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# The differential impact of two mindfulness components among veterans with posttraumatic stress disorder

## Abstract

There is a dearth of empirical research on mindfulness interventions specific to veterans with Posttraumatic Stress Disorder. Of the studies that have been published, most are cross-sectional, have small sample sizes, low statistical power, and used non-randomized designs or no control group. Additionally, dismantling designs employed to discern which specific aspects of mindfulness-based interventions lead to positive outcomes, and subsequently, determine the active ingredients involved in the positive outcomes are lacking. The purpose of this randomized controlled trial was to: a) assess the differential impact of two common components of mindfulness meditation (body scan [BS] and mindful breathing [MB]) on trait and state mindfulness and treatment outcomes compared to an intervention without mindfulness (slow breathing [SB]), and a non-intervention control group (sitting quietly [SQ]); b) explore if changes in mindfulness facets would predict posttreatment outcomes in depression and PTSD for individuals who participated in a mindfulness intervention; and c) investigate if the mindfulness intervention grouping variable (BS v. MB) would moderate the relationship between pre-posttreatment changes in mindfulness facets and posttreatment outcomes in depression and PTSD among a sample of veterans diagnosed with PTSD. Results revealed that BS and MB interventions generally resulted in greater improvements than SB and SQ. Additionally, among participants in a mindful intervention (BS and MB), changes in Nonreactivity, Non-judging, and Acting with Awareness were significant predictors of posttreatment depression. Furthermore, mindfulness group (BS v. MB) moderated the relationship between change in Nonreactivity and post-treatment depression and the relationship between change in Acting with Awareness and post-treatment depression. Simple slope analyses revealed that change in Nonreactivity was a statistically significant predictor of posttreatment depression in the MB group ( $\beta = .64, p = .003$ ), but not in the BS group ( $\beta = -.12, p = .58$ ), whereas change in Acting With Awareness was a significant predictor of post-treatment depression in the BS group ( $\beta = .41, p = .05$ ), but not in the MB group ( $\beta = .20, p = .38$ ). The clinical effects of specific components of mindfulness interventions, as well as the discrete mechanism of action within an intervention, will be discussed.

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THE DIFFERENTIAL IMPACT OF TWO MINDFULNESS COMPONENTS AMONG  
VETERANS WITH POSTTRAUMATIC STRESS DISORDER

A THESIS

SUBMITTED TO THE FACULTY

OF

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BY

DANA DHARMAKAYA COLGAN

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## Abstract

There is a dearth of empirical research on mindfulness interventions specific to veterans with Posttraumatic Stress Disorder. Of the studies that have been published, most are cross-sectional, have small sample sizes, low statistical power, and used non-randomized designs or no control group. Additionally, dismantling designs employed to discern which specific aspects of mindfulness-based interventions lead to positive outcomes, and subsequently, determine the active ingredients involved in the positive outcomes are lacking. The purpose of this randomized controlled trial was to: a) assess the differential impact of two common components of mindfulness meditation (body scan [BS] and mindful breathing [MB]) on trait and state mindfulness and treatment outcomes compared to an intervention without mindfulness (slow breathing [SB]), and a non-intervention control group (sitting quietly [SQ]); b) explore if changes in mindfulness facets would predict posttreatment outcomes in depression and PTSD for individuals who participated in a mindfulness intervention; and c) investigate if the mindfulness intervention grouping variable (BS v. MB) would moderate the relationship between pre-posttreatment changes in mindfulness facets and posttreatment outcomes in depression and PTSD among a sample of veterans diagnosed with PTSD. Results revealed that BS and MB interventions generally resulted in greater improvements than SB and SQ. Additionally, among participants in a mindful intervention (BS and MB), changes in Nonreactivity, Non-judging, and Acting with Awareness were significant predictors of posttreatment depression. Furthermore, mindfulness group (BS v. MB) moderated the relationship between change in Nonreactivity and post-treatment depression and the relationship between change in Acting with Awareness and post-treatment depression. Simple slope analyses revealed that change in Nonreactivity was a statistically significant predictor of posttreatment depression in the MB group ( $\beta = .64, p = .003$ ),

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Key Words: mindfulness, veterans, posttraumatic stress syndrome, depression, body scan, mindful-breathing

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## **Introduction**

Posttraumatic Stress Disorder (PTSD) is a serious and pervasive public health issue. In 2005, approximately 7.7 million American adults met the Diagnostic and Statistical Manual for Mental Disorders (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association [APA], 2000) diagnostic criteria for PTSD (Kessler et al.). The US Department of Veterans Affairs (2011) estimates that 3.5% of the general population meets diagnostic criteria for PTSD, compared with estimates of 31% of Vietnam veterans, 10% of Gulf War veterans, 22% of Operation Enduring Freedom (OEF) veterans, 8% of Operation Gothic Serpent veterans (deployed to Somalia), and 20% of Operation Iraqi Freedom (OIF) veterans (Seal et al., 2009). From 2001 to 2008 the rate of PTSD in OEF and OIF veterans increased dramatically from 0.2% to 21.8% (Seal et al., 2009). Mindfulness and acceptance-based behavioral therapies have shown promise in the treatment of social phobia (Dalrymple & Herbert, 2007) and generalized anxiety disorder (Roemer et al., 2008). Additionally, several treatment outcome studies (Kearney et al., 2012; Kimbrough et al., 2010; Niles et al., 2011; Owens et al., 2012) and retrospective analyses of dispositional mindfulness in trauma survivors (Vujanovic et al., 2009; Wahbeh et al., 2011) suggest that adjunctive mindfulness treatments may effectively decrease symptoms associated with PTSD. However, retrospective analyses and current outcome studies have been unable to make conclusions about which individual elements or combinations of components of mindfulness are most impactful. Knowing the specific effects of each facet of mindfulness would allow clinicians to prescribe appropriate types of meditation and tailor elements of the mindful-based intervention to match the individual being treated.

## **Review of the Literature**

### **Veterans with Posttraumatic Stress Disorder**

Individuals with PTSD suffer debilitating symptoms, which often persist for decades (Kessler, Borges, & Walters, 1999). Clinical hallmarks include recurrent, intrusive recollections or re-experiencing of the traumatic event, avoidance of external or internal cues that can trigger re-experiencing, emotional numbing, and hyperarousal. Additional symptoms consist of distractibility, hypervigilance, irritability or outbursts of anger, disruption of sleep patterns, and exaggerated startle response (APA, 2013). Moreover, individuals with PTSD often experience a host of related difficulties, including discord in interpersonal relationships, reduction in work abilities, increased risk of medical disorders, chronic pain, psychiatric illnesses, substance abuse, and suicide; all of which contribute to the substantial personal and societal cost of PTSD (Hoge et al., 2004; Institute of Medicine, 2010; Kang & Bullman, 2008; Marshall, Panuzio, & Taft, 2005; McDevit-Murphy, Murphy, & Monahan, 2010; Possemato, Wade, Andersen, & Ouimette, 2010; Sharp, 2004; Stevanovic, Franciskovic, Klaric, & Rebic, 2012). Some have estimated that PTSD has a greater effect on quality of life than other mental illnesses, such as major depressive disorder or obsessive compulsive disorder (Davidson, Stein, Shalev, & Yehuda, 2004), and the estimated annual economic expense of PTSD is \$45 billion (Marciniak, 2005).

The Department of Veterans Administration (VA) and Department of Defense (DOD) practice guidelines endorse the use of empirically supported psychotherapeutic treatments for PTSD (Clinical Practice Guidelines for Management of Post-Traumatic Stress, 2010). These guidelines suggest Stress Inoculation Therapy (SIT), Prolonged Exposure (PE), Cognitive Processing Therapy (CPT), and Eye Movement Desensitization and Reprocessing (EMDR) are the most effective treatment for PTSD. These treatments typically include psychoeducation, anxiety management, exposure, relaxation, breath retraining, and cognitive restructuring.

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Estimates are that approximately 50% of individuals who receive these evidence-based treatments improve (Bradley, Greene, Russ, Dutra, & Westen, 2005).

Despite evidence of efficacy and effectiveness for these treatments, collectively they also have a number of limitations. For example, in the general population, the reported average dropout rate from PTSD treatments is 20.5% from Cognitive Therapy, 22.1% from SIT, 26.9% from a combination of exposure and other CBT techniques, and 18.9% from EMDR (Hembree, Cahill, & Foa, 2004). Similarly, between 2002 and 2008, less than 30% of the more than 230,000 OEF and OIF war veterans who sought PTSD treatment completed the intervention (Seal et al., 2010). It has been suggested that many veterans who seek therapy have limited adaptive and coping skills and struggle to engage effectively in emotional and cognitive processing, which may contribute to reported high attrition rates (Becker & Zayfert, 2001). Moreover, approximately half of the military personnel and veterans with a diagnosable PTSD do not seek treatment (Tanielian, 2008). Stecker (2013) identified four primary concerns among OEF and OIF veterans diagnosed with PTSD who refused to seek treatment: (1) concerns about treatment, (2) concerns regarding emotional readiness, (3) stigma of receiving mental health services, and (4) logistical issues.

Additionally, it is estimated that 30% to 60% of individuals engaged in empirically based treatments for PTSD did not reduce their symptoms (Bradley et al., 2005; Hembree et al., 2003). Relatedly, Lombardo (2005) demonstrated that although cognitive-behavioral treatments attempt to reduce the specific symptoms of PTSD, they fail to address the entirety of the polysymptomatic presentation.

Given the limitations with existing PTSD treatments, it is imperative to rigorously evaluate the current standard of care and investigate novel treatment modalities. In response, the

DOD and VA recommended augmenting empirically based treatments with other evidence-based interventions (Lang, 2012). The DOD and VA's practice guidelines suggest Complementary and Alternative Medicines (CAM) may facilitate more engagement in care and should be considered (Clinical Practice Guidelines for Management of Post-traumatic Stress, 2010). These guidelines coincide with increasing acceptance of utilizing CAM modalities (e.g., meditation, yoga, and mindfulness) among the general U.S. population over the last decade (Barnes, Bloom, & Nahin, 2008). Nearly 38% of U.S. adults use CAM approaches to manage a range of physical and emotional health concerns, including trauma, pain, anxiety, and depression (Barnes et al., 2008; Unutzer et al., 2000). This trend is reflected in the White House Commission report on CAM that highlighted the need for continued rigorous research regarding these approaches (Gordon, 2002). These practices deserve careful evaluation and may hold promise as either adjunctive or primary PTSD therapies. As an example of a novel intervention, there is mounting theoretical and empirical literature suggesting that mindfulness-based interventions may be effective in ameliorating PTSD symptoms (Boden et al., 2012; Kearny, McDermott, Malte, Martinez, & Simpson, 2013; Orsillo & Batten, 2005; Owens et al., 2012; Smith et al., 2012; Thompson & Waltz, 2010; Vujanovic, Niles, Potter, Pietrefesa, & Schmertz, 2011; Wahbeh, Lu, & Oken, 2011).

