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Spiritual Wellbeing Mediates PTSD Change in Veterans with Military-Related PTSD

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Abstract
Background A portable practice of repeating a mantram—a sacred word or phrase—has been shown to reduce the severity of posttraumatic stress disorder (PTSD) symptoms in veterans with military trauma. It is thought that the intervention re-directs attention and initiates relaxation to decrease symptom severity, but there may be other mechanisms that may contribute to this improvement.

Purpose We tested the hypothesis that increases in existential spiritual wellbeing (ESWB) would mediate reductions in self-reported PTSD symptoms following a group mantram intervention.
Method Veterans diagnosed with PTSD from war-related trauma completed 6 weeks of case management plus a group mantram intervention (n=66) as part of a randomized trial. Measures included PTSD Checklist (PCL) and Functional Assessment of Chronic Illness Therapy–Spiritual Wellbeing. Path analysis was conducted on those who completed treatment to assess ESWB as a possible mediator of change in PCL from baseline to post-treatment.
Results A significant indirect effect, −2.24, 95% CI (−4.17, −1.05) of the mantram intervention on PCL change was found. The path from the mantram intervention to ESWB change was significant and positive (B=4.89, p<0.0001), and the path from ESWB change to PCL change was significant and negative (B=−0.46, p=0.001), thus supporting the hypothesis.
Conclusions Findings suggest that one contributing mechanism that partially explains how the mantram intervention reduces PTSD symptom severity in veterans may be by increasing levels of ESWB.

Keywords Meditation · Mindfulness · Posttraumatic stress disorder · Spirituality · Veterans

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With the wars in Iraq and Afghanistan, it is estimated that about 300,000 returning troops suffer from symptoms of depression or posttraumatic stress disorder (PTSD) [1, 2]. In attempts to understand ways to alleviate veterans' suffering from PTSD, researchers are beginning to explore spirituality and its relationship to health and wellbeing [3]. Spiritual and religious factors have been reported as being

helpful in coping with other stressful conditions such as human immunodeficiency virus (HIV) [4–8] and cancer [9–11]. Experiences of trauma have been described as challenging to one's religious and spiritual beliefs related to meaning and purpose in life [12]. Therefore, we conjecture that attending to spirituality in individuals who have experienced traumatic stressors might be an important tool for coping with the aftermath of those experiences.

Spirituality is a multi-dimensional construct with various meanings. It has been defined as having meaning, purpose in life, transcendence or connectedness to a higher being, force, or energy [13]. Religion, which is differentiated from spirituality, has been defined as a set of fixed beliefs and practices that are held by a specific group or tradition [14]. It is only recently that aspects of spirituality and religious beliefs are being explored in relationship to war-related trauma and PTSD [3, 15, 16]. This literature suggests that spirituality/religion may be an important coping tool. For example, in a study of 100 veterans, religious beliefs were cited as the most significant factor in helping them accept various problems [15]. On the other hand, loss of religious belief may be associated with increased problems. In a study of 1,385 veterans, those who experienced killing or who failed to prevent others from death reported that their religious beliefs had weakened and their feelings of guilt had increased [16]. These changes were associated with greater use of mental health care services. In another study of 213 treatment-seeking veterans with PTSD, both positive and negative religious coping were associated with PTSD symptom severity and difficulty forgiving oneself was associated with depression and PTSD symptom severity [3].

The Department of Defense has requested a summary of spiritual interventions used for PTSD and brain injury [17]. Despite reports suggesting that spirituality is impacted by trauma and that spirituality/religion may be an important factor in coping, there is little empirical evidence examining the use of spirituality-based interventions for PTSD symptoms.

One intervention that has been studied for its efficacy in managing symptoms of PTSD is a set of strategies for training attention called mantram repetition [18, 19]. "Mantram" versus "mantra" denotes a specific set of guidelines [20]. Mantram repetition [i.e., silently focusing attention on a selected sacred phrase (e.g., Ave Maria, Om Mani Padme Hum, O Wakan Tanka, Rama, etc.)] is practiced daily throughout the day. Slowing down thoughts and developing one-pointed attention, hallmarks of mindfulness practice, are other allied skills taught to support mantram repetition.

