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Barbara L. Niles, Julie Klunk-Gillis, Donna J. Ryngala, Amy K. Silberbogen, Amy Paysnick, and Erika J. Wolf
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Comparing Mindfulness and Psychoeducation Treatments for Combat-Related PTSD Using a Telehealth Approach

Barbara L. Niles
National Center for Posttraumatic Stress Disorder (PTSD) and Veterans Administration (VA) Boston Healthcare System, Boston, Massachusetts, and Boston University

Julie Klunk-Gillis and Donna J. Ryngala
National Center for PTSD and VA Boston Healthcare System, Boston, Massachusetts

Amy K. Silberbogen
VA Boston Healthcare System, Boston, Massachusetts, and Boston University

Amy Paysnick
National Center for PTSD and VA Boston Healthcare System, Boston, Massachusetts

Erika J. Wolf
National Center for PTSD and VA Boston Healthcare System, Boston, Massachusetts, and Boston University

This pilot study examined two telehealth interventions to address symptoms of combat-related posttraumatic stress disorder (PTSD) in veterans. Thirty-three male combat veterans were randomly assigned to one of two telehealth treatment conditions: mindfulness or psychoeducation. In both conditions, participants completed 8 weeks of telehealth treatment (two sessions in person followed by six sessions over the telephone) and three assessments (pretreatment, posttreatment, and 6-week follow-up). The mindfulness treatment was based on the tenets of mindfulness-based stress reduction and the psychoeducation manual was based on commonly used psychoeducation materials for PTSD. Results for the 24 participants who completed all assessments indicate that: (1) Telehealth appears to be a feasible mode for delivery of PTSD treatment for veterans; (2) Veterans with PTSD are able to tolerate and report high satisfaction with a brief mindfulness intervention; (3) Participation in the mindfulness intervention is associated with a temporary reduction in PTSD symptoms; and (4) A brief mindfulness treatment may not be of adequate intensity to sustain effects on PTSD symptoms.

Keywords: PTSD, mindfulness, Telehealth

The ongoing wars in Iraq and Afghanistan have intensified the need for effective psychological interventions to assist veterans returning from war. In addition to the nearly half million veterans from Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) estimated to have posttraumatic stress disorder (PTSD), a substantial portion of the five million other Veterans Health Administration (VHA) patients also suffer from PTSD related to military experiences (VHA Office of Public Health, 2009). Military-related PTSD is associated with psychosocial and health ailments that severely impact veterans and tax the VHA system and society at large. Veterans with chronic PTSD manifest myriad impairments in functioning, such as problems in family relationships (Riggs, Byrne, Weathers, & Litz, 1998), unemployment and income disparities (Sanderson & Andrews, 2006; Savoca & Rosenheck, 2000), and increased morbidity (O'Toole, Catts, Outram, Pierse, & Cockburn, 2009) and mortality (Boscarino, 2006).

Although evidence-based treatments for PTSD offer relief for many sufferers (Foa, Keane, Friedman, & Cohen, 2009), many service members with PTSD diagnoses do not seek mental health treatment (Hoge et al., 2004). A proportion of individuals who do seek treatment for PTSD either drop out or are not substantially helped by it (Chard, Schumm, Owens, & Cottingham, 2010; Garcia, Kelley, Rentz, & Lee, 2011; Schottenbauer, Glass, Arnkoff, Tendick, & Gray, 2008). Emerging evidence suggests that OEF/OIF veterans may be difficult to engage and likely to drop out...
(Erbes, Curry, & Leskela, 2009). It is critical to find innovative ways to address barriers to treatment and new ways to reduce symptoms. The current study examines a novel mode of treatment delivery—telehealth—and evaluates the efficacy of two treatments—mindfulness and psychoeducation—that have the potential to address the symptoms of PTSD.

**Telehealth**

The use of telecommunications technologies to provide or enhance health care has become increasingly popular. Therapy administered over the telephone has gained attention as mobile telephones have become commonplace, are easy to use, and private (Mohr, Vella, Hart, Heckman, & Simon, 2008). Telephone therapy addresses two important barriers to treatment: inconvenience and privacy. Telephone calls can be easily scheduled at convenient times to accommodate busy schedules. Because sessions are not held in a clinic, they bypass the perceived stigma associated with mental health care. Furthermore, telephone interventions are less costly than face-to-face visits, as the financial and time costs of travel are eliminated.