### **The Construct of Mindfulness**

The construct of mindful-awareness originated in the earliest Buddhist texts. In Buddhist contexts, mindfulness, or Sati, is defined as remembering, nonfading, and non-forgetting (Payutto, 1971). In the Discourse on the Establishment of Mindfulness, the Buddha teaches the gradual development of mindfulness through four applications: mindfulness of body, feelings, mind, and finally phenomena. Mindfulness is characterized as a moment-to-moment awareness

of an individual's perceptible mental states; a phenomenological process oriented toward a gradual understanding of an individual's direct experience (Grossman, 2011) devoid of thinking about, comparing, judging, or evaluating the content. Although there is still a lack of consensus regarding the conceptualization of mindfulness in the western scientific community, a commonly cited definition of mindfulness is "the awareness that emerges by way of paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2002, p. 732). Two salient components of mindfulness are a) an intentional regulation of attention to and awareness of the present moment and b) a non-judgmental and a curious willingness to experience the content (thoughts, sensations, and feelings) of the present moment (Bishop et al., 2004). Cultivating an awareness of the present moment with an attitude of acceptance and curiosity alters the relationship and interaction with the distressing content, rather than changing the content itself.

Underlying this construct, are four assumptions: (a) individuals are ordinarily mostly unaware of their moment-to-moment experience, often operating in an "automatic pilot" mode, (b) individuals are capable of developing the ability to sustain attention to mental, emotional, and physical content, determining how to allocate attention, and increasing cognitive flexibility, (c) regular practice is necessary to develop this skill, and (d) moment-to-moment awareness of true experience provides a more vibrant and meaningful sense of life (Bodhi, 2011).

### **Mindfulness and Western Healthcare**

The empirical study and clinical application of mindfulness has been rapidly expanding over the last several decades. Western medicine and psychology began integrating mindfulness to treat psychophysiological and stress-related disorders in the early 1980's. This treatment became known as mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982). MBSR is an

8-week skills-based program led by an instructor in a classroom format. Sessions include psychoeducation regarding stress, cognition, and health. The primary emphasis is to acquire attentional control and receptive awareness by focusing internally (on bodily sensations, breath, thoughts, emotions) and externally (on sights, sounds) on the present moment. This attentional control is taught through an assortment of meditative techniques, such as breath meditation, body scan, sitting and walking meditations, and gentle yoga. The body scan meditation is an exercise in which attention is directed sequentially to numerous areas of the body and is intended to cultivate a nonjudgmental awareness of physical sensations, cognitions, and emotions (Kabat-Zinn, 1985). Sensations in each area are carefully observed with a particular consideration to perceive sensation rather than think about sensation. As the mind becomes distracted, attention is gently returned to the physical sensations arising and dissolving within that moment (Baer, 2006). Mindful-breathing is also a common component of mindfulness. In this practice, the attention rests on the physical sensations associated with breathing. When the mind wanders to something other than the breath, the focus is gently returned to the sensations of breathing.

There is robust scientific evidence to support the beneficial effects of MBSR on medical conditions, including Type 2 diabetes (Rosenzweig et al., 2007), fibromyalgia (Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007), rheumatoid arthritis (Pradhan et al., 2007) and attention-deficit hyperactivity disorder (Zylowska et al., 2008). MBSR has also demonstrated effectiveness in the treatment of anxiety disorders, depression, and PTSD (Grossman et al., 2004; Kabat-Zinn, Massion, Kristeller, & Peterson, 1992; Ramel, Goldin, Carmona, & McQuaid, 2004).

Other treatment protocols soon followed with successful results. Dialectical Behavior Therapy (DBT; Linehan, 1993) was originally developed for borderline personality disorder and



related problems. Mindfulness skill-building is integrated into DBT in the form of three "what" skills (observing, describing, and participating), and three "how" skills (taking a nonjudgmental stance, focusing on one thing in the moment, and being effective). DBT has been found to be a useful adjunct to empirically supported PTSD-specific treatments to address difficulties with emotion regulation and tolerance for distress (Wagner & Linehan, 2006).

Acceptance Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) was developed out of relational frame theory. The goal of ACT is to increase psychological flexibility and empower value-driven behavior change. In ACT, therapists employ mindfulness skills to help clients reduce experiential avoidance and increase their willingness to experience uncomfortable or distressing emotional and mental content, ultimately increasing cognitive flexibility. PTSD symptoms such as intrusive thoughts, reoccurring memories, and associated distressing emotional states are met with awareness, acceptance, and non-judgmental attitude. Controlled trials are currently underway to evaluate the efficacy of ACT as a stand-alone treatment for PTSD.

Mindfulness Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002) consists of an eight-week group treatment that draws upon mindfulness skills and cognitive-behavior therapy techniques with the goal of reducing the risk of depressive relapse. Decreased rumination through the development of metacognitive awareness is the suggested key mechanism. Individuals are invited to be aware of everyday occurrences and allow thoughts to occur without trying to avoid or suppress them. Due to the high comorbidity of PTSD and depression, MBCT could be beneficial for individuals with PTSD.

### **Theoretical and Empirical Evidence for the Application of Mindfulness**

The theoretical and empirical literature suggest that mindfulness-based interventions have the capacity to reduce PTSD symptoms (Follette et al., 2006; Hölzel et al., 2011; Kearney et al., 2012; Kimbrough et al., 2010; Niles et al., 2011; Owens et al., 2012; Roemer & Orsillo, 2009; Sullivan-Kalil, Treanor, Roemer, 2013; Treanor, 2011; Vujanovic et al., 2010 ; Wahbeh et al., 2011). The theoretical model for the development and maintenance of PTSD symptomatology from a mindfulness- and acceptance-based treatment perspective suggests that experiential avoidance is a critical factor. Experiential avoidance is the tendency to attempt to alter the form, frequency, or situational sensitivity of historically produced private experience (emotions, thoughts, bodily sensations) even when attempts to do so cause psychological and behavioral harm (Dahl, Plumb, Stewart, & Lundgren, 2009). Habitual patterns to avoid trauma related thoughts, emotions, and memories lead to the core symptoms of PTSD, including avoidance of external or internal cues that can trigger re-experiencing, emotional numbing, and hyperarousal. Mindfulness is the antitheses of experiential avoidance (Follette et al., 2006).

Based on a review of the existing literature, it appears there may be at least five pathways through which mindfulness reduces PTSD symptomatology. First, mindfulness cultivates a willingness or acceptance of distressing internal experiences. Instead of avoiding, mindfulness invites individuals to approach the unfolding of moment to moment perceptions (i.e., emotions, thoughts, bodily sensation) with a sense of curiosity, openness, and gentleness. This accepting stance may increase the tolerance of unpleasant images, feelings, mental dialogue, and awareness of trauma-related internal or external cues (Vujanovic et al., 2011). Similarly, mindfulness may serve as a cognitive-affective exposure (Baer, 2003), which allows an individual to recognize the transient nature of the distressing signals or experiences, potentially decreasing experiential

avoidance behaviors (Baer, 2003; Thompson et al., 2011). In a related study, Garland and Roberts-Lewis (2013) found thought suppression, rather than extent of trauma history, significantly predicted PTSD severity, and that dispositional mindfulness was inversely associated with PTSD symptoms. More specifically, they found that mindfulness and thought suppression combined to explain nearly half of the variance in PTSD symptoms, and that the inverse association between dispositional mindfulness and post-traumatic stress symptoms was mediated by thought suppression. Consistent practice in mindfulness exercises may decrease PTSD avoidant behavior and thought suppression, targeting the core maintenance factor of the disorder (Foa, Riggs, Massie, & Yarczower, 1995; Vujanovic et al., 2011).

Second, regular mindfulness practices are associated with decreased physiological arousal and stress reactivity (e.g., Delizonna, Williams, & Langer, 2009). People with PTSD experience symptoms of increased arousal and sympathetic nervous system hyperactivity that were not present before the trauma including hypervigilance, disturbed sleep patterns, irritability, outbursts of anger, and exaggerated startle response (APA, 2013; Pole, 2007). When presented with a triggering traumatic event, individuals with PTSD experience an abnormal stress response to the trigger compared to control groups (Cohen et al., 2000; Wahbeh et al., 2011). The amygdala is proposed to play a central role in the stress response, specifically in the recognition of stressful and threatening stimuli (Hasler et al., 2007; LeDoux, 2000). Although the amygdala is a useful function for fear-related learning (Sapolsky, 2003; Shors & Mathew, 1998), prolonged exposure to stress increases the risk of exaggerated amygdala function. This exaggerated amygdala has been found in trait anxiety (Stein et al., 2007), PTSD (Rauch et al., 2000; Shin et al., 2005), and impulsive aggression (Coccaro et al., 2007). Preliminary evidence indicates that a mindfulness practice contributes to the regulation of the amygdala functioning, as well as the

extinction of conditioned fear responses—a process which is abnormal in individuals with PTSD (Holzel et al., 2011). Relatedly, Wahbeh et al. (2011) suggested a mindfulness practice may influence emotional regulation by improving overall prefrontal cortex functionality and providing more effective emotional regulation generated by the amygdala.

Others have suggested that mindfulness leads to a distanced or decentered relationship with one's internal and external experiences leading to decreased emotional reactivity (Desrosiers, Klemanski, & Nolen-Hoeksema, 2013; Hayes & Feldman, 2004). In addition, mindfulness cultivates a greater sensitization to bodily cues (e.g., breathing rate, heart rate) that may provide individuals with the necessary awareness to self-regulate more effectively (Brown & Ryan, 2003). A cross-sectional study suggested that the relationship between observing and symptoms of depression and anxiety depended on the capacity to observe non-reactively, which may influence the symptoms directly or indirectly through cognitive emotional regulation strategies (Desrosiers et al., 2013).

Third, individuals trained in mindfulness may refine their ability to control allocation of their attention (Lang et al., 2012). For example, persons with heightened anxiety tend to overallocate attention to pathways that convey threat (Williams et al., 1996). Derryberry and Reed (2002) suggest that problems arise because individuals with anxiety have difficulty disengaging from a threat, leading to escalating anxiety reaction. Other individuals with anxiety have difficulty disengaging from a source of safety, leading to avoidant or dependent reactions. Individuals who can disengage more easily take appropriate advantage of both threat and safety related information (Derryberry & Rothbart, 1997; Roghtbart & Derryberry, 1994). Frewen et al. (2008) found that individuals with greater levels of mindfulness reported a greater a capacity to “let go” of their thoughts. These individuals perceived negative thoughts as more controllable,

less intrusive, thereby increasing cognitive flexibility which allows for more allocation of attention to adaptive lines of thought, problem solving, and courses of action. Moreover, mindfulness has been associated with reduced rumination (Grabovac et al., 2011; William, 2008), and Bennett and Wells (2010) found that rumination mediates the relationship between beliefs about the trauma memory and PTSD symptoms, suggesting rumination might be an additional mechanism through which mindfulness could influence PTSD symptoms.

