

Association of Participation in a Mindfulness Program With Measures of PTSD, Depression and Quality of Life in a Veteran Sample

David J. Kearney, Kelly McDermott, Carol Malte, Michelle Martinez, and Tracy L. Simpson

VA Puget Sound Health Care System, Seattle, WA

Objectives: To assess outcomes of veterans who participated in mindfulness-based stress reduction (MBSR). **Design:** Posttraumatic stress disorder (PTSD) symptoms, depression, functional status, behavioral activation, experiential avoidance, and mindfulness were assessed at baseline, and 2 and 6 months after enrollment. **Results:** At 6 months, there were significant improvements in PTSD symptoms (standardized effect size, $d = -0.64$, $p < 0.001$); depression ($d = -0.70$, $p < 0.001$); behavioral activation ($d = 0.62$, $p < 0.001$); mental component summary score of the Short Form-8 ($d = 0.72$, $p < 0.001$); acceptance ($d = 0.67$, $p < 0.001$); and mindfulness ($d = 0.78$, $p < 0.001$), and 47.7% of veterans had clinically significant improvements in PTSD symptoms. **Conclusions:** MBSR shows promise as an intervention for PTSD and warrants further study in randomized controlled trials. © 2011 Wiley Periodicals, Inc. *J Clin Psychol* 68:101–116, 2012.

Keywords: mindfulness; posttraumatic stress disorder; acceptance; depression; meditation

Posttraumatic stress disorder (PTSD) is a worldwide problem that is associated with major decrements in quality of life and with significant comorbidity across the lifespan. Clinically, PTSD is characterized by recurrent, intrusive recollections or reexperiencing of a traumatic event, persistent avoidance of internal and external cues that trigger reexperiencing, emotional numbing, and hyperarousal (Diagnostic and Statistical Manual, Fourth Edition, Text Revision [DSM-IV-TR]; American Psychiatric Association 2000). PTSD occurs in alarming proportions among both civilians and soldiers exposed to war or violence. Among soldiers deployed to Iraq, surveys using DSM-IV symptom criteria have shown a prevalence of PTSD of 20.7% to 30.5% 3 and 12 months after deployment (Thomas et al., 2010). The occurrence of PTSD among Vietnam era veterans is similarly high; studies indicate a lifetime prevalence of 10%–31% (Destefano, 1988; Eisen et al., 2004; Kulka, Schlenger, & Fairbank, 1990). Among veterans with histories of military sexual trauma, the rate of current PTSD ranges from 29% to 60% (Himmelfarb, Yaeger, & Mintz, 2006; Kimerling et al., 2010; Shipherd, Pineles, Gradus, & Resick, 2009). PTSD also occurs in a significant proportion of the general population of the United States, with a projected lifetime risk of 8.7% (Kessler, Berglund, Demler, Jin, & Walters, 2005). Symptoms of PTSD often persist for decades, and typically result in major disruptions in interpersonal relationships, physical comorbidity, substance abuse, affective disorders, impaired ability to work, and a high rate of attempted suicide (Davidson, 2001; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995).

Veterans Administration (VA) practice guidelines recommend the use of empirically supported pharmacologic and psychotherapeutic treatments for PTSD. Recommended pharmacologic agents include selective serotonin-reuptake inhibitors (SSRIs) and prazosin, and recommended psychotherapeutic approaches include cognitive processing therapy (CPT), prolonged exposure (PE) therapy, stress management skills training, and eye movement desensitization reprocessing (EMDR; Department of Veterans Affairs/Department of Defense, 2010). Recently, in an effort to increase access to evidence-based treatments for PTSD, the VA disseminated PE and CPT through national provider training rollouts; these

Correspondence concerning this article should be addressed to: David Kearney, Seattle VAMC 111GI, 1660 S. Columbian Way, Seattle, WA 98108; e-mail: david.kearney@va.gov

efforts have met with initial success (Karlin et al., 2010). The increased availability of PE and CPT for PTSD within the VA will undoubtedly provide benefit to many veterans with PTSD.

These behavioral interventions and SSRIs reduce the hallmark features of chronic PTSD, but often fail to address the entire realm of psychopathology (Lombardo, 2005). The utility of PE therapy is also limited by a high dropout rate (38%; Schnurr et al., 2007). PE and EMDR are typically delivered individually by an expert therapist, which limits the ability to deliver these modalities to large numbers of patients. In addition, most clinical trials of treatments for PTSD have excluded patients with significant comorbidity, potentially limiting the applicability of the findings to clinical practice (Lombardo & Gray, 2005). Given the large number of veterans with PTSD, additional treatments suitable for broad implementation are needed that address residual symptoms and persistent reductions in quality of life.

Acceptance-oriented interventions that involve developing increased mindfulness have been proposed as viable alternatives or complements to the standard trauma-focused interventions for PTSD (Kimbrough, Magyari, Langenberg, Chesney, & Berman, 2010; Simpson et al., 2007). Mindfulness has been defined as “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994). Mindfulness emphasizes attending to present moment experience, including thoughts, emotions, and physical sensations, in a nonjudgmental manner (Ludwig & Kabat-Zinn, 2008). Prior research shows that mindfulness skills are enhanced after participation in a structured mindfulness education program, which usually includes instruction from a teacher, opportunities for discussion and questions, and the practice of mindfulness meditation by participants both in class and at home (Baer et al., 2008; Carmody & Baer, 2008; Ludwig & Kabat-Zinn).

Prior clinical studies support teaching mindfulness in the management of a variety of conditions, including chronic pain (Kabat-Zinn, Lipworth, Burney, & Sellers, 1987; Morone, Greco, & Weiner, 2008; Randolph, Caldera, Tacone, & Greak, 1999), psoriasis (Kabat-Zinn et al., 1998), anxiety (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Carmody & Baer, 2008; Goldin & Gross, 2010), fibromyalgia (Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007), cancer care (Carlson, Speca, Patel, & Goodey, 2003, 2004; Speca, Carlson, Goodey, & Angen, 2000), and depression (Ma & Teasdale, 2004; Teasdale et al., 2000). Teaching mindfulness has been postulated to foster a more participatory role for patients with chronic conditions by teaching the ability to engage internal resources to maintain or regain health (Ludwig & Kabat-Zinn, 2008). In addition, there is evidence that participation in an 8-week mindfulness course results in potentially beneficial changes in neurophysiology (Davidson, 2003) and gray matter density (Hölzel et al., 2011).

A common clinical method of teaching mindfulness is a standardized class series called MBSR (Baer, 2003), which is widely available. In setting of PTSD, a small open-trial pilot study of adult survivors of childhood sexual abuse assessed outcomes of MBSR (Kimbrough et al., 2010). Among the 27 participants (15 of whom met PCL (PTSD checklist) criteria for PTSD at baseline), Kimbrough et al. found significant reductions in depression (effect size = 1.0) and PTSD (effect size 0.8), and a significant increase in mindfulness (effect size = 1.0) 24 weeks after enrolling in mindfulness-based stress reduction (MBSR). Acceptance and commitment therapy (ACT), a treatment paradigm that incorporates some elements of mindfulness, has also been proposed as a treatment for PTSD (Follette & Pistorello, 2007; Orsillo & Batten, 2005; Walser & Westrup, 2007), but clinical outcome data are currently lacking.