Challenges associated with telephone mental health treatment have also been identified. Building rapport may be more difficult, and there is the potential for both therapist and client to be distracted by their environments (Haas, Benedict, & Kobos, 1996). It is important that safety and ethical issues (e.g., assisting a suicidal client) may be more challenging when the therapist is geographically distant from the client (Haas et al., 1996). Nonetheless, studies investigating efficacy and client satisfaction of telehealth interventions have been quite promising. A recent meta-analysis of telephone-delivered psychotherapy for depression indicates that it significantly reduces symptoms, with dropout rates below 10% (Mohr et al., 2008).

Studies evaluating telehealth treatments to address PTSD are scant, but findings suggest that telehealth treatments for PTSD can be as effective as those delivered in person. No differences in efficacy, dropout rates, or attendance were detected between cognitive–behavioral therapy (CBT) delivered over the phone and CBT delivered in person for veterans with combat-related PTSD (Frueh et al., 2007). In a trial comparing videoteleconferencing versus in-person modalities of anger-management group therapy for veterans with PTSD, no significant differences were found on measures of attrition, adherence, satisfaction, treatment expectancy, or measures of anger difficulties (Morland et al., 2010). A study of prolonged exposure therapy delivered via one-to-one videoconference demonstrated feasibility and high acceptability for this modality and resulted in significant decreases in self-reported PTSD and depression (Tuerk, Yoder, Ruggiero, Gros, & Acieno, 2010). Thus, there is great potential for the use of telehealth technologies in the treatment of PTSD.

**Mindfulness**

Mindfulness, frequently defined as a focused attention on present experiences without judgment (Kabat–Zinn, 1994), has received increasing attention in the clinical treatment literature. One of the most popular and well-researched mindfulness interventions is mindfulness-based stress reduction (MBSR; Kabat–Zinn, 1990), an 8-week group treatment that introduces a meditative practice and cultivates present awareness of mental processes and physical states. MBSR has demonstrated efficacy in ameliorating a wide range of medical and mental health diagnoses (see Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004).

The use of MBSR as a stand-alone treatment for PTSD has not been thoroughly investigated, though Santorelli and Kabat–Zinn (2009) do not recommend the MBSR program as a first-step treatment, due to concerns that clients may lack skills to tolerate difficult emotions. However, one recent pilot study evaluated the impact of MBSR on symptoms of PTSD and depression among adult survivors of childhood trauma in concurrent psychotherapy (Kimbrough, Magyari, Langenberg, Chesney, & Berman, 2010). Although this trial lacked a control or comparison condition, results showed significant reductions in depression and PTSD symptoms at posttreatment that were largely sustained at the follow-up assessment 4 months later.

Mindfulness skills are key components of some empirically validated treatments for conditions that frequently co-occur with PTSD, such as depression (Segal, Williams, & Teasdale, 2002), borderline personality disorder (Linehan, 1993), and generalized anxiety disorder (Roemer & Orsillo, 2007), suggesting that mindfulness may augment other therapies. A recent meta-analysis also demonstrated robust effects of mindfulness-based therapy on depression and anxiety symptoms in clinical samples (Hoffman, Sawyer, Witt, & Oh, 2010).

Despite the encouraging research on mindfulness for psychological disorders, the extant research suffers from methodological flaws, such as a lack of control groups, small sample sizes, inadequate adherence monitoring, failure to determine clinical significance, and absence of follow-up assessment. Recent commentaries (e.g., Davidson, 2010) have called for empirically sound research to address these methodological issues in order to determine whether mindfulness interventions can be efficacious in treating psychological problems, such as PTSD.

**Psychoeducation**

Education about PTSD has been recommended as a treatment or component of treatment for persistent PTSD (Foa et al., 1999). The goals of psychoeducation are to increase one’s understanding of stress reactions, readjustment difficulties, and recovery, as well as to normalize experiences, and assist in the early identification of symptoms that may reflect the development or exacerbation of a mental disorder. Even though most empirically validated treatments for PTSD begin with psychoeducation (e.g., Foa & Rothbaum, 1998; Resick & Schnicke, 1993), there has been little evaluation of its efficacy.

