable, especially when there are a small number of items in the scale or subscale.³⁵ When an alpha level is considered low or there are few items

in a scale, one also considers the average inter-item correlation as an assessment of reliability. The average inter-item correlations should range from at least 0.15 to 0.50.³⁶ Our study had several alphas that approached or were 0.60; given that these subscales have few items, we assessed the average inter-item correlations before deciding whether they were worthy of use in our analysis. In our study, the subscales with the alphas approaching or at 0.60 all had average inter-item correlations that meet the acceptable range (pretest capacity to observe = 0.220, posttest capacity to observe = 0.246; pretest act with awareness = 0.410, posttest act with awareness = 0.314; pretest limited strategies to regulate emotions = 0.494, posttest limited strategies to regulate emotions = 0.709; pretest lack of emotional clarity = 0.450, posttest lack of emotional clarity = 0.454).

Results

Analysis

All analyses were conducted in SPSS (version 24). Data were entered by agency staff into Excel spreadsheets and provided to the principal investigator in password-protected files that were imported into SPSS. Descriptive statistics were conducted on the sample, and Cronbach's alpha was

run for each measure and its subscales (Tables 1 and 2). Paired *t* tests were run to investigate change on each measure from pre- and posttest data (Tables 3 and 4).

Sample

Data were available for a total of 63 participants ($n = 35$ from administrative data, $n = 28$ from research data). Twenty-six of the participants did not complete the posttest, so analysis was conducted on the sample of 37 who had completed both pre- and posttest measures. There were no statistically significant differences between the sample of 37 and the 26 participants who had not completed the posttest. There were no statistically significant differences by race or age on any of the measures. Gender was not run because the entire sample identified as female.

The majority of the sample ($n = 37$) identified as White (67.6%), followed by Latina (13.5%), African American (8.1%), multiracial (5.4%), and other (2.7%), with the race data missing for one participant. The mean age of participants was 29 years (standard deviation [SD] 8 years, range 18–56 years).

Because there were changes in clinical staff who ran the BIB groups from April 2013 to August 2015 and those who ran the groups from January 2016 to June 2017, independent *t* tests were also run to assess potential differences between the participants who attended the BIB groups during these two periods. Results showed no statistically significant differences on any of the measures at either pre- or posttest, except for one item from the DERS subscale: The mean score on the impulse item “I experience my emotions as overwhelming and out of control” was larger at pretest for participants who attended BIB groups from April 2013 to August 2015 (3.58, SD 1.1) than for those who attended BIB groups from January 2016 to June 2017 (2.67, SD 0.94). Higher scores on the DERS indicate less capacity for emotion regulation, so those who attended BIB groups in 2013 to 2015 reported less capacity for impulse control at pretest than those who attended the groups in 2016 to 2017 ($[t(60) = 3.442, p = 0.001]$; confidence interval [CI] 0.38101 to 1.438). At posttest, there were no statistically significant differences between these two groups on the mean score for the impulse item. However, given that there

Table 3. Paired *t* Test Results for FFMQ Subscales

Subscale	Pretest Mean (SD)	Posttest Mean (SD)	<i>t</i> Value, Degrees of Freedom	<i>p</i> Value	Confidence Interval
Describe experiences	9.35 (2.96)	10.72 (2.35)	$[t(36) = -4.271]$	0.000	-2.03 to -0.723
Not judge inner experiences	5.13 (2.07)	6.30 (2.09)	$[t(35) = -4.237]$	0.000	-1.93 to -0.679
Capacity to observe self	15.18 (2.94)	17.51 (2.35)	$[t(35) = -5.142]$	0.000	-3.622 to -1.57
Act with awareness	7.69 (2.01)	8.40 (2.06)	$[t(35) = -1.701]$	0.098	-1.34 to 0.118
Not react to inner experiences ^a	5.81 (1.35)	6.94 (0.90)			

^aNot used in analysis because of low Cronbach alpha.

FFMQ = Five Facet Mindfulness Questionnaire; SD = standard deviation.

Table 4. Paired *t* Test Results for DERS Subscales

Subscale	Pretest Mean (SD)	Posttest Mean (SD)	<i>t</i> Value, Degrees of Freedom	<i>p</i> Value	Confidence Interval
Not accept emotions	11.35 (4.46)	10.12 (4.09)	$[t(34) = 2.066]$	0.047	0.019 to 2.35
Engage with goals	6.91 (1.87)	5.85 (1.83)	$[t(34) = 3.515]$	0.001	0.482 to 1.80
Limited strategies to regulate emotions	6.33 (2.72)	5.38 (2.41)	$[t(33) = 3.141]$	0.004	0.378 to 1.76
Lack of emotional clarity	5.9 (1.8)	5.08 (1.72)	$[t(34) = 2.867]$	0.007	0.224 to 1.31
Lack of emotional awareness	10.58 (3.76)	8.47 (2.90)	$[t(32) = 3.351]$	0.002	0.748 to 3.06

DERS = Difficulties in Emotion Regulation Scale; SD = standard deviation.

were differences between the groups at pretest, the impulse item was omitted from the analysis.