The purpose of this study was to examine measures of mental health and quality of life before and after participation in a mindfulness program delivered in a group setting to a heterogeneous group of veterans with a high prevalence of PTSD. In this trial, MBSR was provided as an adjunct to the usual care of veterans at a large VA medical center. The study was designed as a practical clinical trial, with relatively broad inclusion criteria, so that the patients studied would be similar to those seen in clinical settings. The intervention was delivered in groups of 20–30 veterans to assess the feasibility of providing the intervention in a format that could facilitate widespread availability. MBSR has been described as fostering an enhanced ability to bring sustained, nonjudgmental attention to cognitive, emotional, and physical experiences, (Kabat-Zinn, 1982), including difficult experiences, which could be

hypothesized to positively influence the symptoms, behaviors, and quality of life of veterans with PTSD. Specifically, the purpose of this study was to assess the acceptability and safety of MBSR for veterans and whether participation in MBSR is associated with improvement in PTSD symptoms, depression, behavioral activation, quality of life, experiential avoidance, and mindfulness. The clinical outcomes, acceptability and safety of MBSR for veterans with symptoms of PTSD have not been previously studied.

METHODS

A prospective, longitudinal follow-up study of veterans who took part in MBSR as an adjunct to their usual care was performed at a large, urban VA Hospital. The study was approved by the Institutional Review Board (IRB) and Research and Development committees of the VA hospital. Written informed consent was obtained before participation. No monetary compensation was provided to study participants and there was no cost to participants for the MBSR course. The study participants were part of a longitudinal follow-up study of several health outcomes of MBSR (Kearney, McDermott, Martinez, & Simpson, 2011).

Participants

Over a 17-month period, 92 veterans, 70 male and 22 female, who participated in the hospital-wide MBSR course offering were studied. The recruitment and retention of participants in the study is summarized in Figure 1. The study population represents veterans who agreed to complete research measures in addition to clinical participation in the MBSR class series. Participants in MBSR either self-referred or were referred by a health care provider. Any veteran who wanted to participate in MBSR after attending a 45-minute orientation video (Bill Moyers ‘Healing and the Mind’) was allowed to participate in MBSR if there were no

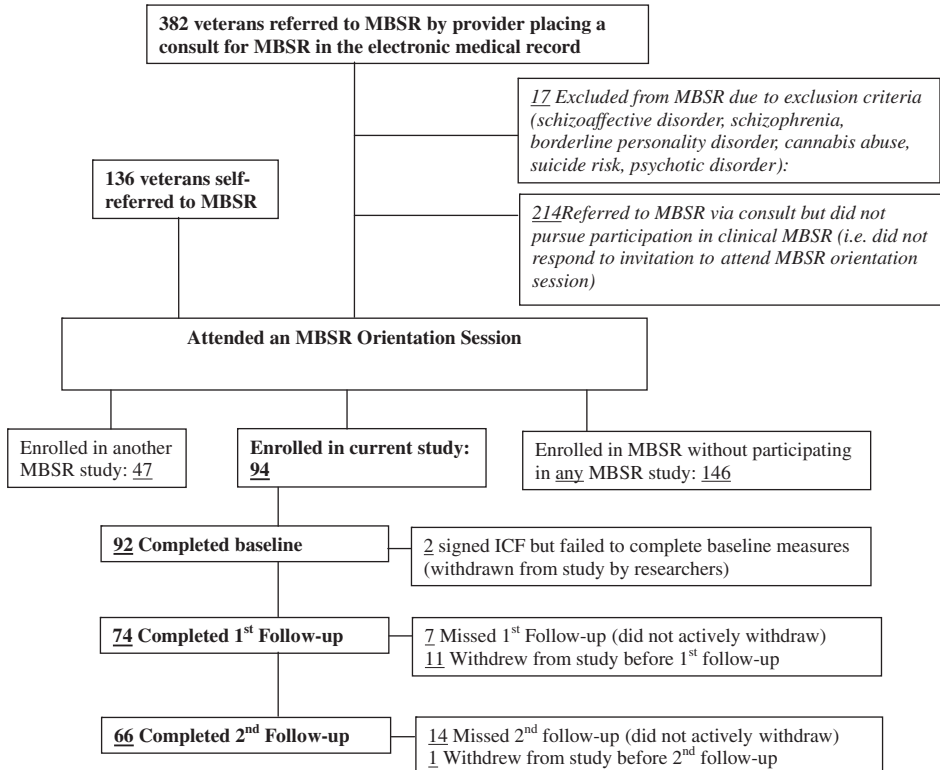


Figure 1. Flow diagram demonstrating participation of subjects from referral to follow up

clinical exclusion criteria (as assessed by review of the electronic medical record). Clinical (and research) exclusion criteria for participation in MBSR are as follows: a history of a psychotic disorder; mania, or poorly controlled bipolar disorder; borderline or antisocial personality disorder; current suicidal or homicidal ideation with intent; and active substance use disorder. The electronic medical record review included assessment of all provider notes within 2–3 months before enrollment in the study to determine whether any of the exclusion criteria were present. A structured psychiatric interview or other formal assessment was not performed to assess for these conditions.

Measures

Demographics. Demographic characteristics were recorded using a written questionnaire.

PTSD symptoms. The PTSD Checklist–Civilian version (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993) is a 17-item questionnaire that assesses Criteria B, C, and D of the PTSD construct consistent with the DSM-IV (American Psychiatric Association, 2000). Participants rated how much they were bothered in the past month by each symptom on a 5-point scale, ranging from 1 (*not at all*) to 5 (*extremely*). The Cronbach alpha of the PCL-C was found to be high (0.97) in a sample of veterans seeking PTSD treatment (Weathers et al.) and 0.94 in the present sample. Values of 38 for women (Dobie et al., 2002) and 44 for men (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996) were used as cutoff scores to provide descriptive information about the sample regarding the proportion who screened positive for a likely diagnosis of PTSD.

Depression. The Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001) was used to assess depression. The sensitivity and specificity of the PHQ-9 compare favorably with structured psychiatric interviews and the Cronbach alpha was found to be 0.89 in a sample of primary care patients (Kroenke et al.) and to be 0.88 in the present sample.

Behavioral activation. The Behavioral Activation for Depression Scale (BADSD; Kanter, Mulick, Busch, Berlin, & Martell, 2007; Kanter, Rusch, Busch, & Sedivy, 2009) assesses the ability to engage in activities to achieve goals despite aversiveness. Respondents rate 25 items on a 7-point scale, ranging from 0 (*not at all*) to 6 (*completely*). Higher scores reflect greater behavioral activation and less avoidance. The Cronbach alpha for the BADSD was found to be 0.92 in both a community dwelling sample (Kanter et al., 2009) and in the present sample.

