

Mindfulness-based Stress Reduction (MBSR) Reduces Anxiety, Depression, and Suicidal Ideation in Veterans

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Introduction: Anxiety, depression, and pain are major problems among veterans, despite the availability of standard medical options within the Veterans Health Administration. Complementary and alternative approaches for these symptoms have been shown to be appealing to veterans. One such complementary and alternative approach is mindfulness-based stress reduction (MBSR), a brief course that teaches mindfulness meditation with demonstrated benefits for mood disorders and pain.

Methods: We prospectively collected data on MBSR's effectiveness among 79 veterans at an urban Veterans Health Administration medical facility. The MBSR course had 9 weekly sessions that included seated and walking meditations, gentle yoga, body scans, and discussions of pain, stress, and mindfulness. Pre-MBSR and post-MBSR questionnaires investigating pain, anxiety, depression, suicidal ideation, and physical and mental health functioning were obtained and compared for individuals. We also conducted a mediation analysis to determine whether changes in mindfulness were related to changes in the other outcomes.

Results: Significant reductions in anxiety, depression, and suicidal ideation were observed after MBSR training. Mental health functioning scores were improved. Also, mindfulness interacted with other outcomes such that increases in mindfulness were related to improvements in anxiety, depression, and mental health functionality. Pain intensity and physical health functionality did not show improvements.

Discussion: This naturalistic study in veterans shows that completing an MBSR program can improve symptoms of anxiety and depression, in addition to reducing suicidal ideations, all of which are of critical importance to the overall health of the patients.

Key Words: mindfulness, meditation, veterans, depression, anxiety, pain, suicidal ideation

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Anxiety, depression, and pain are common concerns among the veteran population. The Veterans Health Administration (VA) provides its patients with a wide range of standard treatment options for these conditions (eg, pharmacotherapy and psychotherapy). However, pharmacotherapy often is only modestly efficacious, and ongoing negative perceptions of antidepressants and opiates among veterans may be a barrier to optimal treatment of pain and psychological symptoms in some.^{1,2} As such, there is an increasing recognition that multimodal regimens that include nonpharmacological therapies such as complementary and alternative or integrative medicine (CAM) might be more effective or desired by veterans for their anxiety, depression, and pain.^{1,2}

CAM use among veterans may be greater than that of the general population, with Baldwin and colleagues reporting almost 50% of veterans in the Southern Arizona VA medical facility using a CAM modality compared with rates of 36%–38% CAM use in the general US population.^{1,3,4} In veterans with chronic pain, up to 76% of those not currently using CAM modalities report wanting to do so if CAM were readily available at their VA facility.⁵ The majority of VA medical facilities provide some type of CAM⁶ and, of those, mindfulness-based stress reduction (MBSR) has one of the largest bodies of positive evidence for improvements in anxiety, depression, and pain, our key outcomes of interest. Several systematic reviews and meta-analyses have been conducted on MBSR, with most concluding it showing promise in treating a variety of health outcomes.^{7–13} For example, a recent large meta-analysis of MBSR showed improvements in anxiety, depression, and pain with effect sizes between 3 and 4.¹⁴

As a manualized treatment regimen with documented teacher training requirements, MBSR is well suited for distribution throughout a large health care system like the VA wherein patient care is provided at multiple sites with multiple practitioners. It also meets the veterans' demand for nonpharmacological interventions and can be delivered on a time-limited, large group format. As such, Kearney et al¹⁵ examined an MBSR course among veterans and found it to be effective with posttraumatic stress disorder symptoms

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such as depression and behavioral activation as well as mental health composite scores.