**Current Study**

In this pilot study, we examined two telehealth interventions—mindfulness and psychoeducation—to address symptoms of combat-related PTSD in veterans using a randomized experimental design. A combination of two face-to-face sessions, followed by six telephone sessions was used in both treatments provided. Primary variables of interest were feasibility and client satisfaction with the telehealth approach and the content of the two therapies. We hypothesized that both treatments would be associated with reduced symptoms of PTSD at posttreatment and 6-week follow-
up, with greater and more clinically significant reductions expected for the mindfulness condition.

Method

Participants

Participants were 33 male veterans recruited through: (1) flyers posted throughout Veterans Administration (VA) Boston Healthcare System; (2) clinician referrals; and (3) an electronic participant recruitment database. Inclusion criteria were: documented military service in a war zone or peace-keeping theater, a current diagnosis of PTSD (as determined by structured interview), and access to a telephone. Exclusion criteria were: severe organicity or active psychosis, an unstable regimen of psychiatric medication over the last 2 months, psychiatric hospitalization in the last 2 months, or symptoms consistent with a diagnosis of alcohol or drug dependence within the past 3 months. The Addiction Severity Index (McLellan, Luborsky, Woody, & O'Brien, 1980) and the substance abuse module of the Structured Clinical Interview for the Diagnostic and Statistical Manual for Mental Disorders 4th edition (DSM-IV) Axis I Disorders (SCID-SA; First, Spitzer, Gibbon, & Williams, 2002) were used to assess current substance use problems as part of the study screen to determine participant eligibility (see below). Substance abuse was not an exclusion criterion.

Sixty-eight veterans completed a telephone screening, 41 completed an initial assessment, and 33 met eligibility criteria and enrolled in the study. See Figure 1 for the study flowchart.

All participants were male, between the ages of 23 and 66 (mean \(M_{\text{age}} = 52.0; \text{standard deviation } SD = 13.0\)), were exposed to trauma in either warzone or peacekeeping theaters, and met full criteria for PTSD as measured by the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1990, see below). Regarding era of military service, 30% \((n = 10)\) were veterans of Operation Iraqi Freedom (OIF), 64% \((n = 21)\) had served in Vietnam, and 6% \((n = 2)\) had served during peace-keeping missions (e.g., Bosnia). Additionally, 76% of the sample \((n = 25)\) identified as White, not Hispanic, 15% \((n = 5)\) Black, not Hispanic, 6% \((n = 2)\) White, Hispanic, and 3% \((n = 1)\) as “other.”

Participants were not required to discontinue ongoing treatment with other mental health providers during the study. Use of and changes in psychiatric medication were assessed through review of VA medical records (for participants receiving mental health care through the VA, \(n = 27\)) or by self report (for participants receiving psychiatric care from other providers, \(n = 6\)). Most participants (67%, \(n = 21\)) were taking prescribed psychiatric medication when they entered the study.

Involvement in ongoing psychotherapy was also assessed by review of medical records. Most of the participants who completed treatment (66%, \(n = 15\) of 27) had one or more individual sessions with a mental health provider in addition to the treatment provided.
by the study, and PTSD was the focus of at least one session for 33% (n = 9 of 27). Per medical record notes, 8 participants (30%) completed 4 or more individual sessions during the 8 weeks in which the study treatment was ongoing, and the average number of sessions for those in individual treatment was 5.5 (range = 1 to 12).

**Measures**

The Clinician Administered PTSD Scale (CAPS; Blake et al., 1990). Considered the “gold-standard” for PTSD assessment, the CAPS is a 30-item structured interview that assesses all DSM-IV diagnostic criteria for PTSD. The scale yields a dichotomous diagnosis and a continuous score of clinician-rated frequency and intensity for each symptom rated on 5-point scales. Symptom severity is determined by summing frequency and intensity scores. We employed the commonly used “Frequency ≥1/Intensity ≥2” scoring rule to determine thresholds for each symptom. The CAPS has repeatedly demonstrated strong and robust psychometric properties with excellent test–retest reliability (r = .89–1.00; Weathers, Ruscio, & Keane, 1999), interrater reliability (r = .92 for total severity; Weathers et al., 1999), and concurrent validity (r = .91 with the Mississippi Scale for Combat-Related PTSD; Weathers et al., 1999). The internal consistency for this measure in the current study was high: Time 1 α = .90, Time 2 α = .93.