Health status. The Short Form-8 (SF-8; Ware, Kosinski, Dewey, & Gandek, 2001) was used to assess health status and health-related quality of life. The Physical Component Summary (PCS) and Mental Component Summary (MCS) scores were each calculated. The MCS of the SF-8 gives greater weight to mental domains (social functioning, role limitations because of emotional problems, and mental health) than physical domains (physical functioning, role limitations because of physical problems, bodily pain, general health and vitality), whereas the PCS gives greater weight to the physical domains than the mental domains. Higher PCS and MCS scores reflect greater quality of life. The Cronbach alpha for the SF-8 in the current sample was 0.88.

Experiential avoidance. The Acceptance and Action Questionnaire (AAQ) is a 22-item self-report measure of experiential avoidance (avoidance of thoughts, feelings, and other private events, and the contexts that engender them; Hayes et al., 2004). Respondents rate items on a 7-point scale ranging from 1 (*never true*) to 7 (*always true*). The AAQ reliability and validity of the AAQ are acceptable (Hayes et al.), though specific information is lacking. The Cronbach alpha for the present sample is 0.84. As scored in this study, higher scores on the AAQ reflect greater acceptance and less experiential avoidance.

Mindfulness. The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008) assesses mindfulness skills. Respondents rate 39 items that comprise domains for nonreactivity to internal experience, observing internal experience, acting with awareness, describing

internal experience, and nonjudgment of experience. Higher scores on the FFMQ reflect greater mindfulness skills. Validation studies show that the FFMQ has adequate convergent validity and incremental validity in the prediction of psychological symptoms (Baer et al., 2008); however, the internal consistency of the full scale is not available from these validation studies. The Cronbach alpha for the full scale based on the current sample is 0.93.

Procedure

After baseline assessment, participants took part in an 8-week MBSR course. All participants continued their usual psychiatric and psychological care during the study, without intervention from the study team. Follow-up assessments were obtained immediately after treatment (2 months postbaseline) and 4 months after treatment (6 months postbaseline). Of the 92 participants were enrolled, 74 (80%) completed 2-month measures and 66 (72%) completed 6-month measures.

Throughout the study period, adverse events were monitored, including need for increased intensity of mental health care. Veterans were given contact information for the class instructors and study team and encouraged to report significant exacerbation of symptoms or adverse effects to the study coordinator or MBSR teacher.

Intervention: MBSR

The MBSR courses taught by instructors who meet professional guidelines for teaching MBSR and have extensive prior experience teaching MBSR. The MBSR intervention followed closely the curriculum developed by Jon Kabat-Zinn at the University of Massachusetts Medical School (Kabat-Zinn, 1982). The MBSR groups included veterans with a wide variety of mental and physical health problems, including PTSD, chronic pain, depression, severe physical disability, and other health issues (summarized in Table 1). There were approximately 5–10 study participants in each MBSR group of 20–30 male and female veterans. This study design was chosen to assess the feasibility of providing the intervention and conducting the clinical research in a practical format that facilitated rapid population of classes. In addition, in the MBSR model, it is thought that inclusion of participants with different clinical problems might result in therapeutic gain by a number of means, including placing an emphasis on learning specific mindfulness skills rather than attempting to alleviate symptoms of a specific disorder, and learning from other group members ways that mindfulness skills can be applied across other aspects of health. Also, teaching mindfulness skills to a group of persons with mixed diagnoses results in a de-emphasis on a specific diagnosis, which has the potential to reduce identification with a specific diagnostic category or disease state.

Participants met once per week (2.5 hours per session) for 8 weeks. During each meeting, participants practiced mindfulness meditation and yoga, received instructions from the teacher, and discussed homework assignments. Between the sixth and seventh week, participants met for 7 hours for a daylong mindfulness retreat, to practice mindfulness exercises more intensively. MBSR emphasizes bringing curiosity and nonjudgmental attention to present-moment experiences, including difficult or unpleasant experiences. This ability is taught using experiential exercises including the “body scan,” sitting meditation, and gentle yoga (Kabat-Zinn, 1990). Homework was assigned as daily meditation or yoga for 45 minutes per day, 6 days per week, using CDs as a guide. The mindfulness instructions in the class exercises, discussions, and homework assignments emphasized intention, attention, and attitude (Shapiro, Carlson, Astin, & Freedman, 2006). In the MBSR classes, participants were often asked to bring to mind their intention for participation in MBSR, (i.e., to bring into awareness the capacity they would like to develop through mindfulness practice). Participants were taught how to bring sustained attention to an aspect of their experience (e.g. a thought, emotion, or bodily sensation), and they were taught flexibility of attention, including the ability to disengage from ruminative cycles of thought (Segal, Williams, & Teasdale, 2002). The quality or attitude of attention fostered in MBSR is one of openness, kindness, curiosity, and nonjudging of present-moment experience, including unpleasant or difficult experiences.

The “body scan” is a 45-minute guided exercise in which attention is systematically directed throughout the body while lying down with eyes closed. Purposes of the body scan include enhancement of the ability to direct and sustain attention, increased body awareness, and development of the ability to bring nonjudgmental awareness to passing thoughts and emotions (Kabat-Zinn, 1990). When distracted by thoughts during the body scan, veterans were instructed to notice thoughts without judging them or being drawn into them, and then return their attention to the body part attended to before the distraction. Sitting meditation was taught as a 30–45-minute exercise that involved sitting upright in a relaxed but wakeful posture. Veterans were asked to bring attention to the feeling of the breath. When thoughts arose during sitting meditation, participants were instructed to bring awareness to thought as an object of attention, and then to return to the breath. Instruction also included expanding awareness from the breath to the body as a whole for a period of time, and meditating on the breath while expanding awareness to include sound. Gentle yoga postures were taught as a form of “mindful movement.” The yoga postures comprised gentle stretching and strengthening exercises that were performed very slowly. Participants were encouraged to bring moment-to-moment awareness of the breath and the sensations that arose in each yoga posture. The gentle yoga postures were intended to help participants develop greater awareness of bodily sensations, to relax, and to become stronger and more flexible. Because of concerns about physical limitations experienced by many veterans, the yoga sequence taught was simpler and gentler than the sequence suggested in *Full Catastrophe Living* (Kabat-Zinn, 1990). Informal MBSR homework practices involving bringing mindful attention to experiences in daily life (e.g., eating a meal, or noticing a pleasant or unpleasant experience) were also assigned.

Statistical Analyses

Participant characteristics are presented using descriptive statistics. Standardized mean differences (Cohen’s *d*) and 95% confidence intervals were calculated to assess the magnitude of change at each follow up time point, and repeated measures analysis of variance with planned contrasts were performed to examine differences in means between baseline and 2-month and 6-month assessments. In addition, linear mixed models were performed to evaluate change over the three time periods. This approach allows incorporation of all available information to maximize efficiency. The linear mixed model allowed for random intercepts and subject-specific slopes. Pearson’s correlation coefficients were used to assess relationships between fitted values that included the random effects based on each linear mixed model. In addition, computed change scores were calculated between baseline and 2 months and baseline and 6 months, to investigate the stability of the change over time and to examine correlations of periods of change among outcomes.