Fourth, mindfulness may also reduce symptoms of PTSD by enhancing exposure and extinction processes (Treanor, 2011), which are considered salient aspects of PTSD treatment (Foa et al., 1995). Theories of classical conditioning suggest that the strength of conditioning is governed by several factors including the salience of the conditioned (CS) and unconditioned stimuli (US), and the magnitude and unexpectedness of the US (Rescorla & Wagner, 1972). Multiple conditioned exciters assist to facilitate extinction by “over-predicting” occurrences of the unconditioned stimuli, therefore increasing the discrepancy between what is expected and what occurs (Rescorla, 2006). Mindfulness has been associated with an increased receptive awareness; an ability to detect multiple stimuli while simultaneously maintaining awareness of a target stimulus (Lutz et al., 2009). Therefore, mindfulness may positively impact extinction learning through increased awareness of the CS and the multiple conditioned exciters while maintaining primary salience of a target stimulus. Furthermore, when pairing mindfulness with exposure processes, the process of mindfulness may be associated with the extinction context and may act as a retrieval cue to mitigate the return of the fear (Treanor, 2011).

Lastly, the National Center for PTSD suggested that integrating mindfulness skills into existing empirically supported therapies may enhance treatment outcomes by increasing the individual’s ability to engage in, prepare for, and comply with the therapeutic process

(Vujanovic et al., 2010). It has been suggested that introducing a mindfulness practice prior to treatment may attract clients who do not pursue evidence-based treatments or cannot tolerate them (Becker & Zayfert, 2001; Follette & Vijay, 2009). This practice may facilitate improved symptoms and activate engagement with a therapist or treatment process. Patients utilizing mindfulness skills during treatment may be better able to persist through trauma processing and thus benefit more fully from exposure-based treatments (Vujanovic et al., 2010.)

In summary, mindfulness-based interventions for PTSD have demonstrated a number of empirical benefits, including: a) increased willingness to tolerate distressing internal events, and a subsequent reduction in experiential avoidance and thought suppression, b) decreased physiological arousal, c) improved emotion regulation, d) greater ability to effectively allocate attention, e) enhanced exposure and extinction processes, and e) preparation for individuals to engage with the therapeutic process (Follette et al., 2006; Hölzel et al., 2011; Shapiro et al., 2006; Vujanovic et al., 2010). As a result, VA clinics around the country are beginning to employ mindful-based interventions in individual or group formats for the treatment of PTSD and a wide variety of other mental disorders.

### **Mindfulness and Trauma**

Although interest and utilization of mindful-based interventions for individuals who have experienced trauma is increasing, in a review of the literature we identified only five published cross-sectional studies investigating the relationship between mindfulness and PTSD symptoms in nonclinical, trauma-exposed populations. In a sample of 124 firefighters, Smith et al. (2011) found that greater mindfulness skills were correlated with fewer PTSD symptoms, depressive symptoms, physical symptoms, and alcohol problems. Similarly, Bernstein, Tanay and Vujanovic (2011) found that levels of mindful attention and awareness, measured with the

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003), were significantly and negatively associated with posttraumatic stress symptom severity, psychiatric multi-morbidity, anxious arousal, and anhedonic depression symptoms, even when the number of traumatic event types were taken into account.

Among a sample of 239 adults who endorsed exposure to traumatic life events, Vujanovic et al. (2009) found a significant, negative relationship between posttraumatic stress symptoms and both the Acting with Awareness and Nonjudgmental Acceptance subscales of the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2006). Most importantly, the nonjudgmental acceptance subscale demonstrated incremental negative associations with each of the posttraumatic stress symptom clusters (avoidance, intrusive thoughts and re-experiencing, and hyperarousal). The effects were above and beyond the variance accounted for by negative affectivity and number of trauma types experienced. The Acting With Awareness subscale was incrementally and negatively associated with only the re-experiencing symptom cluster. Similarly, Thompson and Waltz (2010) found that the Nonjudgmental Acceptance subscale of the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008) negatively incrementally predicted PTSD avoidance symptoms, over and beyond experiential avoidance among a sample of undergraduate students. Finally, among a student sample, the ability to describe emotional experiences was uniquely associated with lower hyper-arousal scores, while Nonreactivity to inner experiences was uniquely associated with lower overall post-traumatic stress symptoms as well as lower re-experiencing and hyperarousal scores (Sullivan-Kalil et al., 2013). Collectively, these five studies show associations among facets of mindfulness and PTSD symptoms.

In addition, Kimbrough et al. (2010) found in MBSR program for adult survivors of childhood sexual abuse, a 65% reduction of depressive symptoms. Similarly, in a pilot study of

MBSR for individuals with PTSD, Goldsmith et al. (2014) found reductions in PTSD symptoms, depression, and shame-based trauma appraisals, and an increase in acceptance of emotional experiences. Additionally, participants' self-reported amount of weekly mindfulness practice was related to increased acceptance of emotional experiences from pretreatment to posttreatment.

### **Mindfulness and PTSD among Veterans**

In a cross-sectional study, Wahbeh et al., (2011) found that veterans with PTSD endorsed significantly lower nonjudgmental acceptance than veterans without PTSD, and that these results remained significant when considering covariates such as depression and other trauma. Mindful Nonjudging was also negatively correlated with re-experiencing, numbing avoid, hyperarousal. Overall, mindfulness accounted for a significant percentage of the variance of PTSD symptoms: re-experiencing 32%, numbing-avoiding 19%, and hyperarousal 16%. Owens et al. (2012) also assessed the relationship between mindfulness skills and PTSD/depression symptom severity in a sample of 149 veterans. Participants completed seven weeks of intensive PTSD treatment using CPT while in a residential treatment program. Hierarchical multiple linear regression was used to determine whether changes in scores on the four subscales of the KIMS predicted symptom severity of PTSD and depression. Overall, mindfulness skills did not increase significantly over the course of treatment. However, changes in the facets of mindfulness were negatively associated with PTSD and depression. The Acting with Awareness subscale negatively predicted self-reported symptoms of PTSD and clinicians assessed symptoms of PTSD, explaining 22% of the variance of the later. Individuals who improved their score on Acting with Awareness subscale were less likely to have a diagnosis of Major Depressive Disorder at post-treatment. Although this study was neither randomized, nor had a control group, it suggests facets of mindfulness predict symptoms of depression and PTSD.



The first published randomized controlled trial (Niles et al., 2011) found a clinically significant improvement in PTSD scores among veterans for an 8-week mindfulness telehealth intervention compared with a psychoeducation telehealth intervention. However, these gains were not maintained in a 6-week follow-up assessment. In addition, Boden et al. (2012) tested prospective associations between pre-to-posttreatment changes in facets of mindfulness, depression, and PTSD severity at treatment discharge. Participants were 48 military veterans in a residential PTSD treatment facility. Though a cognitive behavioral treatment was administered, changes in facets of mindfulness significantly explained post-treatment PTSD and depression severity explaining 19%-24 % of the variance. The Acting with Awareness subscale explained unique variance in post-treatment PTSD severity, and changes in the Non-Judgmental Acceptance subscale explained the unique variance in posttreatment depression severity. This study was also limited by the lack of a control group, small sample size, and limited statistical power. However, these findings are unique in that a cognitive behavioral treatment, not intended to teach mindfulness skills, led to changes in mindfulness facets, which significantly explained post-treatment PTSD and depression severity.

Kearny, McDermott, Malte, Martinez, and Simpson (2012) conducted a prospective, longitudinal study utilizing MBSR as an adjunct to treatment as usual. MSBR was delivered to a group of 30 veterans with a high prevalence of PTSD. Pre and posttreatment outcomes documented significant improvements in PTSD symptoms, depression, behavioral activation, acceptance, and mindfulness at six-month follow-up. Forty-seven percent of veterans demonstrated clinically significant improvements in PTSD severity. The results confirmed the feasibility of providing MBSR in a format that allows widespread accessibility. Kearney et al. (2013) then designed a randomized, controlled pilot study to assess outcomes associated with

MBSR for veterans with PTSD. Forty-seven veterans with PTSD were randomized to treatment as usual (TAU) or MBSR plus TAU. Compared with individuals in TAU group, at four-month follow up, participants who completed the MBSR course reported improvements in mindfulness skills and significant improvements in mental health related quality of life. Post-hoc analysis indicated that significantly more veterans in the MBSR course had clinically meaningful change in both PTSD symptoms and HRQOL at the four-month follow up. Those individuals who completed at least four of the eight classes were more likely to report salutary changes in depression and functional status as indicated by the Behavioral Activation for Depression Scale (BADs; Kanter, Rusch, Busch, & Sedivy, 2009). Limitations in this study included a small sample size, limited statistical power, and a formal assessment of PTSD was not in the inclusion criteria. These studies, however, show that veterans with PTSD symptoms who endorsed increases in mindfulness skills were associated with positive treatment outcomes.

### **Purpose of the Present Study**

There is a dearth of empirical research on mindfulness interventions specific to veterans with PTSD (Vujanovic et al., 2011). Of the studies that have been published, most are cross-sectional, have small sample sizes, low statistical power, and used non-randomized designs or no control group. Randomized controlled trials of mindfulness-based interventions for PTSD are imperative to further our understanding of the impact of this construct among veterans. In addition, it is essential to investigate the mechanisms by which mindfulness interventions affect clinical outcomes. Yet, very few studies have dismantled the individual components of these interventions to assess their relative efficacy of each technique independently. Examining the separate components of a whole intervention may clarify how the interventions work, and potentially allow refinement of the therapy for more optimal outcomes. Therefore, the purpose

of this study was to utilize a randomized controlled trial to: a) assess the differential impact of two common components of mindfulness meditation (body scan and mindful-breathing) on trait and state mindfulness and treatment outcomes compared to an intervention without mindfulness (slow breathing), and a non-intervention control group; b) to explore if changes in mindfulness facets would predict posttreatment outcomes in depression and PTSD for individuals who participated in a mindfulness intervention; and c) to investigate if the mindfulness intervention grouping variable (body scan vs mindful breathing) would moderate the relationship between pre-posttreatment changes in mindfulness facets and posttreatment outcomes in depression and PTSD among a sample of veterans diagnosed with PTSD.

### **Statement of the Hypotheses**

1. There will be an interaction between time and group for state mindfulness, such that participants in the mindfulness interventions will exhibit a greater increase in state mindfulness (TMS) compared to the non-mindfulness intervention, and the non-mindfulness intervention will exhibit a greater increase in state mindfulness than the control group.
2. There will be an interaction between time and group for trait mindfulness, such that participants in the mindfulness interventions will exhibit a greater increase in trait mindfulness (FFMQ) compared to the non-mindfulness intervention, and the non-mindfulness intervention will exhibit a greater increase in trait mindfulness than the control group.
3. There will be an interaction between time and group for depressive symptoms (BDI-II), such that participants in the mindfulness interventions will exhibit lower posttreatment depression scores compared to the non-mindfulness intervention, and the non-

mindfulness intervention will exhibit lower posttreatment depression scores compared to the control group.

4. There will be an interaction between time and group for PTSD symptoms (PCL), such that participants in mindfulness interventions will exhibit lower posttreatment PCL scores compared to the non-mindfulness group, and the non-mindfulness group will exhibit lower PCL scores than the control group.
5. Pre- to post-treatment change scores in Acting with Awareness, Non-judgmental Acceptance, Nonreactivity, and Observing facets will negatively predict post-treatment depressive symptoms (BDI-II), and this relationship will be moderated by mindfulness intervention group (body scan and mindful breathing), while accounting for pre-treatment depression (BDI-II).
6. Pre- to post-treatment change scores in Acting with Awareness, Non-judgmental Acceptance, Nonreactivity, and Observing facets will negatively predict post-treatment PTSD symptoms (PCL), and this relationship will be moderated by mindfulness intervention group (body scan, mindful-breathing), while accounting for pre-treatment PTSD symptoms (PCL).