The PTSD Checklist–Military Version (PCL-M; Weathers, Litz, Herman, Huska & Keane, 1993). The PCL-M is a self-report measure consisting of 17 items that parallel the DSM-IV PTSD criteria. Respondents indicate on a 5-point scale how much they have been bothered in the last month by particular symptoms that are related to stressful military experiences. The PCL has been shown to have excellent test–retest reliability (r = .96; Weathers et al., 1993) and concurrent validity as compared with structured clinical interviews for PTSD (r = .79 to 0.93; Blanchard, Jones–Alexander, Buckley, & Forneris, 1996). The internal consistency for this measure in the current study was high: Time 1 α = .89, Time 2 α = .95, Time 3 α = .91.

The Participant Satisfaction Questionnaire (PSQ). The PSQ is a self-report questionnaire developed for the current study to gather information about participants’ levels of satisfaction with the interventions. Responses using a 5-point scale are summed and averaged to derive an overall satisfaction score. Psychometric properties of this scale have not been established.

**Procedure**

**Clinicians.** Two female clinicians with PhDs in clinical psychology served as therapists. Both served as therapists for both conditions, were regular practitioners of mindfulness meditation, and had received training in assessment and treatment of PTSD in veterans at the National Center for PTSD, Behavioral Science Division, VA Boston Healthcare System. Each participant was assigned to one of the two clinicians to complete the initial assessment and the treatment.

**Informed consent.** The institutional review board-approved informed consent form was reviewed with the participant, and the participant’s signature was obtained at the outset of the first visit.

**Assessments.** The CAPS and Addiction Severity Index were administered to participants at the baseline (Time 1) assessment. If a participant screened positive on the Addiction Severity Index, the SCID-SA was administered, and those who met criteria for substance dependence were screened out. Self-report measures were administered and therapy sessions were scheduled with the clinician who conducted the assessment. Dr. Niles then informed the therapist of the group assignment that had been determined by a random numbers generator. A stratified randomization procedure was used to balance the number of OEF/OIF veterans in each condition. Clinicians and participants were blind to treatment condition until after the first assessment had been completed.

The posttreatment (Time 2) assessment included the same measures as the initial assessment with one additional measure, the PSQ. In order to reduce participant and therapist demand bias, posttreatment assessments were not completed by the participant’s therapist, but by the other study clinician or principal investigator. Participants were compensated $40 for the pre- and posttreatment assessments.

The 6-week follow-up (Time 3) assessment was identical to the posttreatment assessment, with three exceptions: the PSQ was not readministered due to redundancy, the CAPS was not readministered in an effort to reduce participant burden, and participants were compensated $30.

**Treatment.** At the first session for both treatment conditions, participants were provided with a handbook (specific to treatment condition) comprised of two- to three-page readings for each week of treatment. The handbooks for both treatment conditions were developed to meet the needs of a veteran population (e.g., text was in a large and easy-to-read font, written at an eighth grade level). In addition to providing content, the two 45-min in-person sessions were used to establish rapport. The six weekly telephone sessions reviewed information presented in the manuals. The eighth session was used to review the previous seven sessions and address termination issues. Telephone sessions were approximately 20 min in length.

**Mindfulness.** The Mindfulness Handbook was developed in collaboration with the codirector of Professional Training at the Center for Mindfulness in Medicine, Health Care, and Society at the University of Massachusetts Medical School. It complemented the information covered during the sessions and provided education about these mindfulness topics: defining mindfulness, noticing sensations, noticing thoughts and emotions, beginner’s mind, choice, patience, continuing to practice. During the two initial in-person sessions, participants were led through two experiential exercises. Participants were given portable CD players and CDs with 5- to 15-min guided mindfulness exercises to practice the mindfulness skills outside of sessions. Participants were asked to keep track of their practice using monitoring sheets provided, and to report this each week. A few minutes of each session were spent focusing on any difficulties participants may have encountered with the practice.