The proportion of subjects who had a clinically significant change (from baseline) in PTSD symptoms and functional status was calculated at the 2-month and 6-month time points. For PTSD, a clinically significant change was defined as a change of 10 or more points on the PCL (Jacobson & Truax, 1991; Monson et al., 2008). For functional status, a clinically significant change on the SF-8 MCS and PCS summary scores was defined as a change of 10 or more points, which represents one standard deviation (Ware et al., 2001).

Mediation analyses were conducted to determine if changes in mindfulness skills (as measured by the FFMQ) mediated changes in outcomes (PTSD symptoms, depression and functional status). Specifically, mediation analyses were conducted with ordinary least squares regression, using procedures recommended for within-subject designs (Judd, Kenny, & McClelland, 2001), with time point (baseline vs. follow-up) used as the treatment condition. To assess mediation because of a concomitant variable (FFMQ) that varies between treatment conditions, the *Y* difference in outcomes (PTSD symptoms, depression and functional status) was regressed on both the *X* (FFMQ) sum and the *X* (FFMQ) difference (Judd et al.). According to this framework, if there is an overall treatment effect on *X* and the *X* difference predicts the *Y* difference, mediation of the treatment effect in *Y* by *X* is indicated. The portion of the mean treatment effect not mediated through *X* (i.e., the magnitude of the residual

treatment difference in Y , over and above mediation because of X) was estimated by centering X sum and determining the intercept in the regression equation, with 95% confidence intervals (Judd et al.).

All analyses were conducted using Stata 11 (StataCorp LP, College Station, Texas).

RESULTS

Sample Characteristics

The characteristics of the study sample are summarized in Table 1. The majority of participants were male (75%) and Caucasian (85%), with a mean age of 51 ± 10.6 years. Nearly three quarters of the participants (74%) screened positive for PTSD at baseline.

Class Attendance

The mean number of class sessions attended was 5.7 ± 2.83 , of 9 possible classes. Sixty-nine participants (74%) attended at least four class sessions, which we considered the minimum number of classes attended to be considered compliant (Teasdale et al., 2000). Those who did not attend at least four classes did not differ significantly from those who attended at least 4 classes on any of the following baseline characteristics: gender, age, ethnicity, PTSD severity, and mindfulness (data not shown). The only variable that those who did not complete at least four class sessions differed on from those who did was religious affiliation, wherein those who completed the four classes were more likely to endorse a specific religious affiliation (73.9%) than those who did not (30.4%), χ^2 (df) = 14.0 (1); $p < 0.001$.

Adverse Events

No serious adverse events were reported in the study. Specifically, no participants in MBSR withdrew from the intervention because of worsening of PTSD symptoms.

Effect Sizes Across Outcome, Functional Status, and Mindfulness Measures

Table 2 shows the mean scores and effect sizes for the outcome measures at each assessment point, with comparison to baseline. Focusing first on the main symptom outcomes, there was improvement in the PCL indicative of a medium effect size between baseline and 2 months and between baseline and 6 months. There were small to medium effect sizes seen for each of the PCL subscales between baselines and 2 months and baseline and 6 months: re-experiencing, active avoidance, emotional numbing, and hyperarousal. There was a medium effect size for improvement in PHQ-9 at 2 months and medium to large improvement at 6 months.

For measures of functional status, there were improvements in BADS of medium effect size at both 2 months and 6 months. In addition, there were improvements of medium to large effect size in MCS at 2 months and 6 months. Changes in PCS were significant at 2 months but were not significant at 6 months.

Changes over time in acceptance and mindfulness were also noted (Table 2). There were significant improvements in AAQ indicative of a medium effect size at 2 months and 6 months. Improvements in FFMQ were of medium to large effect sizes at 2 months and 6 months.

Of note, the magnitude of change from baseline to 2 months (in the direction of clinical improvement for all scores) was maintained between the 2 month and 6 month time points for all measures.

Clinically Significant Changes Over Time

To assess the frequency of clinically significant changes in measures of PTSD and functional status, the number and percentage of subjects with varying degrees of change from baseline were analyzed and are summarized in Table 3. At 6 months, 47.7% of veterans had clinically

Table 1
Participant Characteristics at Baseline ($n = 92$)

| Characteristic | No. (%) |
|---|----------------|
| Male | 70 (76) |
| Age (mean \pm SD) | 51 \pm 10.6 |
| Ethnicity ($n = 90$) | |
| White | 76 (84) |
| Black | 4 (4) |
| Hispanic | 6 (7) |
| Asian/PI/NA | 2 (2) |
| Other | 2 (2) |
| Religion | |
| Christian | 50 (54) |
| Buddhist | 2 (2) |
| Other | 6 (7) |
| Unknown | 34 (37) |
| Living situation ($n = 90$) | |
| Own/rent | 82 (91) |
| Homeless | 6 (7) |
| Other | 2 (2) |
| Service connection (SC) | |
| Any service connection | 59 (64) |
| At least 50% SC | 43 (47) |
| SC for PTSD | 21 (23) |
| Era of Service | |
| Vietnam | 29 (32) |
| Post-Vietnam | 18 (20) |
| Persian Gulf War | 35 (38) |
| Other | 10 (11) |
| Classes attended (mean \pm SD) 5.7 \pm 2.82 | |
| 0 classes | 7 (8) |
| 1–3 classes | 16 (17) |
| 4–6 classes | 24 (26) |
| 7–9 classes | 45 (49) |
| Baseline + PTSD screen ($n = 90$) | 67 (74) |
| Conditions listed in medical record | |
| Psychiatric | |
| Depressive disorders | 54 (58.7) |
| Bipolar disorders | 7 (7.6) |
| Anxiety disorders (not PTSD) | 16 (17.4) |
| PTSD | 32 (34.8) |
| Substance use disorders ^a | 18 (19.6) |
| ADD or ADHD | 7 (7.6) |
| Medical and pain | |
| Diabetes | 10 (10.9) |
| Hypertension | 24 (26.1) |
| Asthma or COPD | 5 (5.9) |
| GI disorders & conditions | 37 (40.2) |
| Pain conditions | 62 (67.4) |
| 2 or more pain conditions | 41 (44.6) |
| Sleep disorders | 22 (23.9) |
| Chronic fatigue syndrome | 3 (3.3) |
| Classes attended (mean \pm SD) | 5.7 \pm 2.82 |

Note. SD = standard deviation; PI = Pacific Islander; NA = Native American; SC = service connection; PTSD = posttraumatic stress disorder; ADD = attention deficit disorder; ADHD = attention deficit hyperactivity disorder; COPD = chronic obstructive pulmonary disease; GI = gastrointestinal

^a10 noted to be in remission.