## **Method**

### **Procedure**

This study examined de-identified, archival data that was collected from participants by Dr. Helane Wahbeh in June of 2013 and stored in a repository at Oregon Health and Science University (OHSU). The proposed analyses have not been previously conducted on this dataset. The request for archival data analysis was submitted and approved by both the OHSU and Pacific University (PU) Institutional Review Boards. Data released to researchers from OHSU

was coded and did not contain any of the 18 HIPAA identifiers files with coded data to the principal investigator at PU using encrypted email. The data is stored on PU secure servers. At the conclusion of the study, the data were deleted from PU servers.

Veterans with PTSD were recruited through multiple methods including flyers, local newspapers, and outreach talks that were conducted at veteran PTSD support groups, mental health clinics, and veteran centers. Potential participants were also identified by the OHSU electronic medical record system. All interested volunteers were contacted by telephone to describe the study and inclusion/exclusion criteria. If the veteran was eligible and interested in participating, the risks and benefits of participating were described in more detail and an appointment was scheduled for the screening interview. At the screening visit, written consent was obtained and a structured clinical interview was conducted to examine for inclusion and exclusion criteria. If an individual was eligible, s/he completed the baseline assessments and was randomized into one of the four groups. The study used a randomized control trial design. Participants were randomly assigned into one of four groups: 1) body scan (BS); 2) mindful-breathing (MB); 3) slowed breathing (SB); or 4) a sitting quietly control group (SQ).

### **Participants**

The sample consisted of 102 veterans (96 male and 6 female) diagnosed with chronic PTSD. The mean age for participants was 52 years (range = 25-65; *SD* = 12). Fifty-five percent of the veterans reported duty in the Vietnam War, 34% in Operation Enduring Freedom (OEF) or Operation Iraqi Freedom (OIF), and 11% in other conflicts. Seventy-seven percent identified as Caucasian, 2.6% as African American, 3.5% as Native American, 1.8% as Asian, 3.5% as Hispanic, and 0.9% identified as other. Sixty-six percent reported being married, 33% reported being single, and 1% identified as other. Two percent of the participants reported fewer than 12

years of schooling, 47% reported 12-14 years, 26% reported 15-16 years, and 25% reported more than 16 years of education. Table 1 displays the demographic information by condition.

Inclusion and exclusion criteria were chosen to permit generalizability without excessive heterogeneity in the study population. Participants were combat veterans (defined by a score of  $\geq 7$  on the Combat Exposure Scale) with a diagnosis of chronic PTSD, in good general medical health, and if prescribed medication, reported a stable dose for stable medical conditions for the duration of the study. Participants were willing and able to provide informed consent. The Clinician-Administered PTSD Scale for DSM-IV (CAPS; Blake et al., 1995) confirmed PTSD diagnosis. Exclusion criteria included significant chronic medical illness, psychosis, bipolar disorder, cognitive disorder, current delirium, actively suicidal or homicidal, and substance dependence disorder within 3 months of the study. Exclusion of mental disorders was conducted through the Structured Clinical Interview for DSM-IV (SCID-IV; Astin, 1997). Self-reports of sexual assault as primary PTSD event/s, plans to move from the area in the next year, and prior or current meditation practice were also considered exclusion criteria.

## Measures

The **Beck Depression Inventory-II** (BDI-II; Beck, Steer, & Brown, 1996) is a widely used 21-item self-report instrument that measures depressive symptoms based on the DSM-IV criteria. Items are rated on a 0 to 3 Likert-type scale and higher scores are indicative of greater depressive symptoms. Sample items include, “I am sad all the time,” and “I can't get any pleasure from the things I used to enjoy.” The BDI-II has demonstrated good internal consistency ( $\alpha = 0.92$ ), and test-retest reliability ( $r = 0.93$ ). It has also demonstrated evidence of

# THE DIFFERENTIAL IMPACT OF TWO MINDFULNESS INTERVENTIONS AMONG VETERANS

Table 1

## *Demographic Information by Group*

Variables	<u>Treatment Groups</u>			
	<u>BS</u>	<u>MB</u>	<u>SB</u>	<u>SQ</u>
	<i>n</i> = 27	<i>n</i> = 25	<i>n</i> = 25	<i>n</i> = 25
<hr/>				
Gender				
Male	92.90 % (25)	92% (23)	96 % (24)	96% (24)
Female	7.40 % (2)	8% (2)	4% (1)	4% (1)
Age				
M	53.01	49.92	52.24	53.00
SD	12.61	12.75	12.46	11.75
Ethnicity				
White	85% (23)	88% (22)	88% (22)	84% (21)
Black	0	4% (1)	4% (1)	4% (1)
Native American	7.40% (2)	0	0	8% (2)
Asian	0	0	4% (1)	4% (1)
Other	3.70 % (1)	0	0	0
Hispanic	3.70% (1)	8% (2)	4% (1)	0
Education Level				
>12 years	0	0	4% (1)	4% (1)
12- 14 years	55.60% (15)	40% (10)	40% (10)	52% (13)
15- 16 years	22.30% (6)	28% (7)	28% (7)	24% (6)

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<16 years	22.20 % (6)	32 % (8)	28 % (7)	20% (5)
Era of Reported Duty				
Vietnam War	59% (16)	48% (12)	48% (12)	60 % (15)
OEF/ OIF	33% (9)	44% (11)	32 % (8)	28 % (7)
Other	7.4 % (2)	20 % (2)	20% (5)	12 % (3)
Relationship Status				
Single	37 % (10)	36% (9)	36 % (9)	24 % (6)
Divorced	63 % (17)	64 % (16)	64 % (16)	72 % (18)
Other	0	0	0	4 % (1)

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content, construct, and factorial validity (Beck et al., 1993). The BDI-II was administered pre- and post-intervention.

**The Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995)** is a structured clinical interview with 30 items designed to assess the 17 symptoms of PTSD outlined in the DSM-IV, along with eight associated features. The CAPS can be used to make a dichotomous diagnosis of PTSD or to assess the frequency and intensity of each symptom. Items are rated on a 0 to 4 point Likert scales to assess frequency (*0 = none of the time to 4 = most or all of the time*) and intensity (*0 = none to 4 = extreme*) and higher scores are indicative of more frequency and intensity of symptoms. Sample items include, “Have you ever had unwanted memories of (EVENT),” and “How much distress or discomfort did these memories cause you?” Studies have demonstrated strong internal consistency ( $\alpha = 0.94$ ) and test-retest reliability ( $r = 0.90$  to  $0.98$ ).

**Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006)** is a measure of dispositional or trait mindfulness based on a factor analysis of five independently developed mindfulness questionnaires. The 39 items are rated on a 5-point Likert-type scale (*1 = never or very rarely true to 5 = very often or always true*) and load onto five facets of mindfulness: Observing, Describing, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience (Baer, 2006). Higher scores for each facet indicate more of the trait. Sample items include “When I am walking, I deliberately notice the sensations of my body moving” (Observing); “I’m good at finding words to describe my feelings” (Describing); “When I do things, my mind wanders off and I’m easily distracted” (Acting with Awareness); “I criticize myself for having irrational or inappropriate emotions” (Non-judging); and, “I perceive my feelings and emotions without having to react to them” (Nonreactivity). The FFMQ demonstrated good internal consistency on all five factors ( $\alpha$  ranging

from 0.75-0.91). All five factors of the FFMQ were positively correlated with wellbeing and four of the five factors of the FFMQ (all except Observing) were negative predictors of psychological symptoms and depression (Baer et al., 2006). Among meditators, the Observing factor demonstrated a positive correlation, and a negative correlation among non-meditators. The FFMQ total score or facet scores can be used (Baer et al., 2006). This scale was administered pre-and post-intervention.

The **Toronto Mindfulness Scale** (TMS; Lau et al., 2006) is a 13-item state measure of mindfulness and is based on a two-factor operational definition of mindfulness: Curiosity and Decentering. Curiosity refers to eagerness to learn about one's own experience. Decentering refers to not reacting to thoughts and feelings. Items are rated on a 5 point Likert-type scale (*0= not at all to 4= very much*) and higher scores indicating greater levels of mindfulness. Sample items include "I was curious about each of the thoughts and feelings that I was having" (Curiosity), and "I was aware of my thoughts and feelings without over-identifying with them" (Decentering). The TMS has demonstrated high internal consistency ( $\alpha = .86$  [Curiosity] and  $.87$  [Decentering]). The TMS also demonstrated correlations in the expected direction with related constructs, such as absorption, self- awareness, rumination, and depression. The scale was administered weekly after each session.

The **PTSD Checklist – Civilian** (PCL-M; Weathers, Litz, Herman, Huska & Keane, 1993) is a self-report measure consisting of 17 items that corresponds with the DSM–IV PTSD criteria. The scale can be divided into three sub-scores corresponding to the three main syndromes of the disorder: re-experiencing, avoidance, and hyper arousal. A 5-point Likert-type scale measures how much participants have been bothered in the last month by particular symptoms (*1= not at all to 5= extremely.*) Higher scores indicate more intensity. The PCL has

good internal consistency ( $\alpha = 0.89$ ), test–retest reliability ( $r = 0.96$ ) and concurrent validity (Blanchard, Jones–Alexander, Buckley, & Forneris, 1996). This scale was administered pre- and post-intervention.

### **Interventions**

Participants were randomly assigned to one of four groups: 1) body scan meditation (BS); 2) mindful-breathing (MB); 3) slowed breathing (SB); or 4) a sitting quietly (SQ) control group. The BS intervention employed the mindfulness body scan meditation, which is the first formal mindfulness technique introduced and practiced intensively in the MBSR and MBCT programs. A guided meditation with Dr. Wahbeh’s voice was used to direct the participant’s attention to different regions of the body, starting with the toes of the left foot and moving slowly upwards to the top of the head. Scanning was done in silence, stillness, and sitting upright. When the mind was distracted by thoughts or emotions, the participants were instructed to bring their attention back to the part of the body that was the focus of awareness. Nowhere in the script was attention directed to the breath or breathing process. When the body scan instructions reach the abdominal and chest area, body parts are noted without describing their movement. Participants were trained an hour once a week for six weeks in the laboratory. To reduce any variability created by the RA administering the intervention, twenty minute recordings were used to ensure everyone in each group received exactly the same meditation each time. In addition, this group received psychoeducation regarding mindfulness at each visit. The research assistant went over a handout describing mindfulness meditation and the different components of it. They also watched two about mindfulness. Participants were given a tape or CD to guide them through the meditation for their daily home practice between sessions.