The mantram intervention has been studied in various groups including veterans with chronic illness [18], healthcare employees [21–23], adults with HIV [24], and community-dwelling adults [25]. These studies have shown significant reductions in perceived stress and anger and improvements in existential spiritual wellbeing (ESWB) and quality of life [26].

There are a number of mechanisms by which mantram repetition may impact symptomatology. It may serve as a coping tool. After being practiced frequently during stress-free or peaceful times, the repetition of a mantram may become a way to elicit the relaxation response rapidly [27, 28], thus interrupting the stress response upon encountering stressful events. Similarly, the pause provided by the practice may give an individual time in which to choose a more adaptive response to a stressor [29]. Alternatively, mantram may enhance coping through a connection to one's spirituality. The use of a spiritual phrase, as opposed to a secular phrase, is recommended based on prior empirical evidence. Results from randomized controlled trials that focused on a real versus placebo mantra, or on spiritual versus secular meditation showed that the spiritual groups reported greater health benefits such as reductions in physical pain and psychological distress compared with secular groups [25, 30–32]. Thus, the connection to one's spirituality may be an important contributor to the effect of the practice.

We completed a randomized trial of veterans with PTSD in which the group-based mantram intervention was offered as an adjunct to usual care consisting of medication and case management. Mantram intervention was associated with reduced PTSD symptom severity and enhanced ESWB compared with controls [19]. We were interested in understanding whether this symptom change that was observed in our trial was, in part, explainable by a change in spirituality. Reported herein is a mediation analysis to test this hypothesis. Specifically, we predicted that increases in ESWB that occurred during a 6-week, group-based mantram repetition intervention would mediate reductions in PTSD symptoms at post-treatment.

Method

Procedure

Data from outpatient veterans who were randomly assigned to the mantram treatment (n=66) from the randomized trial were analyzed [19]. Approval was obtained from university and hospital human subjects committees. Veterans were recruited using flyers and presentations. They were diagnosed with PTSD using the Clinician-Administered PTSD Scale [33] administered by blinded study assessors. Inclusion criteria consisted of being 18 years or older, having PTSD from a military-related trauma, being stable on doses and types of psychotropic medication for at least 2 months prior to enrollment, and not concurrently participating in other PTSD-related therapies. Exclusion criteria included active substance abuse and having suicidal

ideation, psychosis, dementia, or untreated bipolar disorders. After describing the study to the subjects, the study coordinator obtained written informed consent. Data were collected at baseline and at post-treatment.

Usual Care Control Group

The control condition consisted of case management defined as one 60-min meeting every 1 to 2 months to monitor mental health care, provide general support, and encourage adherence to medication regimens, if applicable. Participants were asked not to participate in other psychotherapy for PTSD during the study period.

Mantram Intervention

The mantram intervention consisted of skills training using a mantram (sacred word) as the focus of attention during non-stressful periods throughout the day and before sleep every night. Mantram repetition was taught as a daily practice to enable emotional self-regulation and relaxation, particularly at the moment of a stressful event. Other supporting skills included intentionally slowing down one's pace of life by prioritizing activities and practicing one-pointed attention or mindfulness such as doing one thing at a time while ignoring interruptions.

The mantram intervention was delivered in six weekly classes (90-min per week) with homework exercises in addition to usual care described above. Participants were given a list of mantrams representing several spiritual traditions from which to choose, the book *Strength for the Storm* [34], and a course manual. For a more detailed description of the intervention, see Bormann [35]. Each class session covered questions and answers, discussion of homework experiences, and 5 min of silent group mantram repetition or writing.

Measures

Demographic and Health-Related Variables Gender, age, ethnicity, marital/partner status, education, employment status, income, duration of PTSD symptoms, years of military service, identification of being religious or spiritual, frequency of other holistic practices, taking antidepressants, and number of classes attended were assessed.

PTSD Checklist-Civilian Version PTSD Checklist-Civilian Version (PCL) [36] is a brief self-report screening instrument for PTSD symptoms. Seventeen items are scored on a 1 (not at all bothersome) to 5 (extremely bothersome) Likert scale [36]. Test–retest reliability is high (r=0.96), and validity is adequate with a Kappa of 0.64 agreement for PTSD diagnosis compared with the Structured Clinical Interview for DSM-IV [37, 38]. Alpha coefficients for internal consistency reliability have ranged from 0.89 to 0.92 in prior studies [36]. Cronbach's alpha in this study was 0.88.

