Published in final edited form as:
Mindfulness (N Y). 2011 December 1; 2(4): 219–227. doi:10.1007/s12671-011-0064-3.

Mindful awareness and non-judging in relation to posttraumatic stress disorder symptoms

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Abstract

The objective of this cross-sectional study was to assess group differences between veterans with and without posttraumatic stress disorder (PTSD) in mindful awareness and mindful non-judging. The relationships between mindfulness and PTSD symptom clusters were also evaluated. Three age and gender-matched groups, 1)15 combat veterans with PTSD, 2)15 combat veterans without PTSD, and 3) 15 non-combat veterans without PTSD, completed the Mindful Attention Awareness Scale and the Accept without Judgment scale. PTSD status was determined with the Clinician Administered PTSD Scale and excluded disorders screened with the Structured Clinical Interview for DSM-IV. Mindfulness scale group differences were assessed with analysis of variance. Mindfulness and the PTSD symptom clusters relationships were assessed with hierarchical regression analysis. There were group differences on mindful non-judging ($F(2,44)=7.22$, $p=.002$) but not mindful awareness ($p>.05$). Combat exposure accounted for significant variation in PTSD symptoms (hyper-arousal 47%; numbing-avoiding 32%; re-experiencing 23%). Mindfulness accounted for a significant percentage variance of PTSD symptoms (re-experiencing 32%; numbing-avoiding 19%, hyper-arousal 16%), beyond combat exposure effects, although only mindful non-judging was significant in the model. This study confirms in a clinical sample that mindful non-judging is associated with PTSD symptoms and could represent a meaningful focus for treatment.

Keywords

Posttraumatic stress disorder; combat veterans; mindfulness; awareness; non-judging

Introduction

PTSD is a serious and growing public health issue. Combat soldiers are especially vulnerable to acquiring PTSD due to high job stress and traumatic event exposure. Vietnam veterans' lifetime prevalence of PTSD is reported as 30% (Kulka, et al., 1990) and 13–17% of Operation Iraqi Freedom and Operation Enduring Freedom soldiers return with PTSD

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(Hoge, Terhakopian, Castro, Messer, & Engel, 2007; Tanielian & Jaycox, 2008). The personal and societal costs of PTSD often include chronic symptoms, increased psychiatric and medical disorder co-morbidity, and marked functional impairment (Brunello, et al., 2001; S. D. Solomon & Davidson, 1997). The annual economic cost of PTSD is estimated at $45 billion (Marciniak, et al., 2005).

As a form of mind-body medicine, meditation has a 5,000 year old known history and is currently implemented in structured clinical programs with positive results. Mindfulness meditation has a growing body of scientific literature supporting its efficacy for various physical and mental/emotional conditions (Allen, Chambers, & Knight, 2006; Grossman, Niemann, Schmidt, & Walach, 2004), including growing evidence for a role in PTSD treatment. Mindfulness is clinically incorporated into Mindfulness Based Stress Reduction program (Kabat-Zinn, 1982; Kabat-Zinn, et al., 1992), Mindfulness Based Cognitive Therapy (Teasdale, et al., 2000), Mindfulness Based Relapse Prevention (Bowen, et al., 2009), Dialectical Behavioral Therapy (Linehan, Heard, & Armstrong, 1993), and Acceptance Commitment Therapy (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Positive clinical outcomes for symptoms relevant to PTSD are shown in depressive symptoms or relapse (Finucane & Mercer, 2006; Kenny & Williams, 2007; Ma & Teasdale, 2004; Mason & Hargreaves, 2001; Sephton, et al., 2007; Teasdale, et al., 2000), anxiety (Finucane & Mercer, 2006; Kabat-Zinn, et al., 1992; McKee, Zvolensky, Solomon, Bernstein, & Leen-Feldner, 2007; Miller, Fletcher, & Kabat-Zinn, 1995; Tacon, McComb, Caldera, & Randolph, 2003), suicidal behavior (Williams, Duggan, Crane, & Fennell, 2006), sleep disturbances (Carlson & Garland, 2005; Shapiro, Bootzin, Figueredo, Lopez, & Schwartz, 2003), and in veterans with PTSD, anxiety, and depression (Finucane & Mercer, 2006; Price, McBride, Hyerle, & Kivlahan, 2007). There is also evidence indicating that mindfulness techniques may affect the functional relationship between the amygdala and the prefrontal cortex, which may be altered in PTSD (Koenigs & Grafman, 2009; Wyland, Kelley, Macrae, Gordon, & Heatherton, 2003). Meta-analytic findings show that PTSD patients exhibit hypo-activity in the prefrontal cortex and hyperactivity in the amygdale (Etkin & Wager, 2007). Mindfulness meditation neuroimaging and electrophysiological studies have shown increased activity in the prefrontal cortex and a decreased activity in the amygdala (Cahn & Polich, 2006; Chiesa & Serretti, 2009; Lieberman, et al., 2007; Rubia, 2009), increased frontal coherence between and within brain hemispheres (Travis & Arenander, 2004), and stronger activations in the medial prefrontal cortex and anterior cingulate cortex compared to controls, which may relate to greater control over distracting events and engagement in emotional processing (Holzel, et al., 2007). Thus, mindfulness meditation may act by improving overall prefrontal cortex functionality allowing increased top-down control on the emotional reactivity generated by the amygdala.

Mindfulness-based clinical practices revolve around educating the student about mindfulness incorporating two distinct components (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008): a mindful awareness component and a mindful non-judging component. The mindful awareness or attention component refers to the self-regulation of attention to focus internally (on bodily sensations, breath, thoughts, emotions) and externally (on sights, sounds) at the current moment on the current experience. It is common and expected that the mind will wander away from this focus and so the practice includes gently bringing the attention back to the present moment. Mindful awareness requires sustained attention and flexibility of attention to switch focus back to the object of interest (Bishop, et al., 2004). The second component of mindfulness, mindful non-judging, is distinct from mindful awareness in that it refers to the attitude and orientation of the process rather than how the attention is being directed or the observation of the experiences themselves (Cardaciotto, et al., 2008). Mindful non-judging embodies an attitude of curiosity and openness (Bishop, et al., 2004). It entails refraining from applying evaluative labels such as good/bad, right/

wrong, or worthy/worthless and to allow an experience to be as it is without attempts to avoid, escape, or change it (Baer, Smith, & Allen, 2004). For example, when a practitioner finds that their mind has wandered from their object of attention, they can judge themselves negatively leading to increased negative emotion or stress. Mindfulness practice encourages them to not judge but rather shift their attitude to openness and acceptance of themselves and their process (Shapiro, Carlson, Astin, & Freedman, 2006).