In 2011, our VA medical facility also implemented MBSR classes for veterans with the goal of providing it to as broad a group of veterans as possible while assessing the program's quality and impact for specific symptoms such as pain, depression, and anxiety, with a limited number of patient completing the assessments. In contrast to Kearney and colleagues' previously described study that excluded veterans with thought disorder spectrum illness, active substance use disorders, borderline and antisocial personality disorders, and active suicidal ideation, the present study included veterans from all these diagnostic categories. The goal was to assess the utilization of this transdiagnostic approach to improve health and well-being in the setting of usual medical care and allows evaluation of the "real-world" benefits of MBSR in a complex patient population. We present here the results of a quality improvement effort in which we evaluate the effects of an MBSR course on several health outcomes: anxiety, depression, pain, physical and mental health functioning, mindfulness, and suicidal ideation. The results can be used to aid health care systems and their providers in determining whether or not to utilize MBSR as an adjunctive treatment for these health conditions.

METHODS

This was a prospective, longitudinal examination of the effectiveness of an MBSR course among veterans at a large urban VA medical center. Veteran participants were either clinician-referred or self-referred after learning about the class from a flyer posted at various medical center locations announcing "mindfulness based stress reduction" that is helpful for "stress, anxiety, chronic pain, depression, and more." All who wanted to participate were allowed to do so unless the psychologist leading the MBSR class determined by a medical record review that the participant had advanced dementia and, as such, was unlikely to benefit from the class. All the veterans completing this MBSR program were also under the care of mental health treatment coordinators. Of the 105 veterans participating in 1 of 9 MBSR courses offered between January 2012 and December 2013, 79 completed both pretests and posttests, so we focused our analyses on those.

MBSR Course

Ten to 15 participants met once per week in 2-hour sessions for 9 weeks, for each of the 9 times the course was provided. The course was taught by a clinical psychologist trained and approved to teach MBSR and having experience teaching 19 cohorts. The course curriculum was modeled after the original MBSR course designed by Kabat-Zinn¹⁶ and certified by a non-VA MBSR teacher trainer.

MBSR training utilizes training in mindfulness, defined as paying attention in a kind way, on purpose, in the present moment and nonjudgmentally to reduce stress and its associated effects on the individual. MBSR implements a standardized approach to teaching mindfulness developed by Kabat-Zinn at the University of Massachusetts Medical Center in 1979. This standardization makes comparison

across course sessions and instructors more feasible. MBSR is typically taught by doing sitting and walking meditations, body scans, loving kindness meditation, and gentle yoga in class, with daily home practice.¹⁶ For sitting meditations, participants were asked to bring attention to their breath for 30 minutes, and when thoughts came to mind, they were taught to bring awareness to that thought and then to return their awareness to the breath. In walking meditation, participants were asked to bring awareness to the process of walking and the contact of the feet on the ground. For body scans, participants were guided for 35 minutes to focus their attention on various parts of the body with their eyes closed. As with the sitting meditation, participants were asked to notice when the mind inevitably wandered and to redirect the attention, with kindness and nonjudgment, back to the present moment sensations in the body. Loving kindness meditations use images, feelings, and words to evoke a feeling of loving kindness and friendliness toward oneself and others.

The MBSR program followed a standard 8-week protocol¹⁶ with the exception of an orientation week, which included the MBSR segment of the video "Bill Moyer's Healing and the Mind" in an attempt to minimize the attrition experienced in other VA MBSR studies (David Kearney, written personal communication, 2010). For the present study, the orientation session included completion of the pretest measures, viewing the 40-minute video and a brief question and answer period. This was followed by a brief 3-minute grounding practice, which is simply intended to bring awareness into the body in the present moment. The subsequent 8 weeks followed the standard MBSR protocol. See Table 1 for protocol details.

Measures

Our measured outcomes included mindfulness, anxiety, depression, suicidal ideation, pain intensity, and mental and physical components of the SF-12 before the first class and at the end of the last class in the course.

Mindfulness

We used the Five Facet Mindfulness Questionnaire (FFMQ) to assess 5 facets of mindfulness with 39 items: (1) nonjudgment of experience, (2) nonreactivity to internal experience, (3) describing internal experience, (4) observing internal experience, and (5) acting with awareness. The FFMQ has demonstrated convergent validity and incremental validity in the prediction of psychological symptoms.^{17,18} Higher FFMQ scores reflect greater mindfulness.