Existential Spiritual Wellbeing Existential spiritual wellbeing was measured using the Functional Assessment of Chronic Illness Therapy Spiritual Wellbeing (FACIT-SWB) 12-item scale [39]. This scale contains 12 items rated on a 0 (not at all true) to 4 (very much true) Likert scale. ESWB consists of two subscales that address the level of experiencing peace and meaning in life and having faith or assurance "that things will be okay." Overall scores can range from 0 (low) to 48 (high). Cronbach's alpha in this study was 0.94.

Statistical Analyses

The Barron and Kenny (1986) method [40] was used to study the indirect effect of the ESWB change score on PCL change score. Three linear regression models were fitted to study the following association: (1) the association between PCL change score (Y) and treatment (X), $Y=i_1+cX$; (2) the association between FACIT-SWB change score (M) and treatment (X), $M=i_2+bX$; and (3) the association between PCL change score and treatment adjusted for FACIT-SWB change score$Y=i_3+c'X+bM$. The c is the total effect of treatment on PCL change score; c' is the direct effect of treatment on PCL change score after controlling for FACIT-SWB change score, and the indirect effect of treatment on PCL change score was defined as $c-c'$. The bootstrap resampling technique [41, 42] with 5,000 replicates was used to calculate the 95% confidence interval for the indirect effect.

Models 1–3 were adjusted for potential covariates including baseline demographics and other clinically important baseline characteristics. The association between each baseline characteristic and FACIT-SWB change score and its association with PCL change score were assessed using linear regression first. The difference in baseline characteristics between treatment groups was assessed using Wilcoxon rank sum test or Fisher's exact test as appropriate. For each model, a variable that was significantly associated with either outcome or predictor was added as a potential covariate and variables with p value <0.05 were considered as potential covariates in final models. If a variable was a significant covariate in any of the three models above, it was added as a covariate for all models while calculating the indirect effect. Spearman correlation coefficient was used to study the association between attendance of mantram class with PCL and FACIT-SWB change score.

Sensitivity analyses were conducted by excluding female subjects from all analyses. Since there was no significant change in results, we reported the analyses on all subjects. All analyses were performed using open-source statistical software R [43].

Results

Participant Demographics

As shown in Table 1, the majority of participants were male (97%). Forty-two percent of the sample was identified as minorities including African American (24%), Hispanic (8%), or other (10%) and the remaining 58% identified as White. Mean age was 57.3 (SD=9.26 years) and ranged from 25 to 84 years. Approximately half (n=72, 53%) were married or partnered, and 55 (40%) reported being employed at study entry. The average number of months of combat was 12.7 (SD=9.97 months).

Mantram Effects on ESWB and PTSD Symptoms

As reported previously [19], over the 6-week group-based intervention period, there were significant improvements in the mantram group for self-reported PTSD symptoms with an average decrease of 6.3 (SD=11.20) in the mantram group compared with 2.6 (SD=7.16) in the control group (p=0.02). For ESWB, there was an average increase of 4.7 (SD=6.15) in the mantram group com-