PTSD may occur when a person has been exposed to a traumatic event that involves actual or threatened death or serious injury, threat to the physical integrity of self or others, and the person's response involves intense fear, helplessness, or horror. People with PTSD experience symptoms of increased arousal and sympathetic nervous system hyperactivity that were not present before the trauma (Buckley, Holohan, Greif, Bedard, & Suvak, 2004; Cohen, et al., 1998; Lakusic, et al., 2007; Mellman, Knorr, Pigeon, Leiter, & Akay, 2004; Muraoka, Carlson, & Chemtob, 1998; Pole, 2007). These symptoms include hyper-vigilance, difficulty concentrating, falling or staying asleep, irritability or outbursts of anger, or exaggerated startle response. People with PTSD may also persistently re-experience their trauma through recurrent and intrusive distressing images, thoughts, perceptions, dreams of the event when exposed to internal or external cues that symbolize or resemble an aspect of the traumatic event (Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV)). Re-experiencing symptoms may be a result of the prefrontal cortex which regulates fear extinction. This concept is supported by multiple neuroimaging studies in people with PTSD found prominent hypo-activations in the prefrontal cortex, ACC, and thalamus, regions associated with the experience or regulation of emotion compared to controls (Etkin & Wager, 2007). Prefrontal cortex reactivity is also inversely correlated with PTSD symptom severity in another neuroimaging study (Shin, Rauch, & Pitman, 2006).

Not much is known about assessing or measuring aspects of mindfulness that patients with PTSD may benefit from, how much mindfulness may contribute to treatment readiness or success, or whether it may be used on its own as an efficacious intervention. There may be a relationship between PTSD symptoms and mindfulness that could inform how to implement clinical interventions in this population. Mindfulness may complement or fill in gaps in the dominant cognitive behavioral paradigms. For example, patients in trauma-processing treatments need to be able to allow/accept feelings, thoughts, and experiences at least to some extent. Patients who are overly dysregulated or suicidal often cannot participate and are referred to therapies that incorporate mindfulness (such as Dialectical Behavior Therapy or Acceptance Commitment Therapy). Mindful non-judging may contribute to treatment readiness by encouraging the practitioner to allow and accept thoughts, emotions, and experiences rather than over-reacting to and avoiding them. We would anticipate that people with increased mindful non-judging would be less avoidant. Also, mindful awareness supports being in the present moment rather than dwelling in the past or future and mindfulness meditation improves pre-frontal cortex function. We also know that re-experiencing symptoms are probably a result of prefrontal cortex failure to regulate emotional content. We would expect that people with increased mindful awareness would be more in the present moment and thus have less re-experiencing symptoms.

Because of the increased positive clinical and neuroimaging evidence that mindfulness interventions may benefit PTSD, this study attempts to examine how mindfulness relates to PTSD symptom clusters in a clinical PTSD population with gold standard assessments, with the intention of conducting a mindfulness meditation intervention trial in combat veterans PTSD in the future. No studies to date have examined the relationship between mindful awareness, mindful non-judging, and PTSD symptoms in a clinical population. In non-clinical populations, one study looked at posttraumatic stress symptoms and mindfulness constructs in a student population without axis 1 psychopathology (Vujanovic, Youngwirth,

Johnson, & Zvolensky, 2009). Another study focused on mindfulness and experiential avoidance as predictors of PTSD avoidance symptoms in college students (Thompson & Waltz, 2010). A third study examined the relationship between posttraumatic stress symptom severity and alcohol use coping motives in 153 adults who reported exposure to at least one DSM-IV PTSD Criterion A traumatic life event and alcohol use in the past month (Vujanovic, Bonn-Miller, & Marlatt, 2011). All three studies used self-report PTSD symptom questionnaires rather than clinician administered interviews. The research questions of this cross-sectional study were: 1) are there differences in mindful awareness and mindful non-judging between age and gender-matched combat veterans with PTSD, combat veterans without PTSD, and non-combat veterans without PTSD?; and 2) what is the relationship between mindful awareness and mindful non-judging to the PTSD symptom clusters of re-experiencing, avoidance, and hyper-arousal? We hypothesized that the PTSD group would have decreased mindful awareness and mindful non-judging. We also hypothesized that mindfulness awareness would be associated with re-experiencing and mindful non-judging would be associated with avoidance.

Methods

Study procedures included a telephone screening, a screening visit, and completion of questionnaires. Study procedures, inclusion/exclusion criteria, and the risks and benefits of participating were explained during a telephone screening. The screening visit included informed consent procedures, medical history and demographic data collection, clinical interviews, and questionnaire distribution. Participants returned their questionnaire packets at another visit within one week of the screening visit. Questionnaires were checked for completeness and missing questions answered if necessary.

Participants in the study were included in three age and gender matched groups: 15 combat veterans with PTSD, 15 combat veterans without PTSD, and 15 non-combat veterans without PTSD. Potential participants were recruited through flyers at the Portland Veterans Administration Medical Center, Portland Veterans Center, and other veterans groups throughout the Portland Metropolitan area. Veterans were excluded if they were over the age of 70, had a current significant chronic medical illness, bipolar, schizoaffective, or psychotic disorders; any DSM-IV cognitive disorder; substance dependence disorder within the past 3 months or current illicit substance use. Inclusion and exclusion criteria were determined through self-reported past and current medical history and the clinical interviews. The study was approved by the institutional review boards of Portland Veterans Administration Medical Center and Oregon Health & Science University. Written informed consent was obtained from all subjects.