Pain

We used 1 item from the PEG scale to assess average past week pain intensity.¹⁹

Depression

We used the 9-item Patient Health Questionnaire-9 (PHQ-9) to screen for depression, which has demonstrated good validity ($r=0.89$).²⁰ Higher PHQ-9 scores reflect greater depression.

TABLE 1. MBSR Program Outline

Session	Topic/Theme	Practices
1	Introductions: There is more right with you than wrong with you	Mindful eating, grounding practice, body scan
2	Stress: Our perceptions of our experience impacts our mood and physiology	Body scan, mindfulness of the breath
3	Noticing experience and savoring that which is pleasant	Mindful movement, spaciousness practice, mindfulness of sounds
4	Getting unstuck, noticing unhelpful habitual patterns	Mindful movement, short loving kindness, 3-minute breathing space
5	Spaciousness, the lifelong work of moving from reacting to responding	Mindful movement, loving kindness, choiceless awareness, walking meditation
6	Chronic pain	Mindful movement, mindfulness of the breath, loving kindness
Retreat	Deepening the practice on silent retreat	Mindful movement, body scan, mindfulness of the breath, walking meditation, loving kindness, mountain meditation, mindful eating, walking loving kindness
7	Interpersonal mindfulness, staying open in an unpredictable process	Mindful movement, mindfulness of the breath, walking meditation
8	Forgiveness and moving on, how to support your ongoing practice	Mindful movement, grounding practice, loving kindness

Anxiety

We used the 7-item Generalized Anxiety Disorder-7 scale to screen for anxiety, which has demonstrated good reliability and validity.²¹ Higher scores reflect greater anxiety.

General Physical and Mental Health Functionality

We used the Short Form-12 (SF-12) to assess general physical and mental health functionality.²² Higher scores on the mental component summary and physical component summary scores reflect greater general health functionality.

Suicidal Ideation

To measure suicidal ideation as an exploratory outcome, we used item 9 from the PHQ-9: “In the past 2 weeks have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?”²² The item has response options: 0 = not at all, 1 = several days, 2 = half the days, and 3 = nearly every day. Each PHQ-9 response was briefly reviewed, and veterans reporting to have suicidal ideations were pulled aside and assessed for safety, in part by being asked questions to determine whether they had a plan and/or intent for self-harm. None of the participants were determined to be in need of a higher level of care to manage risk. All of those participants reporting suicidal ideations also indicated they were actively engaged in outpatient mental health care.

Demographics

We assessed literacy by asking respondents whether they needed help reading medical instructions on their prescriptions. Surveys for 2 of the classes were missing demographic questions, so demographic characteristics were available for 63 of the 79 participants being examined.

Analysis

We first conducted univariate analyses to calculate frequencies. We then calculated *t* tests to reflect the significance of changes between pretest and posttest scores. For mental and physical health status, we defined clinical change as a change of 10 or more,²² and for depression and anxiety we defined clinical change as a change of 5 or more.²³ To assess changes in suicidal ideation we dichotomized the outcome to the presence (response > 0) or absence of suicidal ideation (response = 0) and used a McNemar χ^2 test. We used Bonferroni corrected *P*-values given the multiple comparisons.

We also conducted mediation analyses to determine whether changes in mindfulness were related to changes in the other outcomes (anxiety, depression, pain, and mental and physical health functionality). We did not conduct mediation analysis using suicidal ideation because the item is derived from the depression scale so was accounted for in the depression mediation. We used a standard approach for mediation analysis when a treatment condition (baseline and follow-up) is involved.²⁴ That is, using ordinary least squares analysis, we regressed the Y difference in outcomes on both the X (mindfulness) sum and the X (mindfulness) difference between baseline and follow-up. Mediation is evidenced by the latter term (the mindfulness difference). The former term (the mindfulness sum), when centered, represents the portion of the change in outcomes that is not mediated by the change in mindfulness.