**Psychoeducation.** The PTSD Education Handbook, based on content from an introductory psychoeducation group developed at the National Center for PTSD, complemented the information covered in the initial two sessions and provided additional education on a variety of topics: trust, safety and self-care, effects of trauma, relationships and trauma, coping and healing, change, and moving forward. The treatment was focused on educating participants about how PTSD may affect their lives (e.g., avoidance may take the form of social isolation, workaholism, substance abuse).
Participants were encouraged to reflect on how symptoms may be impacting their day-to-day lives and suggestions for positive coping were offered (e.g., listening to music, physical exercise) but no specific techniques for coping, such as relaxation exercises or behavioral activation, were delivered.

Treatment adherence. At each telephone session, participants in both groups were asked to report the percentage of assigned readings they completed. Participants in the mindfulness condition were also asked to keep a log of the CD track numbers and the amount of unguided practice they engaged in each day during the 8-week treatment. Time spent in mindfulness practice during the 6-week follow-up period was not assessed.

To ensure therapist compliance with treatment delivery, therapists completed a checklist of the major points to be covered at each session. Each therapist met weekly with the principal investigator for supervision regarding the cases. In addition, the therapists and investigators met weekly as a team to review session progress and to problem solve difficulties with the protocols or participant responses. The consultant from the Center for Mindfulness joined team meetings via telephone to provide guidance regarding the mindfulness treatment.

Data Analysis

Univariate analyses were performed with a t test or chi-square test. Repeated measures analyses of variance (RM-ANOVAs) were used to examine differences between the two conditions across all three time points. The type of intervention (mindfulness vs. psychoeducation) was the between-subjects factor and time was the within-subjects factor. The RM-ANOVAs were then separated by group and post hoc tests were used to determine significance between specific cells.

Results

Completion, Compliance, and Satisfaction

Of the 33 veterans who were randomized, 27 (82%) completed the 8-week intervention and posttreatment (Time 2) assessment and 24 (72%) completed the 6-week follow-up (Time 3) assessment (See Figure 1).

Treatment and posttreatment assessment completion rates did not differ significantly between conditions: 76% for the mindfulness condition and 87% for the psychoeducation condition, $\chi^2(1, N = 33) = .674, p = .412$. Reasons for dropping out were: moved away ($n = 2$), terminated after being frequently unavailable for telephone sessions ($n = 2$), experienced a manic episode and dropped out of all VA treatment ($n = 1$), and no reason provided ($n = 1$). OIF veterans who had similar treatment completion rates (80.0%) as veterans from other eras, 82.6%; $\chi^2(1, N = 33) = .032, p = 1.00$. Three participants who completed the Time 2 assessment declined the follow-up (Time 3) assessment. There was no significant difference between groups for completion of the Time 3 assessment, $\chi^2(1, N = 27) = .081, p = .776$. For both groups, no adverse reactions to treatment were reported during the treatment or follow-up periods.

Baseline scores on most demographics (race, ethnicity, education level, employment status, meditation experience) and outcome measures did not differ between the nine dropouts and the 24 completers. Although OIF veterans did not differ from others on the completion of the Time 2 assessment, a chi-square test indicated a trend for OIF veterans to be more likely to drop out of the study before the follow up assessment. Half (50%) of the OIF veterans dropped out by the Time 3 assessment, as compared with 17% of the other veterans, $\chi^2(1, N = 33) = 3.74, p = .053$. A follow-up t test showed that veterans who dropped out were significantly younger ($M_{age} = 42.22, SD = 10.59$) than the veterans who completed, $M_{age} = 55.25, SD = 15.48$, $t(31) = 2.56, p = .016$.

Participants who completed the interventions were very compliant: 89% reported that they completed an average of at least 75% of the readings, while 63% reported completing all readings in their entirety. In the mindfulness condition, compliance with mindfulness practice was surprisingly high: participants reported practicing over 2 hours per week on average ($M = 137, SD = 91$, range = 41 to 307 min), even though the total amount of practice time assigned in the study ranged from only 20–50 min per week. They also reported practicing an average of over 5 days per week, and 69% reported practicing both with and without the help of the guided exercises on CDs.