Clinical Interviews

During the screening visit, potential participants were interviewed by trained clinicians (HW and ML) using the *Clinician-Administered PTSD Scale for DSM-IV (CAPS)* to validate the presence or absence of PTSD and the *Structured Clinical Interview for DSM-IV (SCID-IV)* to screen for exclusionary psychiatric conditions.

The CAPS is a structured clinical interview designed to assess PTSD according to DSM-IV criteria and evaluates frequency and intensity of each symptom. Participants in the PTSD group met DSM-IV-TR criteria A–F; criteria B, C, and D were met when the frequency plus intensity score were ≥4. Participants in the non-PTSD groups did not meet full syndrome criteria. The CAPS yields a total score as well as re-experiencing, numbing-avoiding, and hyper-arousal subscores. The CAPs also includes the Life Events Checklist (LEC) which assesses lifetime trauma exposure (i.e. natural disasters, physical assault, sexual assault). The LEC was used to assess group differences on trauma history other than combat

exposure. Test-retest reliability is high (.90 to .98) as is internal consistency (.85 to .94) (Blake, et al., 1995).

The SCID-IV is a structured diagnostic interview designed to measure the presence or absence of DSM-IV Axis I mental disorders. The SCID-IV is regarded as the "gold standard" for assessing mental disorders and has demonstrated acceptable inter-rater reliability (overall weighted kappa coefficients = .61 for current diagnoses) (First, Spitzer, Gibbon, & Williams, 2002).

Questionnaires

The *Combat Exposure Scale (CES)* assessed the amount of combat each participant experienced. The CES is a 7-item self-report measure. Items are rated on a 5-point frequency (1 = “no” or “never” to 5 = “more than 50 times”). Participants were asked to respond based on their exposure to various combat situations, such as firing rounds at the enemy and being on dangerous duty. The total CES score (ranging from 0 to 41) is calculated by using a sum of weighted scores (Keane, et al., 1989).

The *Beck Depression Inventory-II (BDI)* assessed depression symptoms in the participants. It is a 21-item self-report measure that is widely used and accepted. It is positively correlated with the Hamilton Psychiatric Rating Scale for Depression (r =.71, n = 87) and the Hamilton Rating Scale for Anxiety (r =.47, n = 87) (Beck, Steer, & Brown, 1996).

The *Mindfulness Attention Awareness Scale* was used to assess the primary tenet of mindfulness: the extent to which each participant was able to be attentive and aware to the present moment. It is a 15-item scale that measures the frequency of both general and specific present awareness mindfulness states in daily life. It includes questions such as “It seems I am running on automatic without much awareness of what I’m doing” and “I could be experiencing some emotion and not be conscious of it until some time later.” It shows strong internal consistency (alpha= .82) and expected convergent and discriminant correlations and has been validated with college, community, and cancer patient samples and in French and Swedish (Brown & Ryan, 2003; Carlson & Brown, 2005; Hansen, Lundh, Homman, & Wangby-Lundh, 2009; Jermann, et al., 2009). This score will be referred to as mindful awareness.

Non-judgmental attitude, the second component of mindfulness, was assessed with the *“Accept without Judgment”* subscale from the Kentucky Inventory of Mindfulness Skills. It is a 9-item self-report questionnaire that evaluates the non-judgmental acceptance of internal processes aspect of mindfulness. It includes questions like “I tell myself that I shouldn’t be thinking the way I’m thinking” and “I think some of my emotions are bad or inappropriate and I shouldn’t feel them. The Kentucky Inventory of Mindfulness Skills has strong internal consistency (alpha=.76–.91) and shows expected convergent and discriminate correlations. The KIMS has been validated in college, community, and patient samples and in French, Swedish, and German (Baer, et al., 2004; Baer, et al., 2008; Baum, et al., 2009; Hansen, et al., 2009; Nicastro, Jermann, Bondolfi, & McQuillan, 2010). This score will be referred to as mindful non-judging.

Statistics

The confounding factors of age, gender, medications, depression and trauma type were considered in the study design in the following ways. Age and gender were addressed through the matched group design. Trauma type was addressed with combat exposure being the primary PTSD event (determined by clinical interview). Traumatic events prior to the PTSD primary event, such as childhood abuse or sexual trauma, were also recording during the clinical interview. Two control groups, one with and one without combat exposure, were

chosen to distinguish effects of combat exposure versus PTSD on mindfulness (Pole, 2006). People with PTSD also frequently have co-morbid depression (Schindel-Allon, Aderka, Shahar, Stein, & Gilboa-Schechtman, 2010) and are on medications. Depression status was accounted for as a continuous covariate (Beck Depression Inventory-II score). Participants on medications were included if their dose was stable for 4 weeks or more and all medications were recorded.

Statistical analysis of primary outcomes were conducted in phases: 1) Means, standard deviations, and box plots were observed for each continuous variable and normality was assessed by the Shapiro-Wilk test; 2) Group differences in continuous variables were assessed with analysis of variance if normally distributed and independent samples Kruskal-Wallis non-parametric test if not normally distributed. If significance was found, covariates (depression, prior to PTSD event trauma history) were entered in the model to see if the results changed. Post-hoc tests for significant values were assessed with least square difference for parametric tests and mean rank paired comparisons for non-parametric tests (Langley, 1979). Categorical variables were assessed with the chi-square test; 3) Hierarchical multiple regression analyses were conducted to assess mindful awareness and mindful non-judging's ability to predict re-experiencing, numbing-avoiding, and hyper-arousal symptom components beyond combat exposure. Normality, linearity, and outliers were assessed through normal probability plots and scatter plots of the standardized residuals. None of these assumptions were violated. Zero-order Pearson product-moment correlation coefficients were examined to determine any collinearity between measures. For each PTSD symptom component, combat exposure scale score was entered in step 1, then mindful awareness and mindful non-judging were entered in step two. Combat exposure was included in the model first to assess the effect of the PTSD trauma exposure before including the mindfulness scales. A p-value of .002 was considered statistically significant adjusting for multiple comparisons using the Holm-Bonferroni method (Holm, 1979). P-values below .05 are still noted but not considered statistically significant.