The study was determined by the Institutional Review Board and Research and Development committees of the VA hospital to be a quality improvement effort, because the results of this examination were used to determine the future availability of MBSR within the local VA medical facility. As such, we utilized a deidentified dataset of subject responses for the analyses presented here, did not obtain informed consent, and did not offer financial compensation to the participants. We used Stata 11 (StataCorp LP, College Station, TX) for our analyses.

RESULTS

The participants' baseline characteristics are shown in Table 2. The majority of participants were male (89%) and living in their own home or apartment (69%), whereas about a third were retired (35%), divorced or separated (38%), and lived with a spouse or partner (33%). All but 2 participants completed the MBSR course, which we defined as attending a minimum of 6 of the 9 sessions.

Table 3 shows the preclass and postclass scores. Significant improvements were seen in mindfulness, anxiety, depression, and general mental health functionality from baseline to the 9-week class conclusion. Accordingly, over a third of the sample met a priori definitions of clinical significance for these outcomes, as shown in Table 4. Also,

TABLE 2. Veterans' Characteristics

Characteristics	% or Mean (SD)
Baseline FFMQ scores (n = 79)	
Nonjudgment of experience	24 (7)
Nonreactivity to internal experience	20 (6)
Describing internal experience	26 (6)
Observing internal experience	25 (6)
Acting with awareness	25 (7)
Other characteristics (n = 63)*	
Sex	
Male	89
Female	11
Age	60 (7)
Years of education	14 (2)
Employed	
For wages	14
Unable to work	18
Unemployed	30
Retired	35
Homemaker/student	3
Marital status	
Single	19
Married	32
Living together	6
Divorced/Separated	38
Widowed	5
Living with others	
Alone	28
Spouse/partner	33
Child/family	9
Nonfamily	9
Other	21
Need help reading medical instructions	
Never	63
Rarely	22
Sometimes	9
Often or always	6
Rarely	22
Sometimes	9
Often or always	6
Often or always	6

*Although pre-post data were available for 78 participants, demographic characteristic data were available for only 63 participants because the surveys for 2 classes were missing those questions.

FFMQ indicates Five Facet Mindfulness Questionnaire.

the frequency of suicidal ideation decreased by almost half, from 24.05% to 12.66% (McNemar χ^2 statistic = 4.26, $P = 0.049$). However, pain and physical health status did not improve significantly after MBSR.

When we conducted the mediation analyses to determine whether changes in mindfulness were related to changes in the other outcomes, we found that mindfulness appeared to mediate changes in depression, anxiety, and general mental health functionality (Table 5). That is, the results showed that improvements in mindfulness played a specific role in reducing depression, anxiety, and mental health scores. In addition, the third column shows that a portion of the changes in depression, anxiety, and general mental health functionality were due to other nonmeasured factors above and beyond any mediation by mindfulness.

DISCUSSION

MBSR has received significant attention over recent years as a modality not only to reduce stress but also to improve chronic medical symptoms. A growing literature exists on the physiological mechanisms of MBSR²⁵⁻²⁹ and its potential efficacy in anxiety, depression, and pain.^{13,14} Our examination of MBSR showed that it appears to have the potential to improve multiple health outcomes for veterans, specifically, depression, anxiety, and general mental health functionality with a marginal but significant effect on suicidal ideations. The improvements in health outcomes are notable in that only 1 veteran, because of advanced dementia, was excluded from the study. The present study sample included veterans with active psychosis, active substance use disorders, and severe personality disorders. About one quarter of the veterans in the study (24.05%) expressed active suicidal ideation. The present study may be the first to include these diagnostic categories in a naturalistic treatment setting approach. MBSR had no effect on pain or physical health. The positive benefits of MBSR identified are consistent with prior work within the VA, which examined the effects of an MBSR course on health outcomes or the effects of learned mindfulness skills on health outcomes,^{15,30-32} as well as multiple meta-analyses and systemic reviews of MBSR across a wide range of patient groups and medical conditions.⁷⁻¹¹ The improvement in suicidal ideation has not been addressed in previous studies of MBSR in veterans but is particularly relevant as suicide prevention is considered a central target of VA clinical care. Although this study could not tease out the individual role of mindfulness in the decreasing suicide ideation, the results suggest that MBSR may