Table 2
 Mean Summary Scores and Cohen's *d* Effect Sizes With 95% CI

| Summary scores | Baseline mean ±SD (<i>n</i> = 92) | 2 months mean ±SD (<i>n</i> = 74) | 6 months mean ±SD (<i>n</i> = 66) | Standardized mean difference: baseline to 2 months (95% CI) | Standardized mean difference: baseline to 6 months (95% CI) |
|------------------------|---------------------------------------|---------------------------------------|---------------------------------------|--|--|
| PCL | 52.4 ± 16.3 | 43.4 ± 16.3 | 41.9 ± 16.8 | −0.55 (−0.87 to −0.24) | −0.64 (−0.96 to −0.31) |
| <i>F</i> (<i>df</i>) | | 34.6 (136) | 40.0 (136) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |
| PCL subscale scores | | | | | |
| Re-experiencing | 14.2 ± 5.8 | 11.9 ± 5.3 | 11.0 ± 5.3 | −0.40 (−0.71 to −0.09) | −0.56 (−0.88 to −0.23) |
| <i>F</i> (<i>df</i>) | | 15.1 (136) | 26.6 (136) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |
| Active avoidance | 5.7 ± 2.6 | 4.8 ± 2.3 | 4.8 ± 2.5 | −0.36 (−0.67 to −0.05) | −0.35 (−0.67 to −0.03) |
| <i>F</i> (<i>df</i>) | | 9.0 (136) | 9.5 (136) | | |
| <i>p</i> value | | 0.003 | 0.003 | | |
| Emotional numbing | 15.7 ± 5.6 | 13.2 ± 5.3 | 12.6 ± 5.5 | −0.46 (−0.77 to −0.14) | −0.54 (−0.87 to −0.22) |
| <i>F</i> (<i>df</i>) | | 26.0 (136) | 31.5 (136) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |
| Hyperarousal | 16.9 ± 5.2 | 13.5 ± 5.4 | 13.4 ± 5.3 | −0.64 (−0.96 to −0.33) | −0.67 (−0.99 to −0.34) |
| <i>F</i> (<i>df</i>) | | 38.7 (136) | 30.9 (136) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |
| PHQ-9 | 14.7 ± 6.7 | 11.0 ± 7.2 | 9.8 ± 7.3 | −0.53 (−0.84 to −0.21) | −0.70 (−1.03 to −0.37) |
| <i>F</i> (<i>df</i>) | | 24.6 (136) | 34.3 (136) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |
| BADS | 72.9 ± 26.9 | 85.9 ± 28.3 | 90.8 ± 31.3 | 0.47 (0.16 to 0.78) | 0.62 (0.29 to 0.95) |
| <i>F</i> (<i>df</i>) | | 11.4 (134) | 21.8 (134) | | |
| <i>p</i> value | | 0.001 | <0.001 | | |
| SF-8 PCS | 39.8 ± 10.8 | 41.8 ± 11.2 | 42.5 ± 10.4 | 0.18 (−0.12 to 0.49) | 0.25 (−0.06 to 0.57) |
| <i>F</i> (<i>df</i>) | | 5.4 (138) | 3.6 (138) | | |
| <i>p</i> value | | 0.021 | ns | | |
| SF-8 MCS | 33.2 ± 10.6 | 40.3 ± 12.3 | 41.3 ± 12.2 | 0.62 (0.31 to 0.93) | 0.72 (0.39 to 1.04) |
| <i>F</i> (<i>df</i>) | | 23.1 (138) | 26.6 (138) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |
| AAQ | 80.1 ± 16.1 | 90.8 ± 16.5 | 91.7 ± 18.3 | 0.65 (0.34 to 0.97) | 0.68 (0.36 to 1.01) |
| <i>F</i> (<i>df</i>) | | 39.3 (136) | 35.5 (136) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |
| FFMQ | 108.0 ± 25.3 | 126.2 ± 27.7 | 127.9 ± 26.1 | 0.69 (0.38 to 1.01) | 0.78 (0.45 to 1.11) |
| <i>F</i> (<i>df</i>) | | 56.2 (137) | 56.4 (137) | | |
| <i>p</i> value | | <0.001 | <0.001 | | |

Note: CI = confidence intervals; PCL = PTSD checklist; SD = standard deviation; *df* = degrees of freedom; PHQ-9 = patient health questionnaire-9; BADS = Behavioral activation for depression scale; SF-8 PCS = short form-8 physical component summary; SF-8 MCS = short form-8 mental component summary; AAQ = acceptance and action questionnaire; FFMQ = five facet mindfulness questionnaire

significant improvement in PTSD symptoms, and 6.2% had clinically significant worsening of PTSD symptoms.

Correlation of Change in Mindfulness With Changes in Outcome Measures

Table 4 shows the correlation coefficients of change in FFMQ and changes in other summary scores. There was a significant correlation between change in FFMQ and change in PCL, PHQ, BADS, AAQ and MCS at 2 months, at 6 months and over the three time periods of the study. PCS was the only summary score where change was not correlated with change in FFMQ.

Table 3
Degree of Change From Baseline to 2 and 6 Months for PTSD and Functional Status Measures

| | PCL score | | MCS score | | PCS score | |
|----------------------|-----------|------|-----------|------|-----------|------|
| | No. | % | No. | % | No. | % |
| Change at 2 months | | | | | | |
| Worsened 10+ points | 3 | 4.2 | 4 | 5.3 | 4 | 5.3 |
| Worsened 5–10 points | 3 | 4.2 | 5 | 6.7 | 6 | 8.0 |
| Change <5 points | 20 | 27.8 | 28 | 37.3 | 44 | 58.7 |
| Improved 5–10 points | 17 | 23.6 | 13 | 17.3 | 10 | 13.3 |
| Improved 10+ points | 29 | 40.3 | 24 | 32.0 | 10 | 13.3 |
| Change at 6 months | | | | | | |
| Worsened 10+ points | 4 | 6.2 | 4 | 6.1 | 2 | 3.0 |
| Worsened 5–10 points | 4 | 6.2 | 2 | 3.0 | 6 | 9.1 |
| Change <5 points | 20 | 30.8 | 21 | 31.8 | 41 | 62.1 |
| Improved 5–10 points | 6 | 9.2 | 15 | 22.7 | 8 | 12.1 |
| Improved 10+ points | 31 | 47.7 | 24 | 36.4 | 9 | 13.6 |

Note: PTSD = posttraumatic stress disorder; PCL = PTSD checklist; SF-8 PCS = short form-8 physical component summary; SF-8 MCS = short form-8 mental component summary. A change of 10 or more points is considered clinically significant.

Table 4
Correlation Coefficients of Change in FFMQ With Change in Other Outcomes

| | 2 month change score | | 6 month change score | | Over all 3 time periods | |
|------|--------------------------|----------------|--------------------------|----------------|-------------------------|----------------|
| | Correlation ^a | <i>p</i> value | Correlation ^a | <i>p</i> value | Correlation | <i>p</i> value |
| PCL | −0.43 | <0.001 | −0.56 | <0.001 | −0.60 ^b | <0.001 |
| PHQ | −0.47 | <0.001 | −0.50 | <0.001 | −0.67 ^b | <0.001 |
| BADS | 0.58 | <0.001 | 0.64 | <0.001 | 0.72 ^b | <0.001 |
| AAQ | 0.48 | <0.001 | 0.58 | <0.001 | 0.80 ^b | <0.001 |
| PCS | 0.22 | ns | 0.08 | ns | 0.04 ^c | ns |
| MCS | 0.43 | <0.001 | 0.61 | <0.001 | 0.72 ^c | <0.001 |

Note: PCL = PTSD checklist; PHQ-9 = patient health questionnaire-9; BADS = Behavioral activation for depression scale; AAQ = acceptance and action questionnaire; PCS = short form-8 physical component summary; MCS = short form-8 mental component summary

^aPearson correlation coefficients of each follow up minus baseline.