Results

Group demographics

Demographics and medical history were similar for all groups (all ps>.05 for years in service, race, education, marital status, exercise, sleep, handedness, past psychiatric history, past major depressive disorder, antidepressant use, past or current drug, alcohol, or cigarette use, gender (all groups 100% male), and age). Era was different between groups reflecting more combat era veterans in the PTSD group (Fisher exact test p=.03). There were no group differences on medications use (p>.05). Medications were also categorized as psychotropic medications (i.e. selective serotonin reuptake inhibitors, monamine oxidase inhibitors, tri-cyclics, anti-psychotics, and anxiolytics) versus medications for other health conditions (i.e. diabetes, hypertension, hypercholesterolemia), with no significant group differences in either (all p's >.05). As expected, CAPS total score, re-experiencing, numbing-avoiding, and hyper-arousal were significantly different between groups reflecting greater PTSD severity in the PTSD group (Table 1). All veterans in the PTSD group endorsed immediate onset of symptoms after combat trauma exposure. Combat exposure was also significantly different between groups with the two combat groups having higher combat exposure than the non-combat group. There was no difference between the two combat groups in combat exposure (p>.05).

Mindfulness and PTSD

The PTSD group scored lower on the mindful non-judging (F(2,44)=7.22, p=.002). This significance remained when co-varying for depression (BDI) and other trauma (LEC). Least

square differences post-hoc analysis showed that the PTSD group was different from both the combat control (p=.001) and the non-combat control (p=.01) and the two control groups were not different from each other (p>.05). There was no difference between groups on the mindful awareness scale (p>.05) (Table1).

Relationship between mindfulness and PTSD symptoms

Multicollinearity was assessed for the hierarchical regression. All PTSD symptom clusters were correlated with each other and to combat exposure. Mindful non-judging was negatively correlated with re-experiencing (r=−.62), numbing-avoiding(r=−.50), and hyperarousal (r=−.46) (p's<.0005). Mindful awareness was not correlated with any other variable. The two mindfulness measures were not correlated with each other (Table 2).

In step one of the linear regression, combat exposure accounted for a significant amount of variation in all PTSD symptom clusters: re-experiencing (23%, F(1,43)=13.08; p=.001), numbing-avoiding (32%, F(1,43)=20.0, p <.0005), and hyper-arousal (47%, F(1,43)=37.7, p <.0005). Adding the mindfulness scales in step two explained a significant part of the PTSD symptoms variability beyond combat exposure effects: re-experiencing (32%, *Fchange* (2,41)=14.47, p <.0005), numbing-avoiding (19%, *Fchange* (2,41)=7.9; p =.001); hyper-arousal (16%, *Fchange* (2,41)=8.5, p =.001). However, only the mindful non-judging was significant in this model (p <.005)(Table 3).

Discussion

The objective of this study was to assess differences in mindfulness in combat veterans with PTSD and combat and non-combat control groups. The relationship between mindfulness and PTSD symptoms was also assessed. Mindful non-judging was different between groups with the PTSD group having the lowest score, but there was no difference in mindful awareness. Mindful non-judging contributed a significant amount of variation in PTSD symptoms beyond combat exposure effects.

The three study groups were matched on age, gender, depression, other trauma history, and other important demographic measures. Era was different between groups reflecting war time for the combat exposure participants. Medications were also evaluated and were not different between groups. There were significant differences on all PTSD symptom clusters reflecting appropriately defined groups.

Combat exposure distinguished the trauma-exposed versus non-trauma exposed group and also explained a significant amount of variation in all three PTSD symptom clusters. Interestingly, combat exposure explained more variation for the hyper-arousal (47%) symptoms than the numbing-avoiding (32%) and re-experiencing symptoms (23%). Hyper-arousal has been shown to be the best single predictor of subsequent symptom severity in other studies (Schell, Marshall, & Jaycox, 2004; Z. Solomon, Horesh, & Ein-Dor, 2009) and the most stable PTSD symptom. Another study examining hyper-arousal in clinical and non-clinical veterans over 20 years found that hyper-arousal symptom long-term trajectories did not differ between the groups (Z. Solomon, et al., 2009), alluding to the idea that trauma-exposure itself regardless of disease development may produce lasting hyper-arousal symptoms.

Mindful non-judging was different between groups but mindful awareness was not. Including mindful awareness and mindful non-judging in the regression model for PTSD symptom clusters explained additional variation for each PTSD symptom cluster beyond combat trauma exposure (re-experiencing 32%, numbing-avoiding 19%, hyper-arousal 16%). It is striking that these numbers are far greater than previously observed (6%) in non-

clinical populations highlighting the importance of looking at this research question in a clinical sample (Thompson & Waltz, 2010; Vujanovic, et al., 2009).

Importantly, the two mindfulness measures were not correlated, supporting the notion that mindful awareness and mindful non-judging represent distinct aspects of mindfulness. Mindful awareness and mindful non-judging may represent different brain networks and are thus being differentially implicated in PTSD. Self-referential behavior, conceptually similar to mindful non-judging behavior, is known to be a function of the medial prefrontal cortex (Herwig, Kaffenberger, Jancke, & Bruhl, 2010; Pan, Hu, Li, & Li, 2009) that is inhibitory on the amygdala, whereas, mindful awareness behavior is associated with a different network (Fassbender, et al., 2004; Oken, Salinsky, & Elsas, 2006). These results also imply that mindful awareness alone may not be sufficient to help reduce symptoms. One might expect that mindful awareness would help mitigate the upsetting intrusive thoughts and memories of their traumatic event, because by being more mindful, the person would engage in the present moment reducing the intrusive thoughts. However, it may be that the attitude one brings to the memory is more important in PTSD than having the thoughts or memories go away. For example, someone with PTSD may have an intrusive memory of a combat trauma. That person may judge the memory as negative (which someone with a lower mindful non-judging score may do) or just observe it as it is (which someone with a higher mindful non-judging score may do). Our results are consistent with the idea that people with more PTSD symptoms are more likely to judge their memories, thoughts, feelings negatively. Other studies in non-clinical populations have also found similar results. One study of 191 college students found that non-judging was a significant predictor on PTSD avoidance, whereas other mindfulness constructs were not(Thompson & Waltz, 2010). Another study of 239 adults who endorsed exposure to traumatic events again found that only the mindful non-judging scale was a significant predictor in all PTSD symptom clusters (Vujanovic, et al., 2009). The same group found that non-judging was predictive of alcohol abuse in a 153 trauma exposed individuals (Vujanovic, et al., 2011). Our study builds upon these previous studies by using a clinical population and using standardized clinically administered interviews rather than questionnaires for PTSD symptom assessment.