TABLE 3. Mean Baseline and Class Conclusion Scores and Change Scores Effect Sizes (n = 78)

Outcomes	Baseline Score [Mean (SD)]	Class Conclusion Score [Mean (SD)]	Mean Change (95% CI)	Standardized Mean Change (95% CI)
Mindfulness (FFMQ)	120.71 (20.84)	131.44 (19.48)	10.73 (6.94, 4.52) $t = 5.64, P < 0.0001$	0.63 (0.41, 0.85)
Pain	4.21 (2.63)	4.01 (2.74)	-0.19 (-0.71, 0.32) $t = -0.73, P = 0.47$	-0.08 (-0.30, 0.14)
Depression (PHQ-9)	11.85 (6.13)	8.13 (4.78)	-3.45 (-4.42, -2.49) $t = -7.11, P < 0.0001$	-0.80 (-1.02, -0.58)
Anxiety (GAD)	10.06 (5.46)	6.67 (4.44)	-3.39 (-4.51, -2.28) $t = -6.06, P < 0.0001$	-0.68 (-0.91, -0.46)
Mental health status (MCS)	36.81 (9.66)	43.94 (8.76)	7.13 (5.29, 8.97) $t = 7.72, P < 0.0001$	0.87 (0.64, 1.09)
Physical health status (PCS)	46.55 (11.62)	45.18 (11.95)	-1.37 (-2.91, 0.17) $t = -1.78, P = 0.08$	-0.20 (-0.42, 0.02)

*Changes assessed using t tests.

CI indicates confidence intervals; FFMQ, Five Facet Mindfulness Questionnaire; GAD, Generalized Anxiety Disorder; MCS, mental component summary of Short Form-12 (SF-12); PCS, physical component summary of Short Form-12 (SF-12); PHQ-9, Patient Health Questionnaire-9.

TABLE 4. Clinically Significant Changes From Baseline to Class Conclusion (n = 78)

Outcome	# Clinically Better [n (%)]	# Clinically Worse [n (%)]
Depression (PHQ-9)	33 (42.3)	2 (2.6)
Anxiety (GAD)	32 (41.0)	3 (3.8)
Mental health status (MCS)	28 (35.9)	0

have added value in addition to standard clinical care. This interaction should be a target of future study.

The lack of improvement in pain scores shown here is in contrast to previous publications, including the recent meta-analysis.¹⁴ This discrepancy may have been due to the limited assessment of pain used (a single item of pain intensity) or to patient-related characteristics that may have made pain less responsive. For example, pain chronicity, presence of multiple comorbid pain disorders, or opiate dependent chronic pain in the veteran population may have led to lower MBSR-related improvements. Or possibly pain did not decrease because MBSR's goal is not to eliminate pain but rather to reduce pain-related distress or move closer to the pain and work with it in the meditation to have a different relationship to chronic, uncomfortable sensations, which might not be well detected in a pain intensity measure. A more thorough evaluation of pain characteristics and comorbidities will be necessary in future studies.