All participants who completed the study reported high satisfaction ratings on the PSQ. There were no differences in satisfaction ratings between groups, with 88% of completing participants reporting that the intervention was “convenient” and 81% reporting they “would recommend the intervention to other individuals.” The remaining participants reported being neutral on both of these statements; none reported dissatisfaction.

Pretreatment Group Differences

No differences were found between the two intervention groups on demographic variables (age, race, ethnicity, education level, employment status, era of service, meditation experience). Despite randomization, however, PTSD symptoms for the mindfulness group were less severe at baseline. For the 24 participants who completed all three assessments, scores on the PCL-M were significantly lower, $t(22) = -2.18, p = .040$. The repeated-measures analyses reported below compare the two groups on their relative changes in symptoms over time; due to the small sample size, however, no additional statistical procedure was used to control for the unequal baseline scores in symptoms.

Posttreatment and Follow-Up Group Differences

Evaluation of CAPS scores in the 27 participants who completed treatment and the Time 2 assessment revealed a main effect of condition, $F(1, 25) = 7.21, p = .013, \eta^2_p = .224$, no main effect of time, $F(1, 25) = 3.27, p = .083, \eta^2_p = .116$, and a significant Condition × Time interaction, $F(1, 25) = 5.62, p = .026, \eta^2_p = .183$. We examined this interaction within condition and found that for the mindfulness group, mean scores dropped significantly from 60.92 ($SD = 19.25$) at Time 1 to 47.46 ($SD = 18.29$) at Time 2, $F(1, 12) = 12.11, p = .005, \eta^2_p = .502$, while for the psychoeducation group, there was no significant change in mean symptoms over time, $F(1, 13) = .904, p = .765, \eta^2_p = .007$ (see Table 1).

For the self-report PCL-M, PTSD changes at Time 2 were similar to those found using the interview-based CAPS. For the 26 participants with valid scores, there was a main effect of condition,
For the Mindfulness condition, a significant dose-response correlation was found between total practice time and pre-to-posttreatment improvement in PTSD symptoms, \( r(10) = .66, p = .02, \) 2-tailed, but not for PCL-M scores, \( r(10) = .01, p = .97. \)

**Discussion**

This study indicates that it is feasible to deliver telehealth treatments for PTSD, as over 80% of the participants completed

![Figure 2](image-url)
the 8-week intervention and over 70% completed the follow-up assessment. These rates of completion are comparable to those reported in a VA PTSD clinic (Erbes et al., 2009) and to rates reported for most randomized trials of treatments for PTSD (Schottenbauer et al., 2008). This study detected no differences between OIF veterans and other veterans in completion of treatment, a finding in contrast with that of Erbes et al. (2009) who found that twice as many OEF/OIF veterans dropped out of treatment than did Vietnam veterans. However, three of the eight OIF veterans who completed treatment dropped out during the 6-week follow-up period. As a result, completion rates for follow-up assessment (Time 3) indicate that the veterans from current conflicts were substantially (with a trend toward significantly) more likely to drop out and that those who dropped out were significantly younger than those who completed. These findings suggest that the telehealth format may equally engage younger and older veterans in treatment, but that the younger veterans from current conflicts are not as likely to complete follow-up assessments. The veterans who finished the interventions were very compliant with the treatment, completing all the telephone calls and most of the weekly homework assignments. Participants also reported very high rates of satisfaction with the mode of delivery, a combination of two in-person sessions and six telephone sessions.

The findings of this study support evidence from other recent studies (Frueh et al., 2007; Morland et al., 2010; Tuerk et al., 2010) indicating that telehealth modalities are feasible to deliver and are associated with high satisfaction rates in the treatment of PTSD for veterans. Telehealth interventions may be especially important for clients who have difficulty attending appointments due to health constraints or travel from rural locations. However, even for physically healthy individuals in an urban environment, the convenience offered by a telephone intervention may encourage greater participation in treatment.