Clinical interventions using mindfulness-based therapies in PTSD populations that emphasize the non-judging aspect of mindfulness training may improve outcomes. Since the introduction of MBSR, many adapted mindfulness-based programs have been created specifically for various clinical populations such as Mindfulness-Based Cognitive Therapy (Teasdale, et al., 2000) (major depression disorder relapse prevention), Mindfulness-Based Relapse Prevention (Witkiewitz & Bowen, 2010) (substance abuse relapse prevention), Mindfulness-Based Eating Awareness Training (Kristeller & Wolever, 2011) (binge eating disorder), Mindfulness-Based Childbirth and Parenting (Duncan & Bardacke, 2010). While no specific structured program for people with PTSD yet exists, emphasis on mindful non-judging in mindfulness-based programs being administered to people with PTSD may be helpful. For example, in the MBCT standardized curriculum, the non-judging concept is integrated into multiple modules such as the Dealing with Barriers, Allowing/Letting Be, and Thoughts are Not Facts Modules (Segal, Williams, & Teasdale, 2002). An MBCT teacher who was teaching participants with PTSD could spend more time on the non-judging concepts in these modules. In the MBSR curriculum, class two could incorporate PTSD specific examples of judging/non-judging when discussing “How you see things (or don’t see them) will determine in large measure how you will respond to them” (Kabat-Zinn & Santorelli, 2007). Additionally, a mindfulness teacher may choose to spend more time on the loving kindness meditation that is included in the full-day retreat of MBSR throughout the course to a greater cultivation of non-judging attitude. These are just a few ideas of implementing the knowledge of the mindful non-judging relationship to PTSD symptoms in this study. A prospective clinical study examining this effect longitudinally would help

explore the effect of weighting non-judging concepts in mindfulness-based curricula in this population.

There are a number of limitations to this study that can be addressed in future studies. It was a cross-sectional study and does not allow for causal inference. The study was limited to male Vietnam veterans, precluding generalizability of results to women veterans and people with non combat-related PTSD. Future studies should include women and younger combat veterans.

In conclusion, this study extends prior observations that mindful non-judging is more highly correlated than mindful awareness to PTSD symptoms, especially re-experiencing, to a new clinical population, combat veterans with PTSD.

Acknowledgments

This work was supported in part by National Institute of Health grants T32 AT002688, K01 AT004951, U19 AT002656, UL1 RR024140, K24AT005121, and a Tartar Trust Grant. Special thanks to Roger Ellingson, Dan Zajdel, Aisha Kudura, Alex Amen, Irina Fonareva.

References

Allen NB, Chambers R, Knight W. Mindfulness-based psychotherapies: a review of conceptual foundations, empirical evidence and practical considerations. Australian and New Zealand Journal of Psychiatry. 2006; 40(4):285–294. [PubMed: 16620310]

Baer RA, Smith GT, Allen KB. Assessment of mindfulness by self-report: the Kentucky inventory of mindfulness skills. Assessment. 2004; 11(3):191–206. [PubMed: 15358875]

Baer RA, Smith GT, Lykins E, Button D, Krietemeyer J, Sauer S, et al. Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. Assessment. 2008; 15(3): 329–342. [PubMed: 18310597]

Baum C, Kuyken W, Bohus M, Heidenreich T, Michalak J, Steil R. The Psychometric Properties of the Kentucky Inventory of Mindfulness Skills in Clinical Populations. Assessment. 2009:220–229. [PubMed: 20040728]

Beck, AT.; Steer, RA.; Brown, GK. Beck Depression Inventory -Second Edition Manual. San Antonio: Harcourt Brace & Company; 1996.

Bishop SR, Lau MA, Shapiro S, Carlson L, Anderson ND, Carmody J. Mindfulness: A proposed operational definition. Clinical Psychology: Science and Practice. 2004; 11:230–241.

Blake DD, Weathers FW, Nagy LM, Kaloupek DG, Gusman FD, Charney DS, et al. The development of a Clinician-Administered PTSD Scale. Journal of Traumatic Stress. 1995; 8(1):75–90. [PubMed: 7712061]

Bowen S, Chawla N, Collins SE, Witkiewitz K, Hsu S, Grow J, et al. Mindfulness-based relapse prevention for substance use disorders: a pilot efficacy trial. Substance Abuse. 2009; 30(4):295–305. [PubMed: 19904665]

Brown KW, Ryan RM. The benefits of being present: mindfulness and its role in psychological well-being. Journal of Personality & Social Psychology. 2003; 84(4):822–848. [PubMed: 12703651]

Brunello N, Davidson JR, Deahl M, Kessler RC, Mendlewicz J, Racagni G, et al. Posttraumatic stress disorder: diagnosis and epidemiology, comorbidity and social consequences, biology and treatment. Neuropsychobiology. 2001; 43(3):150–162. [PubMed: 11287794]

Buckley TC, Holohan D, Greif JL, Bedard M, Suvak M. Twenty-four-hour ambulatory assessment of heart rate and blood pressure in chronic PTSD and non-PTSD veterans. Journal of Traumatic Stress. 2004; 17(2):163–171. [PubMed: 15141790]

Cahn BR, Polich J. Meditation states and traits: EEG, ERP, and neuroimaging studies. Psychological Bulletin. 2006; 132(2):180–211. [PubMed: 16536641]