The mediation analysis showed that mindfulness skills learned in the course played a significant role in improved depression, anxiety, and mental health scores. The magnitude of this mediation was small in comparison to the non-specific effects of the MBSR training (eg, the experience of a supportive environment, positive expectation of change, development of new coping strategies during the MBSR training), which is not surprising because the measurement of mindfulness remains controversial. The FFMQ is one of the most widely used scales for mindfulness and has generally been shown to have good psychometric properties^{18,33}; however, questions have been raised regarding its factorial

TABLE 5. Results of Mediation Analysis Regressing Changes in Outcomes on Mindfulness

Outcome	Regression Coefficient for Change in FFMQ (Mediated Portion of Change in Outcome) (95% CI), P value	Regression Coefficient for Intercept (Nonmediated Portion of Change in Outcome) (95% CI), P value
Depression (PHQ-9)	-0.095 (-0.147, -0.044) P < 0.0001	-2.432 (-3.454, -1.410) P < 0.0001
Anxiety (GAD)	-0.083 (-0.148, -0.018) P = 0.012	-2.501 (-3.785, -1.218) P < 0.0001
Mental health status (MCS)	0.136 (0.030, 0.242) P = 0.013	5.669 (3.557, 7.781) P < 0.001

CI indicates confidence intervals; FFMQ, Five Facet Mindfulness Questionnaire; GAD, Generalized Anxiety Disorder; MCS, mental component summary of Short Form-12 (SF-12); PHQ-9, Patient Health Questionnaire-9.

validity (particularly the “nonreact” factor) as well as an overrepresentation of women in many of its validation samples.³⁴ Thus the FFMQ may underrepresent the increases in mindfulness observed in our sample.

This study has a few limitations. Given that it was a quality improvement effort, we did not utilize richer information in the medical records on veteran characteristics that might have influenced the effect of the course, such as any relevant diagnoses or health care utilization data. As a larger number of veterans complete MBSR training, such a chart review investigation could provide important information as potential predictors of response and further guide our implementation planning for MBSR across the VA health care system. Also, this was an observational study only and did not include a randomized control group, so we might have masked any nonspecific effects of MBSR, including placebo effects. In addition, a longitudinal assessment of health care utilization parameters such as frequency of medical visits, no-show rates, medication doses, and physiological parameters (eg, blood pressure, heart rate, and body mass index) obtained before and after MBSR completion may be useful in determining the effectiveness of MBSR to alter health more globally. Finally, the symptom assessments presented were performed at the end of the MBSR course but without longitudinal follow-up. It is frequently found that response to MBSR, as in other behavioral interventions, continues on a positive trajectory when assessed at 3 or 6 months follow-up. To show practical clinical utility, transient effects associated with the active treatment could be avoided by using a measurement distant from the treatment period.

Given veterans' desires to receive nonpharmacological and CAM therapies, and the subsequent implementation of MBSR and other CAM modalities in much of the VA,^{1,2,6} this study assessed MBSR in the “real-world” transdiagnostic context of veterans who have a variety of health conditions. That is, veterans seeking health care at the VA have a greater incidence of mood disorders, posttraumatic stress disorder, and life challenges (eg, homelessness, unemployment, and disability) than the general population and this complexity may impact the benefits of a program like MBSR when implemented in a naturalistic setting.³⁵⁻³⁸ The implications of our results for health care systems and their providers and patients are that MBSR has the potential to be an adjunctive treatment for anxiety, depression and general mental health functionality. However, further work to assess MBSR either in comparison to or in conjunction with other available modalities for the treatment of anxiety and depression such as cognitive behavioral therapy and antidepressants is warranted. In addition, veterans in the VA have increased access to traditional mental health care through psychiatrists, psychologists, and social workers compared with many Americans. Given this context, the added value of CAM treatments such as MBSR should be carefully evaluated in terms of both patient preference and medical outcomes. As MBSR appears to reduce anxiety and depression it might have the potential to reduce the need for antidepressants, thereby serving both the goals of many patients as well as potential reductions in long-term health care utilization.

In summary, this naturalistic study of the effects of MBSR on symptoms in veterans shows that an MBSR program at an urban VA improves symptoms of anxiety and depression, in addition to reducing suicidal ideation, all of which are of critical importance to the overall health of the patients. Further work is needed in this population to better understand the role of MBSR in veterans with pain and to determine whether the benefits of MBSR allow for decreased health care utilization and better long-term outcomes.

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