The MB intervention employed another common component of MBSR and MBCT; mindful breathing. Using a twenty minute guided meditation with Dr. Wahbeh's voice, participants sat upright and attempted to focus attention on his or her breath as it passed through the opening of the nostrils or on the rising and falling of the abdomen or chest. Whenever attention wandered from the breath, the participant was instructed to simply notice the distracting thought, let it pass, and return the attention to the breath. The directions to slow the breath were given while they consciously observed the breathing. This process continued as a scripted meditation. To reduce any variability created by the RA administering the intervention, recordings were used to ensure everyone in each group received exactly the same meditation each time. In addition, this group received psychoeducation regarding mindfulness at each visit. The research assistant went over a handout describing mindfulness meditation and the different components of it. They also watched two videos about mindfulness. Participants were given a tape or CD to guide them through the meditation for their daily home practice between sessions.

The SB participants were trained on a breathing device, RESPeRATE, designed to reduce respiratory rate. RESPeRATE consists of a respiration sensor, headphones, and a control box containing a microprocessor. The system registers the participant's breathing rate and pattern and personalizes a melody with two tones that corresponds to inspiration and expiration. These tones then gradually slowed down to a rate of less than 10 breaths per minute. Participants practiced with RESPeRATE once a week, for twenty minutes, in the laboratory with the interventionist. Respiration was monitored and recorded continuously at all laboratory trainings to ensure the participants were actually slowing their breath from their resting breath rate. The participants were given a RESPeRATE device for use at home and asked to practice daily between laboratory trainings. This group did not receive any mindfulness training.

The SQ control group sat quietly and listened to a neutral-content book on tape for twenty minutes to serve as a time and attention control at each laboratory session. Participants were also asked to sit quietly at home daily and read, listen to a book on tape, or watch TV. No other formal instruction was given about what to do other than to sit quietly. At the end of their participation in the study, SQ participants were given tapes of the mindfulness body scan and mindfulness breathing meditations.

## Results

### Preliminary analyses

Prior to testing hypotheses, all variables involved were examined in SPSS-22 (SPSS Inc., 2013) to evaluate data compliance with univariate and multivariate assumptions. Scores on the BDI-II, FFMQ, and TMS measures were normally distributed and FFMQ ( $\alpha = .90$ ) and TMS ( $\alpha = .89$ ), demonstrated good internal consistency. The internal consistency of the BDI-II and PCL was unable to be conducted as only the summary scores were in the archival data set. Employing a criterion of  $> 3.29$  *SD* from the mean, there were no univariate outliers. Prior to performing the mixed method ANOVAs, homogeneity of variance assumption was tested and confirmed by the Levene's Tests of Equality of Variance. Prior to performing the regression analyses, collinearity statistics (i.e., Tolerance and VIF) revealed all variables were within acceptable limits. The Durbin Watson test indicated independent residuals. Effect sizes were assessed using the *d* statistic and interpreted using the following conventions: small effect = .20, medium effect = .50, and large effect = .80 (Cohen, 1988). Cohen's guidelines were also used for interpreting the effect size of  $R^2$  in hierarchical multiple regression with multiple independent variables (.02 to .12= small, .13 to .25 medium, and greater than .26 = large).

Of the 112 initially eligible participants, 10 dropped out after random assignment but before treatment began. One hundred and two participants completed the baseline measures and were randomly assigned to the body scan intervention ( $n = 27$ ), the mindful-breathing intervention ( $n = 25$ ), the slow breathing intervention ( $n = 25$ ), or the control group ( $n = 25$ ). Missing data was a product of administration error and sample size for each analysis varied by outcome measure (see Figure 1). Group equivalence for age, gender, race, education, and reported duty were assessed and no significant differences were revealed.

### **Mixed Method ANOVAs**

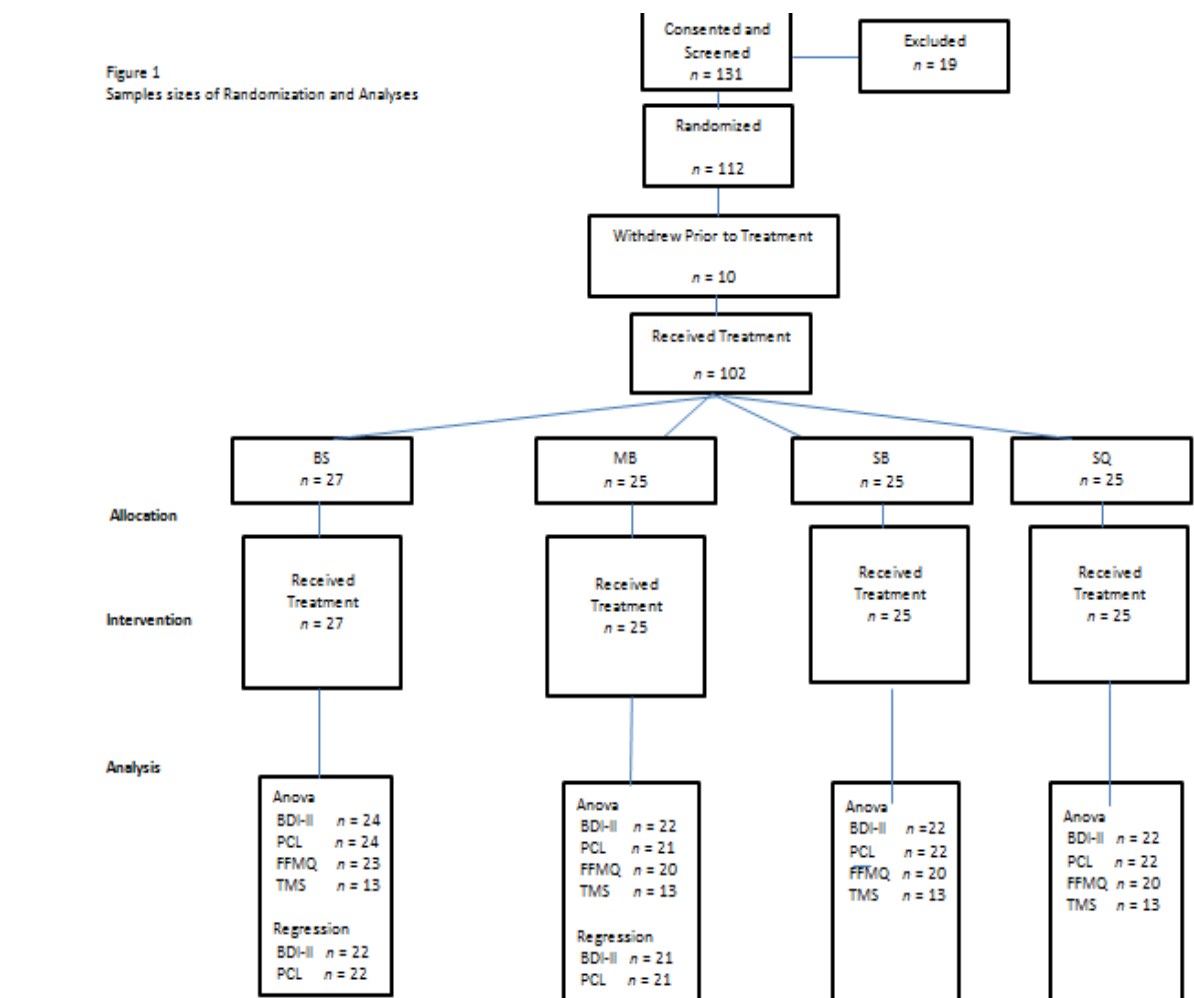
To test hypotheses 1 through 4, mixed-model ANOVAs, with time (pre, post) and group (mindful [BS & MB], non-mindful [SB], no intervention [SQ]) as independent variables, were used. Planned contrasts were used to explore differences among the individual treatments. We chose to keep the  $p$  value at .05 while investigating the pairwise comparisons due to the exploratory nature of the study, the novel population, and the potential of the small sample size to induce an increased likelihood of Type II errors. Table 3 displays the means, standard deviations,  $p$  values, and effect sizes for within group dependent variables, as well as the  $F$ -values,  $p$  values, and the time X group interactions.

The first hypothesis predicted that there would be a time (pre, post) by group (mindful [BS & MB], non-mindful [SB], no intervention [SQ]) interaction for state mindfulness, such that participants in the mindfulness intervention groups (BS and MB) would exhibit higher post-treatment TMS scores compared to participants in the non-mindfulness intervention group (SB) and no intervention group (SQ), and that the SB group would exhibit higher post-treatment TMS scores compared to the SQ group. Results indicated a statistically significant main effect of time  $F(1, 49) = 9.20, p = .004, \eta^2_p = .16$ , but not a statistically significant main effect of treatment

group  $F(2, 49) = 2.50, p = .09, \eta^2_p = .09$  or interaction effect for time and treatment group,  $F(2, 49) = .72, p = .49, \eta^2_p = .03$ . Despite the non-significant interaction effect, as predicted, planned contrasts revealed that the MB group ( $M = 32.92, SD = 8.78$ ) had statistically significant higher posttreatment TMS scores than the SQ group ( $M = 24.00, SD = 10.52; p = .04, d = .92$ ). However, the BS group ( $M = 30.69, SD = 11.92$ ) did not demonstrate statistically significant higher post-treatment TMS scores than the SQ group ( $p = .10, d = .60$ ). There were also not statistically significant differences between the MB group and the SB group ( $M = 28.36, SD = 9.62; p = .27, d = .49$ ), BS and SB groups ( $p = .56, d = .22$ ), or SB and SQ groups ( $p = .28, d = .42$ ).

The second hypothesis predicted that there would be a time (pre, post) by group (mindful [BS & MB], non-mindful [SB], no intervention [SQ]) interaction for trait mindfulness, such that participants in the mindfulness intervention groups (BS and MB) would exhibit higher post-treatment FFMQ scores compared to participants in the non-mindfulness intervention group (SB) and the no intervention group (SQ), and that the SB intervention would exhibit higher post-treatment FFMQ scores compared to the SQ group. Results indicated a statistically significant main effect of treatment group  $F(2, 79) = 4.27, p = .01, \eta^2_p = .10$ , but not a statistically significant main effect of time  $F(1, 79) = 2.32, p = .13, \eta^2_p = .03$ , or interaction effect for time and treatment group,  $F(2, 79) = 1.42, p = .25, \eta^2_p = .04$ . Despite the non-significant interaction effect, as predicted, planned contrasts revealed the BS group ( $M = 125.45, SD = 16.26$ ) had statistically significant higher post-treatment FFMQ scores than the SQ group ( $M = 112.60, SD = 17.90, p = .04, d = .76$ ). Also consistent with prediction, the MB group ( $M = 128.85, SD = 21.35$ ) scored significantly higher than the SQ group ( $M = 116.60, SD = 22.82, p = .01, d = .83$ ) and the SB ( $M = 116.60, SD = 22.82, p = .05, d = .55$ ). There was not a significant difference

Figure 1  
Samples sizes of Randomization and Analyses





# THE DIFFERENTIAL IMPACT OF TWO MINDFULNESS INTERVENTIONS AMONG VETERANS

Table 2

Mean, Standard Deviations, *p*- values, and Within Group Effect Sizes of Dependent Variables, and *F* values and Eta Squared for Time\*Group Interaction Effects *n* = 102

Variables	Within Groups				Between Groups		
	Time 1		Time 2		<i>p</i> value	Cohen's <i>d</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
TMS							
BS	28.31	(10.34)	30.69	(11.92)	.30	.21	
MB	28.08	(9.51)	32.92	(8.78)	.04*	.53+	
SB	22.93	(7.86)	28.36	(9.62)	.02*	.62+	
SQ	22.31	(9.57)	24.00	(10.52)	.46	.17	
FFMQ							
BS	116.87	(22.03)	125.45	(16.26)	.01*	.44	
MB	124.96	(20.03)	128.85	(21.35)	.27	.18	
SB	114.05	(20.81)	116.60	(22.82)	.47	.12	
SQ	113.01	(17.61)	112.60	(17.90)	.89	-.06	
BDI- II							
BS	20.36	(8.72)	14.25	(10.19)	.003*	.65+	
MB	21.91	(10.25)	17.55	(11.26)	.07	.40	
SB	24.41	(9.83)	22.54	(12.21)	.26	.16	
SQ	23.14	(11.64)	20.91	(13.62)	.34	.18	
PCL							
BS	56.25	(9.50)	50.71	(143.91)	.05*	.46	
MB	53.29	(10.95)	46.91	(11.05)	.006*	.58+	
SB	55.56	(11.43)	54.18	(12.05)	.60	.12	
SQ	56.32	(9.80)	51.54	(12.07)	.04*	.43	

Note. Effect sizes for Within Groups were assessed using the *d* statistic and interpreted using the following conventions: small effect = .20, medium effect = .50 and large effect = .80 (Cohen, 1988). The Between Groups table reports the *F*- values, *p*- values and Eta Squared values for the Interaction Effects of Time\*Group.