Cardaciotto L, Herbert JD, Forman EM, Moitra E, Farrow V. The assessment of present-moment awareness and acceptance: the Philadelphia Mindfulness Scale. [Validation Study]. Assessment. 2008; 15(2):204–223. [PubMed: 18187399]

Carlson LE, Brown KW. Validation of the Mindful Attention Awareness Scale in a cancer population. Journal of Psychosomatic Research. 2005; 58(1):29–33. [PubMed: 15771867]

Carlson LE, Garland SN. Impact of mindfulness-based stress reduction (MBSR) on sleep, mood, stress and fatigue symptoms in cancer outpatients. International Journal of Behavioral Medicine. 2005; 12(4):278–285. [PubMed: 16262547]

Chiesa A, Serretti A. A systematic review of neurobiological and clinical features of mindfulness meditations. Psychological Medicine. 2009:1–14. [PubMed: 19335938]

Cohen H, Kotler M, Matar MA, Kaplan Z, Loewenthal U, Miodownik H, et al. Analysis of heart rate variability in posttraumatic stress disorder patients in response to a trauma-related reminder. Biological Psychiatry. 1998; 44(10):1054–1059. [PubMed: 9821570]

Duncan LG, Bardacke N. Mindfulness-Based Childbirth and Parenting Education: Promoting Family Mindfulness During the Perinatal Period. Journal of Child and Family Studies. 2010; 19(2):190–202. [PubMed: 20339571]

Etkin A, Wager TD. Functional neuroimaging of anxiety: a meta-analysis of emotional processing in PTSD, social anxiety disorder, and specific phobia. American Journal of Psychiatry. 2007; 164(10):1476–1488. [PubMed: 17898336]

Fassbender C, Murphy K, Foxe JJ, Wylie GR, Javitt DC, Robertson IH, et al. A topography of executive functions and their interactions revealed by functional magnetic resonance imaging. Cognitive Brain Research. 2004; 20(2):132–143. [PubMed: 15183386]

Finucane A, Mercer SW. An exploratory mixed methods study of the acceptability and effectiveness of Mindfulness-Based Cognitive Therapy for patients with active depression and anxiety in primary care. Biomedcentral Psychiatry. 2006; 6:14.

First, M.; Spitzer, R.; Gibbon, M.; Williams, J. Structured Clinical Interview for DSM-IV-TR Axis 1 Disorders-Patient Edition (SCID-I/P, 11/2002 revision). New York, New York: Biometrics Research Department; 2002.

Grossman P, Niemann L, Schmidt S, Walach H. Mindfulness-based stress reduction and health benefits. A meta-analysis. Journal of Psychosomatic Research. 2004; 57(1):35–43. [PubMed: 15256293]

Hansen E, Lundh LG, Homman A, Wangby-Lundh M. Measuring mindfulness: pilot studies with the Swedish versions of the Mindful Attention Awareness Scale and the Kentucky Inventory of Mindfulness Skills. Cognitive Behaviour Therapy. 2009; 38(1):2–15. [PubMed: 19125361]

Hayes SC, Wilson KG, Gifford EV, Follette VM, Strosahl K. Experimental avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. A Journal of Consulting and Clinical Psychology. 1996; 64(6):1152–1168.

Herwig U, Kaffenberger T, Jancke L, Bruhl AB. Self-related awareness and emotion regulation. Neuroimage. 2010; 50(2):734–741. [PubMed: 20045475]

Hoge CW, Terhakopian A, Castro CA, Messer SC, Engel CC. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. American Journal of Psychiatry. 2007; 164(1):150–153. [PubMed: 17202557]

Holm S. A simple sequentially rejective multiple test procedure. Scandinavian Journal of Statistics. 1979; 6:65–70.

Holzel BK, Ott U, Hempel H, Hackl A, Wolf K, Stark R, et al. Differential engagement of anterior cingulate and adjacent medial frontal cortex in adept meditators and non-meditators. Neuroscience Letters. 2007; 421(1):16–21. [PubMed: 17548160]

Jermann F, Billieux J, Laroi F, d'Argembeau A, Bondolfi G, Zermatten A, et al. Mindful Attention Awareness Scale (MAAS): Psychometric properties of the French translation and exploration of its relations with emotion regulation strategies. Psychological Assessment. 2009; 21(4):506–514. [PubMed: 19947785]

Kabat-Zinn J. An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results. General Hospital Psychiatry. 1982; 4(1):33–47. [PubMed: 7042457]

Kabat-Zinn J, Massion AO, Kristeller J, Peterson LG, Fletcher KE, Pbert L, et al. Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. American Journal of Psychiatry. 1992; 149(7):936–943. [PubMed: 1609875]

Kabat-Zinn, J.; Santorelli, SF. MBSR Curriculum Guide and Supporting Materials. Worcester, MA: Center for Mindfulness in Medicine, Health Care and Society; 2007.

Keane T, Fairbank JA, Caddell J, Zimering R, Taylor K, Mora C. Clinical Evaluation of a Measure to Assess Combat Exposure. A Journal of Consulting and Clinical Psychology. 1989; 1(1):53–55.

Kenny MA, Williams JM. Treatment-resistant depressed patients show a good response to Mindfulness-based Cognitive Therapy. Behaviour Research and Therapy. 2007; 45(3):617–625. [PubMed: 16797486]

Koenigs M, Grafman J. Posttraumatic stress disorder: the role of medial prefrontal cortex and amygdala. Neuroscientist. 2009; 15(5):540–548. [PubMed: 19359671]

Kristeller JL, Wolever RQ. Mindfulness-based eating awareness training for treating binge eating disorder: the conceptual foundation. Eating Disorders. 2011; 19(1):49–61. [PubMed: 21181579]

Kulka, R.; Schlenger, W.; Fairbank, J.; Hough, R.; Jordan, B.; Marmar, C., et al. Trauma and the Vietnam War Generation: Report of Findings from the National Vietnam Veterans Readjustment Study. New York: Routledge; 1990.

