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Mindfulness-Based Stress Reduction: A Nonpharmacological Approach to Chronic Pain

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Mindfulness-Based Stress Reduction: A Nonpharmacological Approach to Chronic Pain

Chronic pain is a serious public health problem, and according to the 2011 study by the National Academy of Medicine at least 100 million Americans suffer from chronic pain (Department of Veterans Affairs and Department of Defense, 2017; Rajguru et al., 2013). Pain affects more Americans than diabetes, heart disease, and cancer combined and is referenced as the most common reason for accessing health care (National Institute of Health [NIH], 2010). The Institute of Medicine (IOM) acknowledges that the annual cost of chronic pain in the United States is higher than that of cancer, heart disease, and diabetes costing more than \$635 billion per year in expenses (Ashrafioun, Allen, & Pigeon 2018; Hilton et al., 2017). Chronic pain, defined as pain lasting more than three months or past the usual time for healing is a significant cause of decreased quality of life (QOL) and disability and is often refractory to treatment (Institute of Medicine Committee on Advancing Pain Research, Care Education [IOM], 2011). Primary care providers who are expected to manage patients with chronic pain often prescribe opioids as part of their treatment (Department of Veterans Affairs, 2017). According to Dowell, Haegrich, and Chou (2016) approximately 3% to 4% of the adult US population is prescribed opioids for chronic pain. Patients, providers, communities, and health systems have struggled to find a balance between access to opioid treatment for chronic pain and potentially harmful consequences of long-term therapy, especially misuse, addiction, and overdose (Becker, Merlin, Manhapra, & Edens, 2017). There has been growing recognition that among America's veterans the prevalence of opioid utilization is high, in fact the opioid prescriptions increased from 18.9% to 76.7% from 2004 to 2012, that is an increase of 76.7% (Department of Veterans Affairs, Department of Defense, 2017; Mosher et al., 2014). There are numerous and well-cited reasons that prove that opioid medications present severe risks and are often inadequate for the

management of chronic pain. An epidemic of opioid-related adverse events has accompanied the increase in prescriptions for opioids, including increased mortality, overdose, sexual dysfunction, fractures, myocardial infarction, constipation, and sleep-disordered breathing (Chou et al., 2015). Opioids were involved in 42,249 overdose deaths in 2016 (Centers for Disease Control and Prevention [CDC], 2017).

Consequently, because of the adverse outcomes associated with the use of opioids, there is a need for a paradigm shift in how chronic pain is treated. Veterans as a population are at a higher risk for adverse effects from opioid use, making this population a priority for a practice change that impacts chronic pain outcomes. Managing chronic pain can be complex, and one recommendation from the clinical research that redirects clinicians away from the use of opioids is a biopsychosocial approach to managing chronic pain. A biopsychosocial model of pain postulates that several factors mediate pain perception and its effects on the patient's function (e.g., mood, social, support, prior experience, biomechanical factors), not just biology alone (Department of Veterans Affairs and Department of Defense, 2017). One treatment modality that is safe, evidence-informed, and effective for treating veterans with chronic pain is Mindfulness-Based Stress Reduction (MBSR). This treatment option is thought to work by focusing the mind on the present and increasing awareness of one's external surroundings and inner sensations, allowing the individual to step back and reframe experiences (Hilton et al., 2017). Clinical care for chronic pain among the veteran population requires a model of pain management that is aligned with evidence-based guidelines, expert consensus reports, clinical practice resources, and current research, and MBSR offers a population health strategy that can culturally transform the current approach to chronic pain management by offering patient-centered approaches that will reduce the opioid use and risks associated with opioids.

Background & Significance

Chronic pain is a common condition in the primary care setting and has wide-reaching personal, social, and psychological impacts, and is associated with a significant increase in morbidity and mortality (Mills, Torrance, & Smith, 2016). Recent research suggests that veterans as a population are at a higher risk of negative consequences secondary to prolonged use of opioids, making this population a priority for integration of different options for treating chronic pain. According to the U.S Department of Veterans Affairs (2015), the veteran population is growing with more than 20 million veterans residing in the United States and Gallagher (2016) states that 50% of the veteran population experiences chronic pain compared to 30% of the U.S adult population. A report by the American Public Health Association in 2011 found that the fatal overdose rate among VA patients is nearly double the national average. One reason is that veterans use opioid painkillers more frequently than civilians because their military training and combat lead to far more injuries compared to civilians and one in five veterans in the primary care setting are prescribed opioids for chronic pain (Department of Veterans Affairs and Department of Defense, 2017). This public health issue which has been labeled an epidemic has become the focus of several committees and governmental agencies. For example, both the Centers for Disease Control (CDC) and the joint Department of Veterans Affairs/ Department of Defense (DoD) have released Clinical Practice Guidelines (CPGs) on opioid prescribing for chronic pain (Ashrafioun, Allen, & Pigeon, 2018). These guidelines are intended to provide healthcare clinicians a framework by which to evaluate, treat, and manage the individual needs and preferences of patients with chronic pain, and were used as a framework for this Doctor of Nursing Practice (DNP) scholarly project (Department of Veterans Affairs and Department of Defense, 2017). The new CPGs recommend non-pharmacological approaches and self-