Regarding compliance with a mindfulness intervention in a veteran PTSD population, participants in the mindfulness condition completed more of the homework assignments than anticipated, engaging in guided or sitting meditation over 2 hours per week on average, substantially more than requested by the protocol. The veterans who chose to participate in this investigation may have been particularly interested in mindfulness and meditation, and may have been more compliant with homework than other veterans seeking treatment for PTSD. Nonetheless, this finding is especially notable given concerns that mindfulness meditation may not be appropriate for individuals with PTSD because intense focus on the present moment could trigger an exacerbation of symptoms or dissociative reaction. In the current study, no adverse reactions to the mindfulness treatment were reported and satisfaction ratings were high. Thus, this study demonstrates that some veterans with PTSD can engage in mindfulness meditation.

The current study provides preliminary evidence that participation in a brief mindfulness intervention may temporarily reduce symptoms of PTSD more than the psychoeducation intervention. Scores on both self-report and clinician-administered measures of PTSD dropped significantly in the mindfulness group between Times 1 and 2. The effect sizes were large, accounting for at least half of the variance in the scores on both measures. Over 50% of those in the mindfulness treatment achieved a clinically significant change in PTSD symptoms as measured by self-report. Given the brevity of the intervention, it is encouraging that the impact on symptoms was clinically significant for a substantial proportion of participants. However, it is important to note that the mean scores on the PTSD measures indicate that even after a reduction in symptoms, substantial PTSD symptoms remained.

The return to baseline on self-report PTSD measures at Time 3 for the mindfulness group indicates that positive effects associated with this brief treatment were not enduring and may reflect the ebb and flow of PTSD over time. Continued mindfulness practice has been found to be necessary for a continued positive effect (Carmody & Baer, 2008). Participants may have stopped practicing or reduced meditation time after the intervention ended. Practice time during the 6-week follow-up period was not measured, so we cannot provide evidence to support this theory. However, the correlation between practice time and change in PTSD symptoms as measured by the CAPS at Time 2 was significant. Thus, it seems very plausible that reduction of mindfulness practice is associated with the rise in PTSD symptoms.

The psychoeducation intervention did not appear to impact PTSD symptoms; pre- to posttreatment mean scores on PTSD measures were not significantly different and the majority of participants showed no clinically significant change. One explanation for this might be that additional education about PTSD symptoms is not beneficial for those who have already received it, as most participants in this study had been in treatment and educated about PTSD symptoms before. A few veterans in this study evidenced a clinically significant worsening of symptoms which may indicate that psychoeducation can be harmful for some individuals. However, a more likely explanation may be that education about the symptoms of PTSD causes more awareness of symptoms and can thus increase reports of symptoms. For example, psychoeducation may allow participants to notice trauma cues, the distress associated with the cues, and the subsequent avoidant responses. Alternatively, a desire to attain or maintain service-connected compensation for PTSD may cause veterans to report more symptoms and distress (e.g., Frueh et al., 2003), although this would be true for both conditions. Thus, despite findings that PTSD symptoms increased slightly following the psychoeducation intervention, we concur with previous suggestions that psychoeducation is likely helpful for traumatized individuals who are new to treatment (e.g., Foal & Rothbaum, 1998; Resick & Schnicke, 1993) and recommend it as an early component of treatment for PTSD.

The small sample size for this pilot study limits the conclusions that can be drawn. First, in terms of data analysis, participants who dropped out of treatment did not complete Time 2 or Time 3 assessments and the small sample precluded use of maximum-likelihood based methods of addressing missing data at these time points. Intention-to-treat analyses therefore were not possible for this study. Thus, it must be assumed that the missing data is not missing at random and may be biased. As this is a pilot investigation, differences detected between the mindfulness and psychoeducation conditions can only be considered suggestive and future formal clinical trials with appropriate intention-to-treat and missing data procedures are needed to examine whether these differences are replicable. Second, the risk of type one error was elevated because we used several repeated-measures ANOVAs. In order to balance the risks of type one and type two error, follow-up tests were performed only after the initial omnibus F tests indicated significant differences. Third, participants in the psychoedu-
cation group evidenced greater PTSD symptoms, indicating that randomization along these dimensions was not successful; a larger sample size would likely have produced more balanced groups. Because the mindfulness group had less severe PTSD symptoms, it is not possible to know if this intervention would produce similar results in a sample with greater symptom severity. However, it is notable that treatment effects were detected in the mindfulness group despite the lower initial scores on the PTSD measures, suggesting a robust effect. Fourth, even though the number of people taking psychiatric medications was balanced across groups, all three participants with medication changes were in the mindfulness group and one of the three evidenced a clinically significant improvement in symptoms. A larger sample would allow inclusion of medication change as a covariate. Finally, the small sample precluded use of regression analyses to identify mediators and moderators of treatment outcomes.