Table 1 Group characteristics at baseline

Variable (range)	Mantram (n=66) Mean (SD)	Control (n=70) Mean (SD)	All (N=136) Mean (SD)	p value[a]
Age (25–84 years)	56.1 (9.60)	58.5 (8.83)	57.3 (9.26)	0.047
Months of combat (0.5–84 months)	12.3 (7.84)	13.1 (11.70)	12.7 (9.97)	0.86
Years of symptoms (0.5–63 years)	32.6 (12.20)	36.0 (9.70)	34.3 (11.10)	0.03
PTSD checklist (17–85)	61.8 (11.50)	62.3 (10.40)	62.0 (10.9)	0.98
FACIT[b] Spiritual Wellbeing (0–48)	22.3 (8.40)	21.0 (8.18)	21.6 (8.29)	0.31
	n %	n %	n %	p value[c]
Gender, n (%)				
Male	63 (95)	69 (99)	132 (97)	0.36
Ethnicity, n (%)				
White	38 (58)	41 (59)	79 (58)	0.48
African American	18 (27)	15 (21)	33 (24)	
Hispanic	3 (5)	8 (11)	11 (8)	
Other	7 (11)	6 (9)	13 (10)	
Married/cohabiting	33 (50)	39 (56)	72 (53)	0.61
Not employed	40 (61)	41 (59)	81 (60)	0.86
Income ≤$30,000	28 (42)	34 (49)	62 (46)	0.49
Prescribed antidepressants	57 (86)	61 (87)	118 (87)	0.89
Do you consider yourself				
Spiritual?	7 (11)	10 (14)	17 (12)	0.74
Religious?	13 (20)	10 (14)	23 (17)	
Spiritual and religious?	42 (64)	44 (63)	86 (63)	
Not spiritual or religious?	4 (6)	6 (9)	10 (7)	
Holistic practices				
Practices focused breathing often or routinely[d]	36 (55)	27 (39)	63 (54)	0.07
Practices visual imagery often or routinely[d]	18 (27)	15 (21)	33 (24)	0.43
Practices progressive muscle relaxation often or routinely[d]	10 (13)	9 (15)	19 (14)	0.70

Percentages might not add up to 100 due to rounding off

[a] Wilcoxon rank sum test

[b] Functional Assessment of Chronic Illness Therapy

[c] Fisher's exact test

[d] Practices "often or routinely" versus "never, rarely, or sometimes"

pared with a slight decrease of 0.3 (SD=5.12) in the control group ($p<0.0001$).

The number of classes attended during the 6-week study period ranged from three to six classes (*Mean*=5.65, SD=0.63, Median=6). Spearman's rank correlations showed that the relationships between class attendance and outcomes were not significant ($r=0.03$, $p=0.81$ for PCL change; $r=0.06$, $p=0.62$ for ESWB change). However, this might be due to the large percentage (98%) of participants who attended four or more sessions.

Mediation Analyses

We conducted linear regression analyses in order to test whether changes in ESWB mediated the effect of mantram on posttest changes in the PCL [40]. As shown in Fig. 1, the mantram intervention was a significant predictor for PCL change ($B=-3.81$, $p=0.016$) and ESWB change ($B=4.89$, $p<0.0001$) over the 6-week intervention period. Controlling for posttest change in ESWB, the association between mantram and PCL change over a 6-week intervention period became non-significant ($B=-1.57$, $p=0.344$). In the same model, we found that ESWB score was a significant predictor of PCL posttest change scores ($B=-0.46$, $p=0.001$). The estimated indirect effect of mantram treatment on PCL change score was −2.24 with a 95% confidence interval of (−4.17, −1.05). Because there were only four females in the study sample, we repeated the linear regression analyses without them and the results were similar. Thus, the mediation hypothesis was supported. Increases in existential spiritual wellbeing mediate decreases in PTSD symptom severity.

Discussion

In spite of evidence that spirituality/religion may be an important coping resource for some people and that trauma impacts such beliefs, very few spiritual interventions for PTSD have been empirically tested. Because of the spiritual component of mantram repetition, it is important to understand whether or not the PTSD symptom improvement that we observed was associated with changes in ESWB. Findings presented herein suggest that this is the case, namely that mantram intervention can reduce the severity of PTSD symptoms by enhancing the experience of ESWB, e.g., feelings of meaning, purpose in life, faith, and assurance. This is consistent with the results of prior