management strategies as frontline treatments for chronic pain. According to Ashrafioun, Allen, and Pigeon (2018), these recommendations are based on substantial evidence indicating the potential for long-term benefit with few adverse effects from non-pharmacological strategies. Complementary and integrative health approaches for pain management such as MBSR are among the nonpharmacologic approaches noted in CPGs (Ashrafioun, Allen, & Pigeon, 2018). There are several key points of overlap between pain theories, and mindfulness models. For example, emotion and emotional regulation are posited as influencing the experience of pain. According to Day, Jensen, Ehde, and Thorn (2014) Melzack and Wail's gate control theory proposes that the brain plays a dynamic role in the interpretive process of the sensory pain stimulus, and the areas of the brain most closely linked to pain include the prefrontal cortex, anterior cingulate cortex, primary and secondary sensory cortices, and insula. Like the gate control theory, Hilton et al. (2017) make obvious that mindfulness meditation is thought to work by refocusing the mind by increasing awareness of one's external surroundings and inner sensations, allowing the individual to step back and reframe experience. MBSR offers benefits by regulating attention to present moment awareness of the body and emotions leading to a state of equanimity in the body and mind, which will alleviate and even remove all pain and physical sufferings in the mind-body continuum (Leung, Han, Martin, & Kotecha, 2015). MBSR offers a biopsychosocial approach to pain care that is multimodal, interdisciplinary and has been practiced since the 1970s. MBSR focuses on the suffering, which encompasses how a person responds to the experiences of pain and the capacity to reflect on life purpose and meaning with pain and suffering as part of that exploration (Whole Health and Pain and Suffering, 2018). In the 1970s MBSR was designed as an innovative intervention that uses a meditative approach that fosters mind-body awareness by Jon Kabat-Zinn Ph.D. (U.S Department of Veterans Affairs,

2017). Kabat-Zinn's early research on chronic pain revealed statistically significant reductions in pain and pain-related drug utilization and recently has become a popular and effective therapy for chronic pain management (U.S Department of Veterans Affairs, 2017). MBSR offers a structured group environment that employs mindfulness meditation to alleviate suffering associated with physical, psychosocial, and psychiatric disorders that is effective for a diverse population.

This DNP project supports a change in practice that was based on the following population, intervention, comparison, outcome, and time (PICOT) question: In veterans with chronic pain (P), how does MBSR (I) compare to treatment as usual (C) and affect opioid prescriptions in the primary care setting (O) over a period of two months (T)?

Aims & Purpose

The purpose of this DNP project was to offer an evidence-informed, safe, and effective non-pharmaceutical approach for chronic pain management for veterans as a population in the primary care setting. The aims of this DNP project were to (a) implement MBSR as an adjunctive treatment; (b) demonstrate that MBSR has a biopsychosocial impact on pain by measuring the effect on activity, sleep, mood, and stress; and (c) show a reduction in self-reported pain intensity over nine weeks measured time. Implementation of MBSR in the primary care setting supports the implementation site's strategic goal to provide veterans personalized, proactive, patient-driven health care, and empower veterans to improve their wellbeing (Whole Health for Pain and Suffering, 2018). This DNP project supports a change in practice by leading a collaborative pain care model that integrates complementary and alternative behavioral approaches for the veteran population experiencing chronic pain in the primary care setting.