\**p* < .05    \*\**p* < .001    +*d* < .50

between the BS group and the SB group ( $p = .14$ ,  $d = .45$ ), or SB and SQ groups ( $p = .52$ ,  $d = .19$ )

The third hypothesis predicted that there would be a time (pre, post) by group (mindful [BS & MB], non-mindful [SB], no intervention [SQ]) interaction for depressive symptoms, such that participants in the mindfulness intervention groups (BS and MB) would exhibit lower post-treatment BDI-II scores compared to participants in the non-mindfulness intervention group (SB) and the no intervention group (SQ), and that the SB intervention would exhibit lower post-treatment BDI-II scores compared to the SQ group. Results demonstrated a statistically significant main effect of time  $F(1, 86) = 12.91$ ,  $p = .001$ ,  $\eta^2_p = .131$ . There was not a significant effect of treatment  $F(3, 86) = 1.7$ ,  $p = .17$ ,  $\eta^2_p = .06$ , or a significant interaction effect between time and treatment group  $F(3, 86) = .983$ ,  $p = .41$ ,  $\eta^2_p = .03$ . Planned comparisons revealed the BS group ( $M = 14.25$ ,  $SD = 10.19$ ) had statistically significant lower posttreatment depression scores than the SB group ( $M = 22.54$ ,  $SD = 12.21$ ,  $p = .02$ ,  $d = .74$ ). Trending towards statically significant, the BS group had lower scores than the SQ group ( $M = 20.91$ ,  $SD = 13.62$ ),  $p = .06$ ,  $d = .56$ . Scores in the MB group ( $M = 17.55$ ,  $SD = 11.26$ ) were not significantly lower than the SQ group ( $p = .35$ ,  $d = .27$ ) or the SB group ( $p = .17$ ,  $d = .42$ ). The SB group scores were not significantly lower than the SQ group ( $p = .65$ ,  $d = .13$ ).

The fourth hypothesis predicted that there would be a time (pre, post) by group (mindful [BS & MB], non-mindful [SB], no intervention [SQ]) interaction for PTSD symptoms, such that participants in the mindfulness intervention groups (BS and MB) would exhibit lower post-treatment PCL scores compared to participants in the non-mindfulness intervention group (SB) and the no intervention group (SQ), and that the SB intervention would exhibit lower post-treatment PCL scores compared to the SQ group. Results indicated a statistically significant

main effect of treatment group effect of time  $F(1, 85) = 14.33, p < .001, n^2_p = .14$ . There was not a significant main effect of group  $F(1, 85) = .93, p = .43, n^2_p = .03$ , or interaction effect for time and treatment  $F(3, 85) = .84, p = .48, n^2_p = .03$ . Planned contrasts revealed that the MB group scores ( $M = 46.91, SD = 11.05$ ) were marginally significantly lower than the SB group ( $M = 54.18, SD = 12.05; p = .06, d = .43$ ). No additional statistically significant differences between groups were found: BS group ( $M = 50.71, SD = 13.91$ ) and the SQ group ( $M = 51.54, SD = 12.07; p = .82, d = .06$ ), BS and SB groups ( $p = .34, d = .20$ ), the MB group and the SQ group ( $p = .22, d = .4$ ), or the SB group and the SQ group ( $p = .48, d = .22$ ).

### **Hierarchical Multiple Regression Analyses**

To test hypotheses 5 and 6, hierarchical regression models were used. To reduce multicollinearity, each predictor in the regression analyses was centered. Hypothesis 5 predicted that pre-to-posttreatment change scores in Acting with Awareness, Non-Judgmental Acceptance, Nonreactivity, and Observing facets would negatively predict post-treatment depression (while accounting for pre-treatment depression) among participants receiving a mindfulness intervention, and that this relationship would be moderated by type of mindfulness intervention (BS vs. MB). BDI-II pre-treatment score was entered as Step 1 and found to be a statistically significant predictor of post-treatment depression scores ( $R^2 = .24, p = .001$ ). In Step 2, mindfulness group (BS vs. MB) was entered and found to not be a significant predictor ( $R^2 = .02, p = .31$ ). Pre-posttreatment changes in Acting with Awareness, Non-judgmental Acceptance, Nonreactivity, and Observing facets were entered in Step 3. Collectively, their effect was statistically significant, contributing 23% unique variance to the model ( $R^2 = .23, p = .009$ ). When examined individually, changes in Nonreactivity ( $\beta = .37, p = .002$ ), Non-judging ( $\beta = .33, p = .05$ ), and Acting with Awareness ( $\beta = .47, p = .008$ ) facets were significant predictors. In

Step 4, the interactions between the type of mindfulness (BS vs. MB) and pre-posttreatment changes in Acting with Awareness, Non-judgmental Acceptance, Nonreactivity, and Observation facets were entered. Collectively, they accounted for an additional 13% of the variance ( $R^2 = .13$ ,  $p = .04$ ) in post-treatment depression scores. When examined individually, the group X Nonreactivity ( $\beta = .90$ ,  $p = .08$ ) was a marginally significant predictor and group X Acting with Awareness ( $\beta = 1.30$ ,  $p = .03$ ) interaction was a statistically significant predictor of post-treatment depression scores. Table 4 displays the BDI-II regression results.

To further explore the interaction between the type of mindfulness intervention pre- to posttreatment changes in Nonreactivity and Acting with Awareness facets, simple slope analyses were conducted. This was done by regressing post-treatment BDI-II on change scores in Nonreactivity and Acting with Awareness in separate analyses for the BS and MB groups. Change in Nonreactivity was a statistically significant predictor of posttreatment BDI-II scores ( $\beta = .64$ ,  $p = .003$ ) in the MB group but was not a significant predictor in the BS group ( $\beta = -.12$ ,  $p = .58$ ). Alternatively, change in Acting with Awareness was a significant predictor of post-treatment BDI-II in the BS group ( $\beta = .41$ ,  $p = .05$ ), but was not a significant predictor in the MB group ( $\beta = .20$ ,  $p = .38$ ). These simple slopes are shown in figures 2 and 3.

Hypothesis 6 predicted that pre-posttreatment-treatment change scores in Acting with Awareness, Non-Judgmental Acceptance, Nonreactivity, and Observing facets would negatively predict post-treatment PTSD symptom severity (while accounting for pre-treatment PTSD symptom severity) among participants receiving a mindfulness intervention, and that this relationship would be moderated by type of mindfulness intervention (BS vs. MB). The same process as outlined in the first regression was followed in the second regression. In Step 1, PCL pretreatment scores were entered and determined to be a statistically significant predictor of PCL

# THE DIFFERENTIAL IMPACT OF TWO MINDFULNESS INTERVENTIONS AMONG VETERANS

Table 3

*Summary of Hierarchical Regression Analysis for Variables predicting BDI-II*

Variable	$\beta$	$R^2$	$\Delta R^2$	$F\Delta$	$p$
Step 1		.24	.24	12.90	.001*
Pretest BDI -II	.50				.001*
Step 2		.26	.02	1.07	.31
Pretest BDI -II	.51				.001*
Group (BS vs. MB)	-.14				.31
Step 3		.49	.23	4.00	.009*
Pretest BDI -II	.51				<.001**
Group (BS vs. MB)	.04				.75
Change in NR	.37				.015*
Change in NJ	.37				.05*
Change in AWA	.47				.008*
Change in OB	.10				.48
Step 4		.63	.13	2.8	.04*
Pretest BDI -II	.48				.001*
Group (BS vs. MB)	.12				.36
Change in NR	.90				.006*

# THE DIFFERENTIAL IMPACT OF TWO MINDFULNESS INTERVENTIONS AMONG VETERANS

Change in NJ	.39	.08
Change in AWA	.88	.18
Change in OB	.36	.16
BSMB * Change in NR	.90	.08
BSMB * Change in NJ	.07	.78
BSMB * Change in AWA	1.30	.03*
BSMB * Change in OB	.19	.43

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NOTE: Cohen's guidelines were used for interpreting the effect size of  $R^2$  with multiple independent variables (.02 to .12= small, .13 to .25 medium, and greater than .26 = large). BSMB \* Change indicates the interaction between grouping variable (body scan vs. mindful breathing) and change in mindfulness facet (NR = Nonreactivity, NJ = Non-judging, AWA = Acting with Awareness, OB= Observing).