Lakusic N, Fuckar K, Mahovic D, Cerovec D, Majsec M, Stancin N. Characteristics of heart rate variability in war veterans with post-traumatic stress disorder after myocardial infarction. Military Medicine. 2007; 172(11):1190–1193. [PubMed: 18062395]

Langley, R. Practical Statistics Simply Explained. London: Pan Books; 1979.

Lieberman MD, Eisenberger NI, Crockett MJ, Tom SM, Pfeifer JH, Way BM. Putting feelings into words: affect labeling disrupts amygdala activity in response to affective stimuli. Psychological Science. 2007; 18(5):421–428. [PubMed: 17576282]

Linehan MM, Heard HL, Armstrong HE. Naturalistic follow-up of a behavioral treatment for chronically parasuicidal borderline patients. Archives of General Psychiatry. 1993; 50(12):971–974. [PubMed: 8250683]

Ma SH, Teasdale JD. Mindfulness-based cognitive therapy for depression: replication and exploration of differential relapse prevention effects. A Journal of Consulting and Clinical Psychology. 2004; 72(1):31–40.

Marciniak MD, Lage MJ, Dunayevich E, Russell JM, Bowman L, Landbloom RP, et al. The cost of treating anxiety: the medical and demographic correlates that impact total medical costs. Depression and Anxiety. 2005; 21(4):178–184. [PubMed: 16075454]

Mason O, Hargreaves I. A qualitative study of mindfulness-based cognitive therapy for depression. British Journal of Medical Psychology. 2001; 74(Part 2):197–212.

McKee L, Zvolensky MJ, Solomon SE, Bernstein A, Leen-Feldner E. Emotional-vulnerability and mindfulness: a preliminary test of associations among negative affectivity, anxiety sensitivity, and mindfulness skills. Cognitive Behaviour Therapy. 2007; 36(2):91–101. [PubMed: 17530495]

Mellman TA, Knorr BR, Pigeon WR, Leiter JC, Akay M. Heart rate variability during sleep and the early development of posttraumatic stress disorder. Biological Psychiatry. 2004; 55(9):953–956. [PubMed: 15110740]

Miller JJ, Fletcher K, Kabat-Zinn J. Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders. General Hospital Psychiatry. 1995; 17(3):192–200. [PubMed: 7649463]

Muraoka MY, Carlson JG, Chemtob CM. Twenty-four-hour ambulatory blood pressure and heart rate monitoring in combat-related posttraumatic stress disorder. Journal of Traumatic Stress. 1998; 11(3):473–484. [PubMed: 9690188]

Nicastro R, Jermann F, Bondolfi G, McQuillan A. Assessment of Mindfulness With the French Version of the Kentucky Inventory of Mindfulness Skills in Community and Borderline Personality Disorder Samples. Assessment. 2010:197–205. [PubMed: 20212075]

Oken BS, Salinsky MC, Elsas SM. Vigilance, alertness, or sustained attention: physiological basis and measurement. Clinical Neurophysiology. 2006; 117(9):1885–1901. [PubMed: 16581292]

Pan X, Hu Y, Li L, Li J. Evaluative-feedback stimuli selectively activate the self-related brain area: an fMRI study. Neuroscience Letters. 2009; 465(1):90–94. [PubMed: 19732807]

Pole N. Moderators of PTSD-related psychophysiological effect sizes: results from a meta-analysis. Annals of the New York Academy of Sciences. 2006; 1071:422–424. [PubMed: 16891589]

Pole N. The psychophysiology of posttraumatic stress disorder: a meta-analysis. Psychological Bulletin. 2007; 133(5):725–746. [PubMed: 17723027]

Price CJ, McBride B, Hyerle L, Kivlahan DR. Mindful awareness in body-oriented therapy for female veterans with post-traumatic stress disorder taking prescription analgesics for chronic pain: a feasibility study. Alternative Therapies in Health and Medicine. 2007; 13(6):32–40. [PubMed: 17985809]

Rubia K. The neurobiology of Meditation and its clinical effectiveness in psychiatric disorders. Biological Psychology. 2009; 82(1):1–11. [PubMed: 19393712]

Schell TL, Marshall GN, Jaycox LH. All symptoms are not created equal: the prominent role of hyperarousal in the natural course of posttraumatic psychological distress. Journal of Abnormal Psychology. 2004; 113(2):189–197. [PubMed: 15122939]

Schindel-Allon I, Aderka IM, Shahar G, Stein M, Gilboa-Schechtman E. Longitudinal associations between post-traumatic distress and depressive symptoms following a traumatic event: a test of three models. Psychological Medicine. 2010:1–10.

Segal, ZV.; Williams, MG.; Teasdale, JD. Mindfulness-Based Cognitive Therapy for Depression: A New Approach to Preventing Relapse. New York: Guilford Press; 2002.

Sephton SE, Salmon P, Weissbecker I, Ulmer C, Floyd A, Hoover K, et al. Mindfulness meditation alleviates depressive symptoms in women with fibromyalgia: results of a randomized clinical trial. Arthritis and Rheumatism. 2007; 57(1):77–85. [PubMed: 17266067]

Shapiro SL, Bootzin RR, Figueredo AJ, Lopez AM, Schwartz GE. The efficacy of mindfulness-based stress reduction in the treatment of sleep disturbance in women with breast cancer: an exploratory study. Journal of Psychosomatic Research. 2003; 54(1):85–91. [PubMed: 12505559]

Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. Journal of Clinical Psychology. 2006; 62(3):373–386. [PubMed: 16385481]

Shin LM, Rauch SL, Pitman RK. Amygdala, medial prefrontal cortex, and hippocampal function in PTSD. Annals of the New York Academy of Sciences. 2006; 1071:67–79. [PubMed: 16891563]

Solomon SD, Davidson JR. Trauma: prevalence, impairment, service use and cost. Journal of Clinical Psychiatry. 1997; 58(Suppl 9):5–11. [PubMed: 9329445]

Solomon Z, Horesh D, Ein-Dor T. The longitudinal course of posttraumatic stress disorder symptom clusters among war veterans. Journal of Clinical Psychiatry. 2009; 70(6):837–843. [PubMed: 19573481]

Tacon AM, McComb J, Caldera Y, Randolph P. Mindfulness meditation, anxiety reduction, and heart disease: a pilot study. Fam Community Health. 2003; 26(1):25–33. [PubMed: 12802125]

Tanielian, T.; Jaycox, LH., editors. Invisibile wounds of war: psychological and cognitive injuries, their consequences, and services to assist recovery. Santa Monica, CA: RAND Corporation; 2008.