^bCorrelations of fitted value from a linear mixed model with random intercepts and slopes.

^cCorrelations of fitted value from a linear mixed model with random intercepts.

Linear Mixed Models Assessing Change Over Time

Table 5 contains estimates and 95% confidence intervals from linear mixed models. With the exception of the PCS, all summary scores and subscales allowed for subject-specific slopes. All coefficients were significant at $p < 0.001$, except the PCS, which had significance levels of $p < 0.05$ at 2 and 6 months, and the PCL active avoidance subscale, which had a significance level of $p < 0.001$ at 2 months and $p < 0.01$ at 6 months.

Mediation Analyses

To assess mediation because of a concomitant variable (FFMQ) that varies between treatment conditions, changes in outcomes (change in PCL, PHQ-9, and MCS) were regressed on the FFMQ sum and the FFMQ difference (from baseline to follow-up). In the regression models, baseline FFMQ score was not predictive of change in outcomes at 2 or 6 months (indicating absence of moderation by FFMQ on outcomes), but FFMQ change from baseline to posttest was significantly associated with change in PCL, PHQ-9, and MCS at 2 and 6 months. These findings, which indicate mediation of outcomes by FFMQ, are summarized in Table 6. The intercept in this regression equation, which estimates the magnitude of the residual treatment difference in outcome variables, over and above mediation because of FFMQ (i.e., the portion of treatment effect not mediated through FFMQ) is also reported in Table 6. With the exception of PCL at 2 months, the portion of treatment effect not mediated by FFMQ was not significantly different than zero for all outcomes and time points.

DISCUSSION

This study found that veterans who took part in MBSR experienced significant improvements in measures of mental health, including measures of PTSD, depression, experiential avoidance, and behavioral activation as well as mental and physical health-related quality of life over a 6-month period. The MBSR program appeared to be safe for participants with symptoms of PTSD, and improvements in clinical outcome measures were maintained from the point of time when subjects finished MBSR (2 months after enrollment) until the longest follow-up time point 6 months after enrollment. The changes demonstrated for measures of mental health had medium to large standardized effect sizes. At 2-month follow-up, 40% of

Table 5
Linear Mixed Model Estimates

| Summary scores | 2 months vs. baseline coefficient (95%CI) | 6 months vs. baseline coefficient (95% CI) |
|-------------------|--|---|
| FFMQ | 17.9 (13.36 to 22.46) | 18.8 (14.02 to 23.56) |
| PHQ | -3.5 (-4.77 to -2.21) | -4.4 (-5.79 to -2.94) |
| BADS | 11.0 (5.46 to 16.58) | 15.1 (9.18 to 21.05) |
| AAQ | 9.9 (7.14 to 12.74) | 10.0 (6.62 to 13.29) |
| PCS | 2.0 (0.38 to 3.67) | 1.9 (0.15 to 3.58) |
| MCS | 6.7 (4.19 to 9.17) | 7.4 (4.75 to 10.14) |
| PCL | -8.4 (-10.77 to -6.12) | -9.7 (-12.90 to -6.52) |
| PCL subscales | | |
| Re-experiencing | -2.1 (-2.96 to -1.22) | -3.0 (-4.14 to -1.79) |
| Active avoidance | -0.8 (-1.29 to -0.38) | -0.9 (-1.50 to -0.28) |
| Emotional Numbing | -2.4 (-3.26 to -1.63) | -2.9 (-3.90 to -1.81) |
| Hyperarousal | -3.1 (-4.02 to -2.22) | -3.0 (-3.97 to -1.98) |

Note: FFMQ = five facet mindfulness questionnaire; PHQ-9 = patient health questionnaire-9; BADS = Behavioral activation for depression scale; AAQ = acceptance and action questionnaire; PCS = short form-8 physical component summary; MCS = short form-8 mental component summary; PCL = PTSD checklist.

Table 6

Results of Regression Analyses in Which Changes in Outcome Measures (PCL, PHQ-9 and MCS) Were Regressed on Change in FFMQ at 2 and 6 Months

| Outcome measure | Baseline to 2 months | | Baseline to 6 months | |
|-----------------|--|------------------------------|--|------------------------------|
| | Regression coefficients (95% CI): change in FFMQ | Nonmediated portion (95% CI) | Regression coefficients (95% CI): change in FFMQ | Nonmediated portion (95% CI) |
| PCL | 0.20 (0.10 to 0.31) | -4.67 (-7.66 to -1.69) | 0.37 (0.24 to 0.51) | -2.04 (-5.97 to 1.90) |
| <i>p</i> value | <0.001 | 0.003 | <0.001 | ns |
| PHQ-9 | 0.12 (0.07 to 0.18) | -1.24 (-2.83 to -0.35) | 0.15 (0.08 to 0.21) | -1.45 (-3.25 to -0.36) |
| <i>p</i> value | <0.001 | ns | <0.001 | ns |
| SF-8 MCS | 0.22 (0.11 to 0.33) | -2.58 (-5.74 to 0.58) | 0.33 (0.22 to 0.44) | -0.98 (-4.07 to 2.11) |
| <i>p</i> value | <0.001 | ns | <0.001 | ns |

Note: PCL = PTSD checklist; PHQ-9 = patient health questionnaire-9; MCS = short form-8 mental component summary; FFMQ = five facet mindfulness questionnaire.

participants had clinically significant reductions in PTSD symptoms, as did 48% of participants at the 6-month follow-up. In addition, mindfulness skills increased significantly over the course of the study, suggesting that the veterans who participated in MBSR successfully learned new mindfulness skills because of participation, and raising the possibility that increased mindfulness played a role in the changes seen. In mediation analyses, enhanced mindfulness skills mediated the relationship between participation in MBSR and improvement in measures of PTSD, depression, and quality of life. These results suggest that veterans with chronic conditions, including PTSD, might benefit from participation in MBSR as an adjunct to their usual clinical care.