\* $p < .05$     \*\* $p < .001$

Figure 2  
Depression and Acting With Awareness

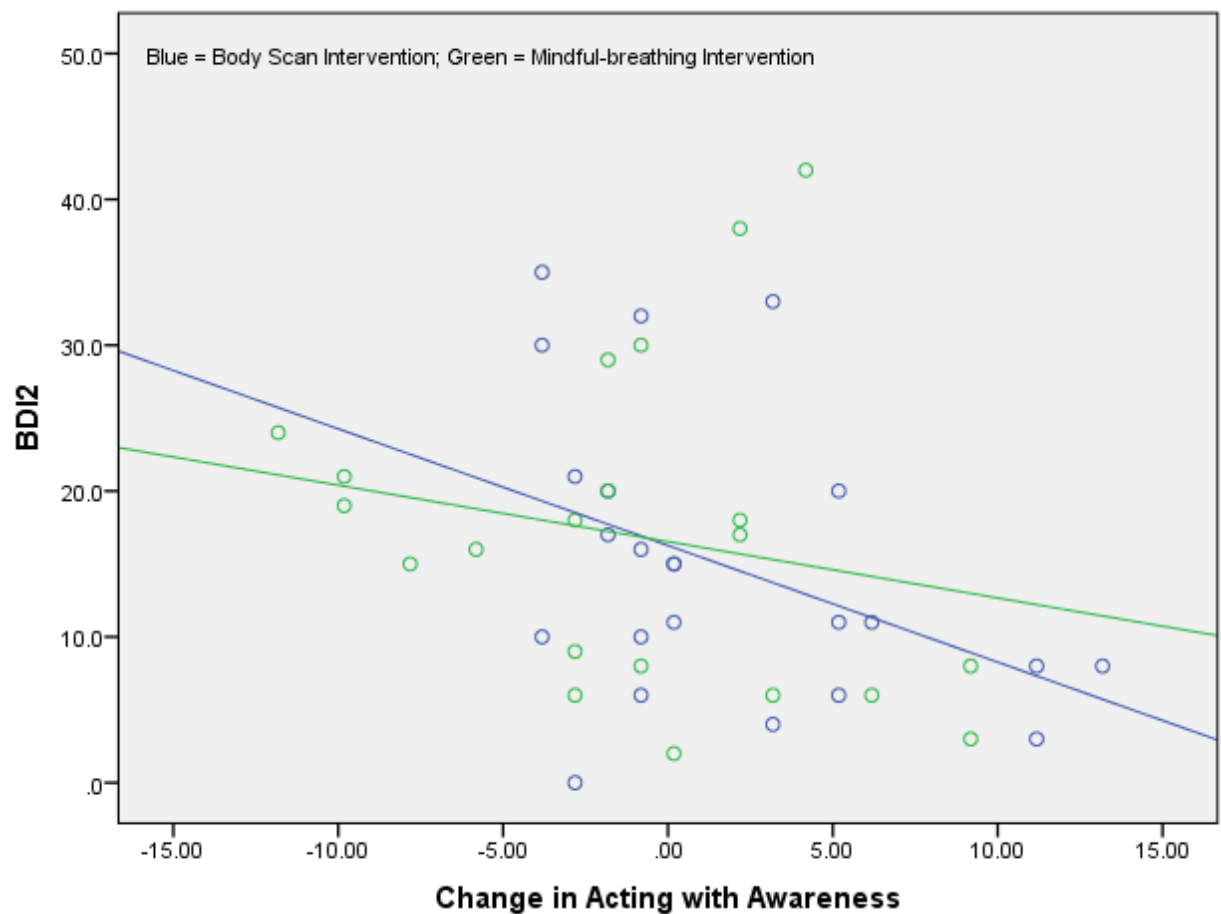


Figure 2. This line graph represents post-treatment BDI-II regressed onto pre-post treatment change scores in Acting with Awareness in the BS and MB interventions. Change in Acting with Awareness was a significant predictor of post-treatment BDI-II in the BS group ( $\beta = .41, p = .05$ ), but was not a significant predictor in the MB group ( $\beta = .20, p = .38$ ).

Figure 3  
Depression and Nonreactivity

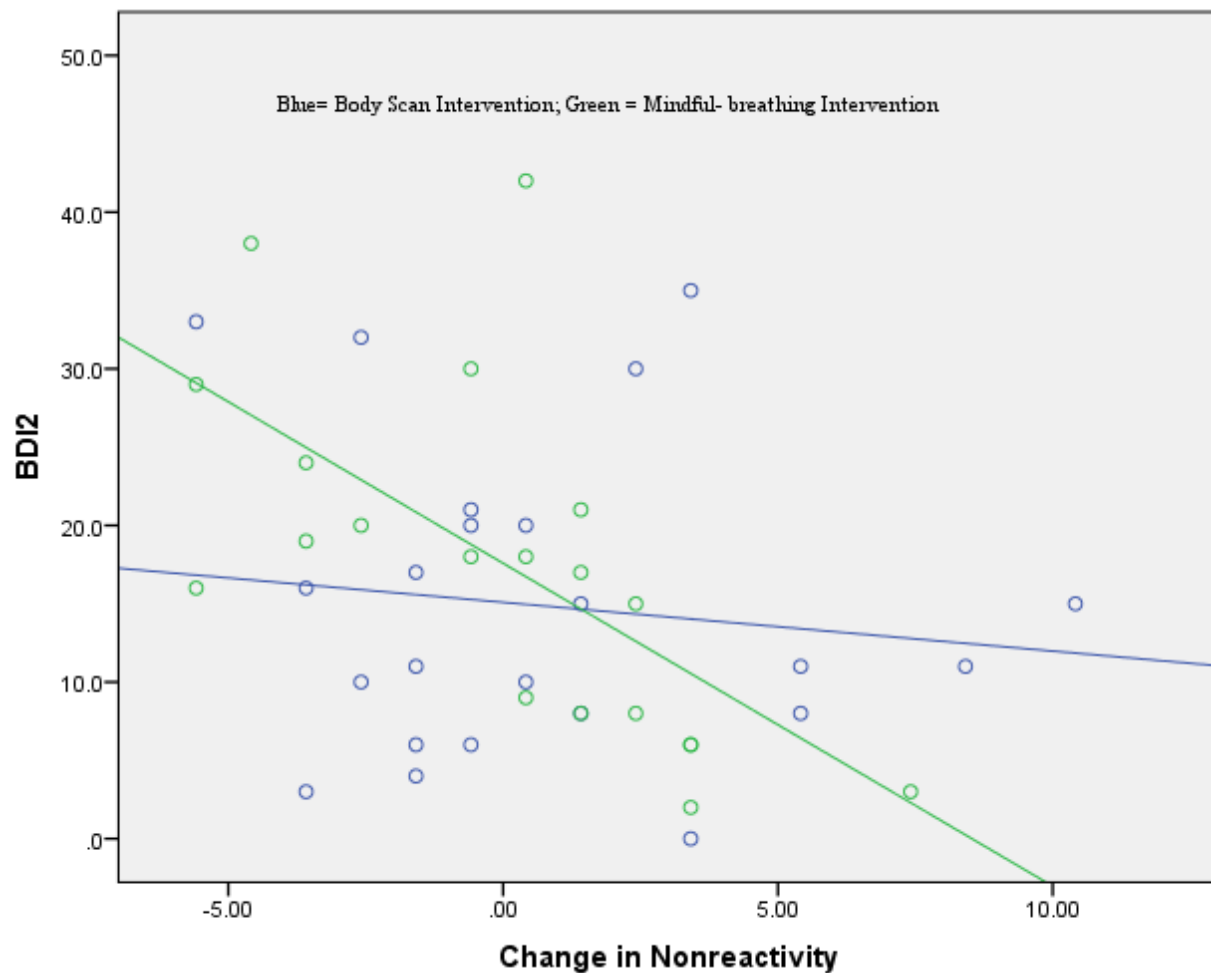


Figure 3. This line graph represents post-treatment BDI-II regressed onto pre-post treatment change scores in Nonreactivity in the BS and MB interventions. Change in Nonreactivity was a statistically significant predictor of posttreatment BDI-II scores ( $\beta = .64, p = .003$ ) in the MB group but was not a significant predictor in the BS group ( $\beta = -.12, p = .58$ ).



the SB and SQ groups did not. Although no significant interaction effects were found, planned contrast tests between groups revealed several noteworthy findings.

posttreatment scores, accounting for 27% of the variance in the posttreatment PCL scores ( $R^2 = .27, p < .001$ ). None of the additional steps were found to be significant predictors of posttreatment PCL scores.

### **Discussion**

This study is among the first to utilize a randomized control trial to examine the separate components of a mindfulness intervention and to investigate the mechanisms by which mindfulness interventions affect clinical outcomes among veterans with PTSD. The purpose of this study was threefold: a) to assess the differential impact of two common components of mindfulness meditation (body scan and mindful-breathing) compared to an intervention without mindfulness (slow breathing), and a non-intervention control group on state and trait mindfulness, depression, and PTSD symptom severity, b) to assess if changes in specific mindfulness facets would predict posttreatment outcomes in depression and PTSD for individuals who participated in a mindfulness intervention, and c) to investigate if the mindfulness intervention grouping variable (BS vs MB) would moderate the relationship between pre-to-posttreatment changes in mindfulness facets and posttreatment outcomes in depression and PTSD among a large sample of veterans diagnosed with PTSD. We predicted that participants in the mindfulness interventions (BS, MB) would exhibit greater decreases in depression and PTSD symptoms and greater increases in self-reported mindfulness when compared to the SB group and the control group. Overall, the mindfulness interventions had the greatest effects on depression, PTSD symptoms, and trait mindfulness measures compared to the

SB and SQ groups. In addition, participants in the mindfulness groups demonstrated clinically significant decreases in pre-to-posttreatment depression and PTSD symptom severity, whereas

### **Body Scan**

During the BS intervention, participants were directed to attend to different regions of the body, starting with the toes of the left foot and moving slowly upwards to the top of the head. When the mind was distracted by thoughts or emotions, the participants were instructed to bring their attention back to the part of the body that was the focus of awareness. To avoid potential overlap with the MB group, instructions were explicitly devoid of attending to the breath and no specific instructions were given to notice the thoughts and let them pass before returning to the bodily sensations. As predicted, compared to the SB and SQ groups, the BS group evidenced significant lower posttreatment depression scores (although the difference between the BS and SQ group was only marginally significant,  $p = .06$ ). Additionally, participants in the BS group evidenced the greatest rate of decrease in depression and largest increase in trait mindfulness (FFMQ) when compared to the other three groups. However, inconsistent with our prediction, the BS intervention did not result in statistically lower PTSD symptom severity or greater state mindfulness compared to the SB or SQ group.

### **Mindful Breathing**

In the MB group, participants sat upright and attempted to focus attention on their breath. Whenever attention wandered from the breath, the participant was instructed to notice the distracting thought, let it pass, and return the attention to the breath. To reduce overlap with the BS group, no explicit instructions were given to focus awareness on any body parts; only the breath. Directions to reduce the respiration rate were also given while individuals consciously observed the breath. When compared to the SB group, the MB group trended toward evidencing

significantly lower posttreatment PTSD symptom severity ( $p = .06$ ). Self-reported trait mindfulness was significantly increased (FFMQ) compared to the SB group and the SQ group, and state mindfulness significantly increased (TMS) compared to the SQ group. Additionally, participants in the MB group evidenced the greatest rate of decrease in PTSD symptoms when compared to the other three groups. Inconsistent with our predictions, the MB group did not demonstrate significantly different posttreatment depression scores when compared to the SB and SQ groups. Although not hypothesized, there were no differences between MB and BS groups for any of the variables.

### **Slow Breathing**

In the SB group, participants were asked to slow the breath using the RESPeRATE biofeedback device; no suggestions were given to bring awareness to the quality of the breath or to notice distracting thoughts as they arise. This design afforded the opportunity to discern the clinical effects of slow breathing from the clinical effects of mindful breathing. Slow breathing has known physiological effects caused by parasympathetic activation such as decreased oxygen consumption, decreased heart rate and blood pressure, and increased heart rate variability (Jerath et al., 2006). It may be that slowed breathing during meditation, and subsequent parasympathetic activation, mediates clinical improvement, although mixed results in mindful-breathing studies are found (Conrad et al., 2006; Zucker et al., 2009). As noted above, the SB group had marginally higher PTSD symptoms ( $p = .06$ ) and lower trait mindfulness when compared to the MB group, and higher depression compared to the BS group posttreatment. Also, the SB group neither evidenced any statistically significant pre-to-posttreatment improvement nor differences between the SQ group in depression, PTSD, or trait mindfulness. Interestingly, the SB group evidenced a significant pre-posttreatment increase in state mindfulness. The results suggest that

the mechanism of action in mindful-breathing may be different from the reduction of respiration rate.