Teasdale JD, Segal ZV, Williams JM, Ridgeway VA, Soulsby JM, Lau MA. Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. A Journal of Consulting and Clinical Psychology. 2000; 68(4):615–623.

Thompson BL, Waltz J. Mindfulness and experiential avoidance as predictors of posttraumatic stress disorder avoidance symptom severity. Journal of Anxiety Disorders. 2010; 24(4):409–415. [PubMed: 20304602]

Travis F, Arenander A. EEG asymmetry and mindfulness meditation.[comment]. Psychosomatic Medicine. 2004; 66(1):147–148. author reply 147–148. [PubMed: 14747649]

Vujanovic AA, Bonn-Miller MO, Marlatt GA. Posttraumatic stress and alcohol use coping motives among a trauma-exposed community sample: The mediating role of non-judgmental acceptance. Addictive Behaviours. 2011 2011 Jul; 36(7):707–712.

Vujanovic AA, Youngwirth NE, Johnson KA, Zvolensky MJ. Mindfulness-based acceptance and posttraumatic stress symptoms among trauma-exposed adults without axis I psychopathology. Journal of Anxiety Disorders. 2009; 23(2):297–303. [PubMed: 18834701]

Williams JM, Duggan DS, Crane C, Fennell MJ. Mindfulness-Based cognitive therapy for prevention of recurrence of suicidal behavior. A Journal of Consulting and Clinical Psychology. 2006; 62(2):201–210.

Witkiewitz K, Bowen S. Depression, craving, and substance use following a randomized trial of mindfulness-based relapse prevention. A Journal of Consulting and Clinical Psychology. 2010; 78(3):362–374.

Wyland CL, Kelley WM, Macrae CN, Gordon HL, Heatherton TF. Neural correlates of thought suppression. Neuropsychologia. 2003; 41(14):1863–1867. [PubMed: 14572519]

Table 1

Measures by group

Measure	Combat, PTSD[e] (n=15)	Combat, Non-PTSD (n=15)	Non-Combat, Non-PTSD (n=15)	Statistics
Age	55.9 ± 10.4	51.0 ± 13.0	54.8 ± 9.1	F(2,44)=.81, p=0.45
Mindful Awareness[b]	3.0 ± .90[f]	3.4 ± .75	2.9 ± .79	F(2,44)=1.44, p=0.25
Mindful Non-Judging[c]	22.5 ± 8.2	33.5 ± 7.1	30.7 ± 9.5	$F(2,44)=7.2$, $p=.002$
Re-experiencing	20.2 ± 7.0	1.7 ± 2.7	4.2 ± 6.0	$X^2=26.7$; $p=.0001$ [a]
Numbing-Avoiding	31.5 ± 7.5	5.0 ±6.1	4.4 ± 7.9	$X^2=28.2$; $p=.0001$ [a]
Hyper-arousal	23.9 ± 4.0	6.4 ± 5.8	2.3 ± 4.5	$X^2=0.88$; $p=.0001$ [a]
CAPS Total[d]	75.3 ± 13.2	11.6 ± 11.8	10.9 ± 14.1	$X^2=26.5$; $p=.0001$ [a]
Combat Exposure Scale	29.6 ± 10.1	18.9 ± 8.8	0.5 ± 1.1	$X^2=0.88$; $p=.0001$ [a]
Beck Depression Inventory	19.8 ± 13.7	9.8 ± 8.0	13.0 ± 9.4	$X^2=5.0$; $p=.08$ [a]

[a] Independent samples Kruskal-Wallis non-parametric test.

[b] Mindful Awareness-The Mindfulness Attention Awareness Scale.

[c] Mindful Non-Judging-Accept without Judgment subscale from the Kentucky Inventory of Mindfulness Skills.

[d] CAPS-Clinician administered post-traumatic stress disorder scale.

[e] PTSD-posttraumatic stress disorder

[f] Mean plus or minus standard deviation

Table 2

Zero-order Pearson correlations of PTSD symptoms and mindfulness scales

	Re-experiencing	Numbing-Avoiding	Hyper-arousal	Combat	Mindful Awareness	Mindful Non-judging
Re-experiencing	-	.82[b]	.76[b]	.48[a]	.02	−.62[b]
Numbing-Avoiding	-	-	.86[b]	.56[b]	−.01	−.50[b]
Hyper-arousal	-	-	-	.68[b]	−.08	−.46[a]
Combat Exposure	-	-	-	-	.09	−.13
Mindful Awareness	-	-	-	-	-	.06
Mean	**8.7**	**13.6**	**10.8**	**16.3**	**28.9**	**43.1**
Standard deviation	**9.9**	**14.6**	**10.6**	**14.3**	**9.4**	**11.4**

n=45

[a] p<.001

[b] p<.0005

Table 3

Regression analyses

	Adjusted R^2	ΔR^{2a}	B	SE B[b]	β	*p*
Re-experiencing	.22	.23	.33	.09	.48	.001
Step 1-Combat Exposure	.52	.32	.01	.09	.02	.88
Step 2-Mindfulness			−.60	−.57	−.57	<.005
Awareness						
Non-Judging						
Numbing-Avoiding	.30	.32	57	.13	.56	<.0005
Step 1-Combat Exposure	.47	.19	−.04	.14	−.03	.78
Step 2-Mindfulness			−.68	.17	−.44	<.0005
Awareness						
Non-judging						
Hyper-arousal	.46	.47	.50	.08	.68	<.0005
Step 1-Combat Exposure	.60	.16	−.11	.09	−.12	.237
Step 2-Mindfulness			−.42	.11	−.37	<.0005
Awareness						
Non-Judging						

[a] Change in R^2

[b] Standard error B