Mindfulness practice has been postulated to constitute a form of exposure therapy (Baer, 2003). Consistent with this idea, our findings of an increase in behavioral activation and functional status along with a decrease in experiential avoidance support the hypothesis that an increase in mindfulness leads to decreased avoidance behaviors. This is postulated to occur because of mindfulness practice, which encourages participants to bring forth an attitude of curiosity and openness to experience, including difficult experience. Although these ideas remain to be tested specifically, it is possible that an enhanced ability to bring sustained nonjudgmental attention to difficult emotional states decreases emotional numbing and hypervigilance. Another possible mechanism by which MBSR could result in a decrease in PTSD symptomatology is through decreased rumination, which has been shown to mediate the relationship between beliefs about the trauma memory and current PTSD symptomatology (Bennett & Wells, 2010). Enhanced mindfulness has been shown to decrease rumination (Williams, 2008). For persons with PTSD, rumination might focus on evaluative thoughts about the trauma, or beliefs arising from the trauma. The level of distress caused by intrusive thoughts, as well as the tendency to avoid or suppress these thoughts (Shipherd & Salters-Pedneault, 2008), would be hypothesized to be reduced by mindfulness practice. There is evidence that avoidance of intrusive thoughts through thought suppression has the paradoxical effect of increasing reexperiencing for persons with PTSD (Shipherd & Beck, 2005). In the instructions provided in mindfulness practice, thoughts, including distressing thoughts related to trauma, are regarded as passing mental events, not to be avoided or suppressed, and there is evidence that mindfulness practice results in decreased thought suppression (Brown, Ryan, & Creswell, 2007). At this point, these comments regarding possible mechanisms of symptom reduction in PTSD remain speculative. Definitive, randomized controlled trials that assess PTSD symptomatology and with measurement of possible mechanisms are needed.

Our study had a number of limitations. The improvement in clinical measures could be because of regression to the mean; a control arm is needed to address this possibility. The improvement in mental health measures could also be due to nonspecific effects of provider interaction and participation in a group, rather than because of the effects of an increase in mindfulness. We measured mindfulness, and showed in a mediation model that enhanced mindfulness skills mediated the relationship between condition (baseline or follow-up) and change in PTSD symptoms, depression, and mental health-related quality of life. However, randomized controlled trials are needed to provide evidence in support of a causal association between MBSR, increased mindfulness, and improved outcomes in veterans. In addition, our study utilized only self-report measures. Although the PCL self-report measure for PTSD has good psychometric properties, a clinician interview is considered the optimal method for assessing PTSD (Weathers, Keane, & Davidson, 2001). An additional limitation is that we did not collect information about compliance with MBSR homework practice. Future trials should include measurement of MBSR homework practice to assess whether compliance is associated with improved outcomes. Also, our study was performed in a veteran population that was predominantly Caucasian and male and the results might not be generalizable to other populations. Finally, we had incomplete follow-up of some participants, which could introduce bias in the results.

The MBSR program evaluated in our study is a general mindfulness training program intended for persons with a variety of problems; the MBSR program was not modified for PTSD. Part of our intent was to study MBSR in the format in which it is typically taught because MBSR is already widely available. If MBSR is safe and associated with a reduction in PTSD symptoms, it could represent an additional resource for persons with PTSD. Given that MBSR is a group intervention, it is likely to be a cost-effective method of teaching mindfulness. The results from this open trial offer initial support for teaching MBSR to veterans with PTSD and other chronic conditions because it appears acceptable and safe, and improvement in clinical conditions is associated with participation in the course. Future research on MBSR for PTSD is warranted.

Acknowledgments

This material is the result of work supported by resources from the VA Puget Sound Health Care System, Seattle, Washington.

We would like to acknowledge the contribution of Kurt Hoelting, M.Div., who taught some of the MBSR classes.

We would also like to thank the Veterans involved in this study at VA Puget sound for their willingness to participate in this research.

None of the authors have financial or other conflicts of interest related to this work.

REFERENCES

- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual, Fourth Edition, Text Revision*. Washington, DC: Author.
- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*(2), 125–143.
- Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S. et al. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment, 15*(3), 329–342.
- Bennett, H., & Wells, A. (2010). Metacognition, memory disorganization and rumination in posttraumatic stress symptoms. *Journal of Anxiety Disorders, 24*(3), 318–325.
- Bohlmeijer, E., Prenger, R., Taal, E., & Cuijpers, P. (2010). The effects of mindfulness-based stress reduction therapy on mental health of adults with a chronic medical disease: A meta-analysis. *Journal of Psychosomatic Research, 68*(6), 539–544.
- Brown, K. W., Ryan, R. A., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*(4), 211–237.

- Carlson, L. E., Speca, M., Patel, K. D., & Goodey, E. (2003). Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress, and immune parameters in breast and prostate cancer outpatients. *Psychosomatic Medicine, 65*(4), 571–581.
- Carlson, L. E., Speca, M., Patel, K. D., & Goodey, E. (2004). Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress and levels of cortisol, dehydroepiandrosterone sulfate (DHEAS) and melatonin in breast and prostate cancer outpatients. *Psychoneuroendocrinology, 29*(4), 448–474.
- Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*(1), 23–33.
- Davidson, J. R. T. (2001). Recognition and treatment of posttraumatic stress disorder. *Journal of the American Medical Association, 286*(5), 584–588.
- Davidson, R. J. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine, 65*(4), 564–570.
- Department of Veterans Affairs / Department of Defense (2010). *VA / DoD Clinical Practice Guideline for Management of Post-Traumatic Stress*. Washington, DC: Author.
- Destefano, F. (1988). Health-status of vietnam veterans.I. Psychosocial characteristics. *Journal of the American Medical Association, 259*(18), 2701–2707.
- Eisen, S. A., Griffith, K. H., Xian, H., Scherrer, J. F., Fischer, I. D., Chantarujikapong, S. ... Tsuang, M.T. (2004). Lifetime and 12-month prevalence of psychiatric disorders in 8,169 male Vietnam War era veterans. *Military Medicine, 169*(11), 896–902.
- Follette, V.M., & Pistorello, J. (2007). Finding life beyond trauma: Using acceptance and commitment therapy to heal from post-traumatic stress and trauma-related problems (pp. 266). Oakland, CA: New Harbinger.
- Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*(1), 83–91.
- Grossman, P., Tiefenthaler-Gilmer, U., Raysz, A., & Kesper, U. (2007). Mindfulness training as an intervention for fibromyalgia: Evidence of postintervention and 3-year follow-up benefits in well-being. *Psychotherapy and Psychosomatics, 76*(4), 226–233.
- Hayes, S. C., Strosahl, K., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D. ... McCurry, S.M. (2004). Measuring experiential avoidance: A preliminary test of a working model. *Psychological Record, 54*(4), 553–578.
- Himmelfarb, N., Yaeger, D., & Mintz, J. (2006). Posttraumatic stress disorder in female veterans with military and civilian sexual trauma. *Journal of Traumatic Stress, 19*(6), 837–846.
- Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S.W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging, 191*(1), 36–43.
- Jacobson, N. S., & Truax, P. (1991). Clinical significance - A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology, 59*(1), 12–19.
- Judd, C. M., Kenny, D. A., & McClelland, G. H. (2001). Estimating and testing mediation and moderation in within-subject designs. *Psychological Methods, 6*(2), 115–134.
- Kabat-Zinn, J. (1982). 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, 4*(1), 33–47.
- Kabat-Zinn, J. (1990). *Full catastrophe living. Using the wisdom of your body and mind to face stress, pain and illness*. New York: Bantam Doubleday Dell Publishing.
- Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life* (1st ed.). New York: Hyperion.
- Kabat-Zinn, J., Lipworth, L., Burney, R., & Sellers, W. (1987). Four-year follow-up of a meditation-based program for the self-regulation of chronic pain: Treatment outcomes and compliance. *The Clinical Journal of Pain, 2*, 159–173.
- Kabat-Zinn, J., Wheeler, E., Light, T., Skillings, A., Scharf, M. J., Croypley, T. G. ... Bernhard, J.D. (1998). Influence of a mindfulness meditation-based stress reduction intervention on rates of skin clearing in patients with moderate to severe psoriasis undergoing phototherapy (UVB) and photochemotherapy (PUVA). *Psychosomatic Medicine, 60*(5), 625–632.