### **Mindfulness Facets Predict Posttreatment Change**

Inconsistent with our predictions, change in mindfulness facets did not predict posttreatment PTSD symptom severity. However, changes in specific mindfulness facets did explain decreased posttreatment depression scores. Collectively, pre-to-posttreatment changes in Acting with Awareness, Non-judgmental Acceptance, Nonreactivity, and Observing facets contributed 23% to the unique variance even after accounting for the large and significant variance explained by pre-treatment depression. When examined individually, changes in Nonreactivity, Non-judging, and Acting with Awareness were significant predictors of posttreatment depression. The interactions between the type of mindfulness group (BS vs. MB) and pre-posttreatment changes in Acting with Awareness, Non-judgmental Acceptance, Nonreactivity, and Observing facets accounted for an additional 14% of the variance in post-treatment depression scores. When examined individually, the interaction of mindfulness group and change in Nonreactivity and mindfulness group and change in Acting with Awareness were statistically significant predictors of posttreatment depression scores.

To further explore the interactions between the mindfulness intervention grouping variable (BS vs MB) and pre-to-posttreatment changes in mindfulness facets in the prediction of posttreatment depression, simple slope analyses were conducted. We found that for participants in the BS intervention, as Acting with Awareness scores increased, depression decreased, whereas in the MB intervention, change in Acting with Awareness was unrelated to depression. Alternatively, in the MB intervention, as Nonreactivity increased, depression decreased, whereas in the BS intervention, changes in Nonreactivity were unrelated to depression.

### **Which Intervention for Whom?**

Understanding the clinical effects of a specific component of mindfulness interventions, as well as the discrete mechanism of action within an intervention, has the potential to optimize clinical outcomes for veterans with PTSD. This study attempted to answer the questions, “Which aspects of mindfulness-based interventions lead to what positive outcomes?” and subsequently, “What are the active ingredients involved in the positive outcomes?” to inform the clinical application of these interventions and specifically target salient mechanisms.

The results demonstrated that the BS as a standalone intervention significantly reduced depression compared to the SB group, and evidenced a marginally significant reduction compared to the SQ group ( $p = .06$ ). This is consistent with previous research that reported amount of time devoted to body scan practice was correlated with significant improvements in trait anxiety, depression, perceived stress, emotional health, and emotional well-being (Lengacher et al., 2009). In the BS group, change in Acting with Awareness, but not Nonreactivity, predicted decreased depression. Acting with Awareness, the ability to maintain awareness of daily activities, is frequently contrasted with “automatic pilot,” and has been negatively associated with depressive symptoms among a veteran populations (Owens et al., 2012) and predicted lower levels of depression in students (Cash & Whittingham; Christopher et al., 2012).

Mindfulness has also been associated with reduced rumination (Grabova et al., 2011) which may partially explain the findings. While acting with awareness, one gathers his/ her attention into the present moment activity. Cultivating a deeper sensitivity and attention to the present moment while practicing the body scan intervention may assist individuals to attend to the present moment while engaged in daily living. This present moment awareness thus aids in

the development of concentration, and subsequently, in the reduction of mental rumination. Analayo (2003) describes this process through a simile which compares mindfulness of the present moment to a strong post to which six wild animals (sense organs) are bound. Although the animals may at first struggle to escape (drift into automatic thought), sooner or later they sit or lie down next to the post. The benefit of being grounded in the experience of the present moment is the reduction of mental agitation and rumination. The body scan may assist participants to become more aware during daily activities, thus avoid automatically engaging in unproductive styles of cognitive processing, ultimately breaking the cycle of automatic rumination and depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008).

Moreover, several studies document that mindfulness-based intervention participants, including pre-deployment military personnel (Jha et al., 2010), prefer the body scan practice, as measured by practice time, compared to other core practices (Carmody & Baer 2008; Shapiro, Brown & Biegel, 2007; Tacon, Caldera, & Ronaghan 2004). This is a specifically salient consideration for the veteran population which has a higher than average attrition rate (Hembree et al., 2004; Seal et al., 2010). A preliminary practice of the body scan may increase a combat veteran's ability to engage in, prepare for, and comply with the therapeutic process (Vujanovic et al., 2010). Additionally, the body scan may allow an individual the opportunity to refine her ability to control allocation of her attention (Lang et al., 2012) and recognize the transient nature of the distressing signals or experiences, potentially decreasing experiential avoidance behaviors (Thompson et al., 2011). Combined with previous research, these results suggest that the body scan intervention can be an effective practice to reduce depression in veterans with PTSD.

MB as a standalone intervention resulted in a statistically significant increase in trait mindfulness when compared to SB and SQ, and evidenced a trend towards a statistically

significant reduction of PTSD symptom severity compared to SB ( $p = .06$ ). Furthermore, in the MB intervention, higher levels of Nonreactivity, but not Acting With Awareness, predicted decreased depression. Similarly, Feldman, Greeson, and Senville (2010) found that mindful breathing was correlated with decentering (Feldman, et al., 2010). Decentering is the ability to view thoughts and emotions as impermanent and to tolerate aversive experience without engaging in rigid avoidance (Segal et al., 2002), and it has been associated with decreased physiological arousal, stress reactivity, and emotional reactivity (Delizonna et al., 2009). Relatedly, the Nonreactivity facet on the FFMQ includes the ability to “decenter” from internal experiences and has been associated with lower PTSD (Sullivan-Kalil et al., 2013) and depression (Desrosiers et al., 2013).

Mindful breathing and Nonreactivity have important implications in the clinical intervention of veterans with PTSD. Mindful breathing, with an emphasis on Nonreactivity to internal experiences, may allow an individual the opportunity to recognize the transient nature of the distressing signals or experiences, potentially decreasing experiential avoidance behaviors (Delizonna et al., 2009; Sullivan-Kalil et al., 2013; Thompson et al., 2011). Mindful breathing may also refine the ability to control allocation of attention (Lang et al., 2012). Finally, mindful breathing and increased Nonreactivity may assist veterans with PTSD to engage in, prepare for, and comply with the therapeutic process (Vujanovic et al., 2010). Inconsistent with our hypothesis, change in Nonreactivity did not predict PTSD symptom severity, and the MB intervention did not produce statistically significant lower rates of PTSD symptoms or depression when compared to both the SB and SQ groups. However, the results trended in the expected direction and justify further investigation.

Finally, dismantling studies are necessary to discern the mechanisms of action within each component of interventions, especially when interventions consist of multiple practices. However, overall, the magnitudes of the effects of the separate mindfulness components in the present study were generally small to medium, while effect sizes found in previous studies evaluating mindful-based interventions in their entirety have typically been medium to large (see Carmody and Baer, 2008; Carmody, Baer, Lykins, & Olendzi, 2009; Greeson et al., 2011). These findings are consistent with Sauer-Zavala et al. (2012) who investigated three different meditation practices commonly used in mindfulness-based interventions. These results may further support the notion that the large effects of mindful-based interventions may not be due to any one component of these interventions, but instead the synergetic power of the combined practices.

### **Limitations**

The results of this study must be interpreted with caution. The small sample size reduced the statistically power, potentially masking statistically significant differences among groups, even though the differences may have been clinically important. Second, the risk of type one error was elevated because of the repeated measures ANOVAs. Further clinical trials are needed to examine whether these differences are replicable.

There were also several aspects of the design study which indicate these results should be interpreted with caution. The sample was mostly White men residing in a small city in the Northwest who identified as combat veterans with PTSD, thus limiting the generalizability of the findings even within the larger veteran population. All of the measures in this study used to assess trait and state mindfulness, depressive symptoms, and PTSD symptom severity were self-report questionnaires. Although all of the measures have demonstrated acceptable reliability,



they are nonetheless vulnerable to possible distortions and response bias. Finally, daily home practices were not standardized within the control group. Posttreatment interviews revealed control group participants endorsed practicing mindful-breathing, relaxation exercises, and reading spiritual texts, potentially skewing the results.

Despite the limitations, this research provides important information regarding the clinical effects of specific components of mindfulness interventions, as well as the discrete mechanisms of action within an intervention. Examining the separate components of a whole intervention clarifies how the intervention works and begins to address the critical question, “Which interventions works for whom?” potentially refining therapy for specific populations and thus promoting more optimal patient care. Future research should include additional randomized control trials with dismantling designs to further our understanding of the construct of mindfulness as related to veterans with PTSD.

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## Appendix A

### What is Mindfulness?

Mindfulness is described as paying attention in a particular way, on purpose, in the present moment, and non-judgmentally.

Mindfulness is described as “**Paying Attention.**” Paying Attention involves observing your moment to moment experiences both internally within your mind and body and externally, by what you are observing around you through your senses. The key to Paying Attention is that it is done in present time. Moment by moment you consciously bring your focus back to your internal and external sensations. It is very normal for your mind to wander and think about things you need to do, reflect on the past or plan for the future. In fact, this usually happens continuously throughout meditation practice. When you find that your mind has wandered, bring it gently back to the present moment and your focus on your breath. Mindfulness *is* this moment-to-moment process. That is really all it is. Does that make sense? Do you ever experience your mind wandering?

Being “**On Purpose**” is about *why* you are practicing mindfulness meditation. Being aware of your INTENTION for meditation sets the stage for what is possible and reminds you from moment to moment of why you are practicing in the first place. Jon Kabat-Zinn, the founder of mindfulness meditation programs in the West said, “I used to think that meditation practice was so powerful . . . that as long as you did it at all, you would see growth and change. But time has taught me that some kind of personal vision is also necessary.”  
What is your intention for your meditation practice?

Mindfulness is also described as paying attention “**In a particular way.**” What is meant by this is about the attitude that one brings to the act of paying attention. The goal is to have an attitude of open curiosity, compassion, and kindness for oneself and the world. For example, attention can have a cold, critical quality, or it can include “an affectionate, compassionate quality . . . a sense of openhearted, friendly presence and interest.” When your mind wanders, you can be angry at yourself for “not getting it right” or you can congratulate yourself for realizing your mind wandered and gently bringing it back to your focus. It is important for you to consciously commit to bringing kindness, curiosity, and openness to these meditations. Paying attention without these heart qualities may result into a practice that is condemning or judgmental of your experience and that is opposite to our intention with this mindfulness meditation practice for you.

Do you agree to try as best you can to have an open, compassionate and kind attitude towards yourself while you do these meditations?

Mindfulness meditation can use many different types of objects to focus on during the meditations, like the breath, sounds, or feelings in the body. For your group, we will be teaching a meditation that will focus on the sensations in your body. By being mindful of what you are sensing in your body, you will practice being mindful in the present moment.

**MINDFULNESS.....**

**PAYING ATTENTION  
ON PURPOSE  
IN THE PRESENT MOMENT  
NON-JUDGEMENTALLY**