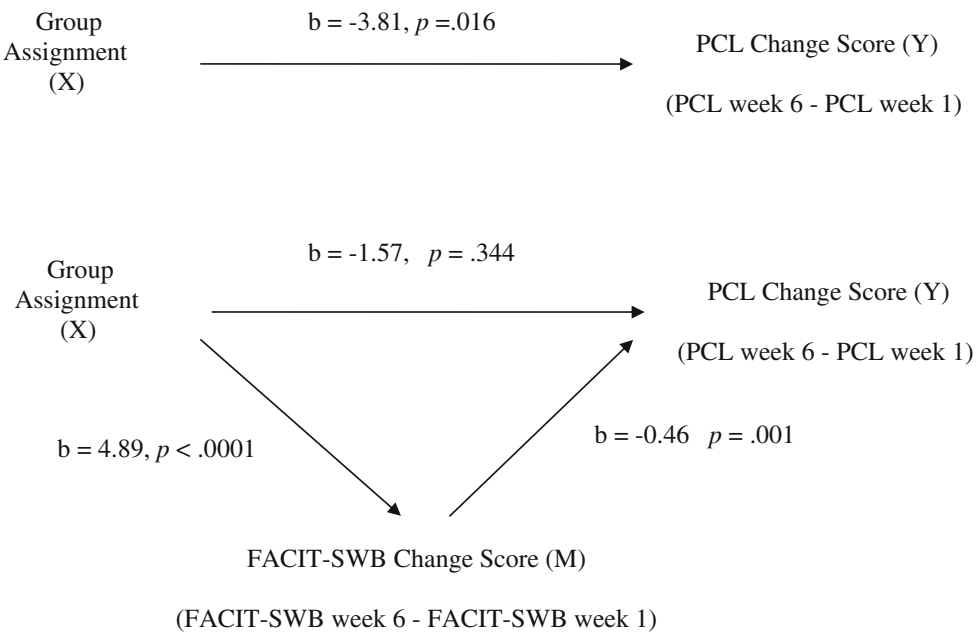

Fig. 1 Mediation diagram summarizing linear regression analyses

PCL = PTSD Checklist

FACIT-SWB = Functional Assessment of Chronic Illness Therapy – Spiritual Wellbeing

Note. Adjusted to account for income, race, employment, and religious identity

investigations in other groups, including veterans with chronic illness and health care employees [18, 21], in which mantram participants reported a greater sense of ESWB. Thus, mantram may provide individuals with an awareness of a higher power or inner strength that assists them in managing their symptoms rather than simply acting as a relaxation tool. Although findings from the present study are provocative, further experimental investigations are needed to more carefully examine other potential mechanisms of the mantram intervention.

Mantram repetition has broad applicability. Unlike sitting meditation, mantram repetition encourages the focus of attention intermittently throughout the day on a chosen sacred phrase. Thus, it is portable and may lead to greater adherence than a practice that requires longer blocks of time. The mantram intervention can be applied to a wide variety of conditions [44]. Bearing in mind that anger, substance abuse, and interpersonal conflict have also been identified as important correlates of PTSD, the mantram intervention may also be an efficacious adjuvant treatment for such individuals. Individuals with active or recent substance abuse were excluded from the present trial, and future trials should examine the efficacy of mantram in more representative samples of veterans with PTSD.

In terms of methodology of assessing the mediation effect, Preacher and Hayes [42] pointed out that Baron and Kenny's approach may erroneously conclude a mediation effect is present or not present [45] and it suffers from low statistical power in most situations [45]. Therefore, we combined Baron and Kenny's criteria with a formal test of significance of indirect effect. Bootstrap approach was used to calculate the 95% confidence interval for indirect effect since it makes no assumption about the shape of sampling distribution of the statistic. Using normal probability plot and the Shapiro–Wilk test of the normality of the sampling distribution of indirect effects estimated with bootstrap, we found that normal assumption was not satisfied, and therefore, the bootstrap approach is more appropriate for our data.

Findings from the present trial must be interpreted in the context of some unique strengths and limitations. The present trial recruited veterans who had not experienced other evidence-based treatments, such as cognitive–behavioral therapy or prolonged exposure, and participants were stable on medications prior to entering the trial. Therefore, outcomes cannot be attributed to other PTSD treatments or psychopharmacology. In terms of limitations, results are not generalizable to women or veterans who abuse substances, have suicidal ideation, or have psychotic disorders. The participants were required to have experienced their primary trauma as related to military or combat-related so results cannot be generalized to other types of trauma such as domestic violence, natural disaster, or sexual abuse.

Although results of the present investigation suggest a causal chain of events where increases in ESWB mediate subsequent reductions in PTSD symptom distress, these results need to be replicated in future trials and with more diverse PTSD populations to enhance confidence in these findings. In the meantime, these results appear to encourage continued investigations into the mechanisms of change for spirituality-based interventions.

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