- Kanter, J. W., Mulick, P. S., Busch, A. M., Berlin, K. S., & Martell, C. R. (2007). The Behavioral Activation for Depression Scale (BADs): Psychometric properties and factor structure. *Journal of Psychopathology and Behavioral Assessment*, 29(3), 191–202.
- Kanter, J. W., Rusch, L. C., Busch, A. M., & Sedivy, S. K. (2009). Validation of the Behavioral Activation for Depression Scale (BADs) in a community sample with elevated depressive symptoms. *Journal of Psychopathology and Behavioral Assessment*, 31(1), 36–42.
- Karlin, B. E., Ruzek, J. I., Chard, K. M., Eftekhari, A., Monson, C. M., Hembree, E. A. ... Foa, E.B. (2010). Dissemination of evidence-based psychological treatments for posttraumatic stress disorder in the veterans health administration. *Journal of Traumatic Stress*, 23(6), 663–673.
- Kearney, D. J., McDermott, K., Martinez, M., & Simpson, T. L. (2011). Association of participation in a mindfulness programme with bowel symptoms, gastrointestinal symptom-specific anxiety and quality of life. *Alimentary Pharmacology & Therapeutics*, 34, 363–373.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions* of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, 62(6), 593–602.
- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic-stress-disorder in the national comorbidity survey. *Archives of General Psychiatry*, 52(12), 1048–1060.
- Kimbrough, E., Magyari, T., Langenberg, P., Chesney, M., & Berman, B. (2010). Mindfulness intervention for child abuse survivors. *Journal of Clinical Psychology*, 66, 17–33. doi:10.1002/jclp.20624
- Kimerling, R., Street, A. E., Pavao, J., Smith, M. W., Cronkite, R. C., Holmes, T. H., & Frayne, S.M. (2010). Military-related sexual trauma among veterans health administration patients returning from Afghanistan and Iraq. *American Journal of Public Health*, 100(8), 1409–1412.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613.
- Kulka, R., Schlenger, W., & Fairbank, J. (1990). *Trauma and the Vietnam-War generation*, Vol. 1-2, Report of Findings from the National Vietnam Veterans Readjustment Study. New York: Brunner/Mazel Publishers.
- Lombardo, T. W. (2005). Beyond exposure for posttraumatic stress disorder (PTSD) Symptoms: Broad-spectrum PTSD treatment strategies. *Behavior Modification*, 29(1), 3–9.
- Ludwig, D. S., & Kabat-Zinn, J. (2008). Mindfulness in medicine. *Journal of the American Medical Association*, 300(11), 1350–1352.
- Ma, S. H., & Teasdale, J. D. (2004). Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology*, 72(1), 31–40.
- Monson, C. M., Gradus, J. L., Young-Xu, Y., Schnurr, P. P., Price, J. L., & Schumm, J. A. (2008). Change in posttraumatic stress disorder symptoms: Do clinicians and patients agree? *Psychological Assessment*, 20(2), 131–138.
- Morone, N. E., Greco, C. M., & Weiner, D. K. (2008). Mindfulness meditation for the treatment of chronic low back pain in older adults: A randomized controlled pilot study. *Pain*, 134(3), 310–319.
- Orsillo, S. M., & Batten, S. V. (2005). Acceptance and commitment therapy in the treatment of posttraumatic stress disorder. *Behavior Modification*, 29(1), 95–129.
- Randolph, P., Caldera, Y. M., Tacone, A. M., & Greak, B. L. (1999). The long-term combined effects of medical treatment and a mindfulness-based behavioral program for the multidisciplinary management of chronic pain in West Texas. *Pain Digest*, 9, 103–112.
- Schnurr, P. P., Friedman, M. J., Engel, C. C., Foa, E. B., Shea, M. T., Chow, B. K. ... Bernardy, N. (2007). Cognitive behavioral therapy for posttraumatic stress disorder in women - A randomized controlled trial. *Journal of the American Medical Association*, 297(8), 820–830.
- Segal, Z.V., Williams, J.M.G., & Teasdale, J.D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford Press.
- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, 62(3), 373–386.
- Shipherd, J. C., & Beck, J. G. (2005). The role of thought suppression in posttraumatic stress disorder. *Behavior Therapy*, 36(3), 277–287.

- Shipherd, J. C., Pineles, S. L., Gradus, J. L., & Resick, P. A. (2009). Sexual harassment in the Marines, posttraumatic stress symptoms, and perceived health: Evidence for sex differences. *Journal of Traumatic Stress, 22*(1), 3–10.
- Shipherd, J. C., & Salters-Pedneault, K. (2008). Attention, memory, intrusive thoughts, and acceptance in PTSD: An update on the empirical literature for clinicians. *Cognitive and Behavioral Practice, 15*(4), 349–363.
- Simpson, T. L., Kaysen, D., Bowen, S., MacPherson, L. M., Chawla, N., Blume, A. ... Larimer, M. (2007). PTSD symptoms, substance use, and Vipassana meditation among incarcerated individuals. *Journal of Traumatic Stress, 20*(3), 239–249.
- Specia, M., Carlson, L. E., Goodey, E., & Angen, M. (2000). A randomized, wait-list controlled clinical trial: The effect of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients. *Psychosomatic Medicine, 62*(5), 613–622.
- Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*(4), 615–623.
- Thomas, J. L., Wilk, J. E., Riviere, L. A., McGurk, D., Castro, C. A., & Hoge, C. W. (2010). Prevalence of mental health problems and functional impairment among active component and National Guard Soldiers 3 and 12 months following combat in Iraq. *Archives of General Psychiatry, 67*(6), 614–623.
- Walser, R. D., & Westrup, D. (2007). *Acceptance & commitment therapy for the treatment of post-traumatic stress disorder: A practitioner's guide to using mindfulness & acceptance strategies*. Oakland, CA: New Harbinger Publications.
- Ware, J. E., Kosinski, M., Dewey, J. E., & Gandek, B. (2001). How to score and interpret single-item health status measures: A manual for users of the SF-8 health survey. Lincoln, RI: QualityMetric Incorporated.
- Weathers, F. W., Keane, T. M., & Davidson, J. R. (2001). Clinician-administered PTSD scale: A review of the first ten years of research. *Depression and Anxiety, 13*(3), 132–156.
- Weathers, F.W., Litz, B.T., Herman, D.S., Huska, J.A., & Keane, T.M. (1993). The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. Paper presented at the Ninth Annual Meeting of the International Society for Traumatic Stress Studies, San Antonio, TX.
- Williams, J. M. G. (2008). Mindfulness, depression and modes of mind. *Cognitive Therapy and Research, 32*(6), 721–733.