There are also aspects of study design that indicate these results should be interpreted with caution. (1) Veterans in VA treatment for combat-related PTSD are a select group and these results may not apply to other veteran, military, or PTSD populations. The majority of the veterans in this study were in concurrent VA treatment. Given that VA populations have shown lower response rates to PTSD treatments than nonveterans (Bradley, Greene, Russ, Dutra, & Westen, 2005; Friedman, Marmar, Baker, Sikes, & Farfel, 2007), it is notable that the mindfulness condition was associated with symptom reduction. (2) The assessors for the Time 2 and Time 3 assessments were not blind to condition and may have been biased in the administration of the CAPS at Time 2. However, the self-report PCL findings at Times 1 and 2 were very similar to the CAPS findings, indicating consistency across methods of assessment. (3) The study therapists delivered both treatments and were not randomly assigned to condition; this raises concerns about potential bias regarding delivery of treatment (Luborsky, Barrett, Antonuccio, Shoenberger, & Stricker, 2006). They were both mindfulness practitioners and thus may have favored the mindfulness treatment, which may have unduly inflated the superiority of the mindfulness intervention. However, they both also regularly delivered psychoeducation to veterans with PTSD. (4) Although checklists were used to assess therapist adherence to the treatment protocol, adherence was not evaluated by independent reviewers via recordings. Thus, the therapists may have deviated from the protocol at times. (5) The study design did not allow a comparison between the novel aspects of the treatments (telehealth mode of delivery, mindfulness as a treatment for PTSD) and available empirically supported treatments for PTSD.

Overall the findings from this study of veterans with combat-related PTSD provide preliminary support for the feasibility of (1) a telehealth mode of delivery and (2) an intervention promoting mindfulness. The mindfulness intervention was associated with a reduction in PTSD symptoms at posttreatment, and this investigation contributes to the literature suggesting that mindfulness training may be useful in the treatment of PTSD (e.g., Follette & Vijay, 2009; Kimbrough et al., 2010). The brief treatment was not adequate to sustain changes and may need to be extended in length or intensity or paired with other treatments to have lasting effects.

The mechanisms by which mindfulness can impact PTSD symptomatology should be explored in future studies. For example, the arousal symptoms of PTSD have been shown to be important in “driving” the other PTSD symptoms (Schell, Marshall, & Jaycox, 2004) and decrements in arousal associated with mindfulness practice may account for changes in symptoms. Mindfulness practice also encourages cognitive flexibility and cultivation of non-judgmental acceptance of thoughts and feelings, even those that are distressing. This may serve as exposure to trauma-related cognitions and emotions and may be effective in a manner similar to the way that exposure-based treatments are hypothesized to reduce symptoms.

Mindfulness meditation has shown promise in treating many disorders and the current study suggests that its use in the treatment of PTSD merits further investigation. This study also highlights that mindfulness can be delivered through a telehealth format, a more flexible alternative to traditional face-to-face treatment. Future treatment trials should evaluate the use of mindfulness for PTSD using intention-to-treat analyses with larger samples, clinician-administered outcome measures administered by blind assessors, and evaluation of therapist adherence to protocol. Comparing current evidence-based treatments for PTSD with mindfulness interventions alone and with mindfulness interventions combined with evidence-based treatments will be important in determining whether mindfulness can enhance current efficacious treatments for PTSD. In addition, future studies should evaluate different modalities of mindfulness treatment delivery, such as group, face-to-face individual, telehealth with no face-to-face, or Internet-based treatment. To provide optimal patient care, it is critical to consider novel approaches that may complement and extend current therapies for PTSD.

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