Paired *t* Tests

Mean scores on the overall FFMQ were statistically significantly different from pretest (42.4, SD 5.9) to post-test (49.04, SD 7.2; [$t(34) = -6.212, p = 0.000$]; CI -8.77 to -4.45). Subscale mean scores also indicated statistically significant differences from pre- to posttest, with the exception of the “act with awareness” subscale (Table 3).

Mean scores on the overall DERS were statistically significantly different from pretest (40.12, SD 10.84) to posttest (34.63, SD 9.64; [$t(17) = 3.899, p = 0.000$]; CI 2.61 to 8.35). Subscale mean scores also indicated statistically significant differences from pre- to posttest, with the exception of “not accepting emotions,” although this approached significance with the p value at 0.047 (Table 4).

Discussion

The findings from this study suggest that TIY delivered in a community-based setting promotes well-being in sexual assault survivors. Participants demonstrated significant growth in their capacity to practice skilled awareness as measured by the FFMQ, including their ability to observe themselves in the present moment, describe their experiences, and practice nonjudgment. As measured by the DERS, findings also suggest that after participation in a TIY group, participants were better able to regulate their emotions, felt clearer about their emotions, engaged less in avoidance of their emotions, and grew in their ability to maintain goal-oriented behaviors even when upset.

As stated previously, van der Kolk²⁰ proposed three qualities of successful PTSD treatment. Evidence from the present study suggests that TIY may fulfill at least two of these recommended qualities, including supporting survivors in developing familiarity with their present-moment internal experiences and sensations (as evidenced by changes in the FFMQ subscales “capacity to observe self” and “describe experiences”) and cultivating skills for self-regulation (as evidenced by changes in the DERS subscales “limited strategies to regulate emotions” and “engage with goals”). However, there was no evidence from our study that TIY fulfills van der Kolk’s third quality of successful treatment, taking deliberate actions to address present-moment needs (as evidenced by the lack of statistically significant changes from pre- to posttest in the FFMQ subscale “act with awareness”).

Furthermore, the results of the current study align with the findings of Dick et al.,¹² suggesting that participation in TIY leads to improvements in emotion regulation and skilled awareness and to decreases in emotional avoidance, which in turn may be associated with decreases in PTSD

symptomatology. Although our study did not have access to direct measures of PTSD (e.g., PCL-5,³⁷ PCL-C,³⁸ Clinician-Administered PTSD Scale [CAPS]³⁹), other researchers demonstrated statistically significant relationships between subscales of the FFMQ and the PCL-C⁴⁰ and between the DERS³ and CAPS.⁴¹

This study provides evidence that mindfulness and emotion regulation skills, which are proposed by Mitchell and colleagues¹³ to be key to the resolution of traumatic memories, are increased through the practice of TIY. Those authors suggested that as trauma survivors become more skilled in attending to their present-moment experiences (skilled awareness) they will also become adept at recognizing and accepting their emotions as they arise (emotion regulation skills) and engage less in emotional avoidance, which is known to impede the processing of traumatic memories thought to be key to PTSD resolution.^{13,17}

Lastly, this study provides preliminary support for the use of a TCTSY protocol with survivors of sexual assault. Although previous studies have demonstrated promising evidence for the use of TIY with trauma survivors in general, the current study demonstrates that engagement in a TCTSY protocol was beneficial for survivors of sexual assault specifically. In a context in which existing trauma treatments (e.g., EMDR, exposure-based therapies, and cognitive behavioral therapies) are not wholly effective for treating PTSD, TIY, such as the BIB group examined in this study, may offer an important alternative. However, given our small sample and absence of a control group, further studies are needed to determine a clear view on the effectiveness of TIY.

Limitations

The findings from our study must be considered in the context of its limitations. Without a comparison group, our one-sample pre- and posttest design cannot rule out other reasons why the participants demonstrated statistically significant changes in mindful awareness and emotion regulation. In addition, there were no checks for fidelity across the different administrations of the intervention. However, the groups were run consistently by the individual who developed the protocol and by the individual she trained. Missing data is also a limitation for the study, although there were no statistically significant differences between the study sample of 37 and the 26 participants who had not completed the posttest. Another limitation is related to absence of attendance tracking and completion rates in our study. To honor the natural setting of the agency and collect the data with the minimum possible infringement on the therapeutic process for the women in the group, we did not take attendance or follow up to query women if they chose to not fill out the posttest.

In addition, our study is limited by being solely quantitative and therefore omitting participants' perspectives on their experiences of the process and the intervention's strengths and challenges. Future studies that employ qualitative and/or mixed methods would facilitate a broader picture of the effects of TSY with sexual assault survivors in community-based settings.

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Conflict-of-Interest Statement

There are no conflicts of interest related to this manuscript.

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