Theoretical Framework for the Practice Change

Implementation of MBSR as a strategy to improve chronic pain requires adopting tenets from various implementation theories, models, and frameworks. One model that provides a comprehensive taxonomy of operationally defined constructs from multiple disciplinary domains is the Consolidated Framework for Implementation Research (CFIR) (Damschroder & Lowery, 2013). The CFIR framework includes constructs from a synthesis of existing theories that offers a list of constructs to promote theory development and verification of what works where and why across multiple contexts (Damschroder et al., 2009). The CFIR is composed of five major domains: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and the process of implementation. Each of these five domains allows for a menu approach, promoting flexibility in the constructs that apply to the study at hand. The priority of these domains will change because it is a conceptual framework. Intervention characteristics, one of the five major domains had the highest priority, because if clinicians did not accept MBSR as an effective non-pharmacological approach to managing chronic pain, then implementation and sustainability were not going to be effective. Most health-care clinicians recognize that there is a need to move away from opioid prescribing and MBSR provides a safe alternative that is well suited to meet the needs of a diverse population. MBSR is an externally developed program that offers an approach that applies the same treatment principles without tailoring it to a specific diagnosis, making MBSR applicable to a large population of patients (Gallegos, Cross, & Pigeon, 2015).

Evidence

A comprehensive search of the literature related to veterans with chronic pain and MBSR yielded two-hundred and eleven articles. The search was conducted using Clinical Key

for Providers, Cumulative Index of Nursing and Allied Health Literature (CINAHL) PubMed of the National Library of Medicine, ProQuest, and EBSCO host databases. Articles included in this review encompassed publications within the last ten years that were peer-reviewed research articles of adult populations, written in English language and had a linked full text. Out of the two hundred and eleven articles, one hundred and eighty-five records were excluded based on titles and abstracts that did not meet inclusion criteria, leaving twenty-six articles for additional review. These twenty-six articles were further appraised to include: veterans as a population, MBSR as a single intervention for chronic pain, and study design. After final appraisal only two articles were used for review; a systematic review of thirty-eight randomized controlled trials and one randomized control trial (Appendix B and C). According to Maglione et al. (2016), the conclusion of a systematic review of twenty-eight randomized controlled studies (RCTs) showed that mindfulness meditation improves pain symptoms, depression, and quality of life; however, there were substantial differences in study outcomes resulting in a low quality of evidence overall. One trend across the research was that data collection and data analysis lacked consistency across several studies and because of this it has weakened the strength of the evidence. Several studies conclude that there need to be more trials to increase confidence in supporting improved chronic pain outcomes. (Hilton et al., 2017; Maglione, 2016). Hilton et al. (2017) cite that mindfulness meditation statistically significantly reduced depression, improved mental-health-related quality of life, and improved physical health-related quality of life. The authors of this study report that there is low quality of evidence due to substantial unexplained heterogeneity among studies that mindfulness meditation is associated with a small decrease in pain, compared with control in 24 RCTs (Hilton et al., 2017; Maglione, 2016). Kearney et al. (2016) concluded that veterans who were randomized to the MBSR plus treatment as usual,

showed a clinically significant change in the primary outcomes measures of pain, fatigue, and cognitive failures four months after the study. MBSR shows promise in improving chronic pain outcomes and these outcomes expand the scientific basis for patients with chronic pain.

Implementation Process

This DNP scholarly project provided a timely intervention for the implementation site which was shifting their current culture of health care from a problem-based model to a Whole Health Care Model. This model of health engages and inspires veterans to their highest level of health and wellbeing by introducing four key parts of the circle of health: (1) the individual's story; (2) self-care strategies; (3) professional care; and (4) community (Whole Health and Pain and Suffering, 2018). The implementation process took place over four months. The process of implementation fluctuated, and some challenges required adaptations as part of the implementation process. One problem was the readiness for implementation. The organization had stakeholder turnover, and this turnover impacted leadership engagement, available resources, and access to information. For example, the organization had three MBSR trained clinicians, but because of their commitments to other programs, there was a delay in scheduling MBSR at this site. Having available resources dedicated to MBSR was essential to the implementation process. Scheduling MBSR requires eight to ten weeks of dedicated time and space, and because of the extensive infrastructure, this was challenging to coordinate. Some reasons that impacted scheduling were staff leave, open vacancies, and competing priorities. Because MBSR programs are modeled on the program created by Jon Kabat-Zinn and described in his book *Full Catastrophe Living* (1999), only trained clinicians can teach MBSR. Having a trained instructor is an essential consideration for intervention fidelity.

Execution of MBSR required a process to recruit participants. Recruitment started with advertisement through educational flyers, emails, and provider meetings. The recruitment timeline was only three weeks which limited the number of participants. The following ways were used to recruit participants: (1) educational flyers; (2) provider meetings; (3) emails; and (4) posters. Participants who had volunteered were invited to attend an informational session where they were provided the instructional materials, screened for chronic pain, and offered a schedule.

The first session started on May 10, 2018 and ended July 12th, 2018. Participants in the MBSR group met every Thursday for two and half hour sessions guided by a certified MBSR clinician using the MBSR curriculum provided by the Department of Veteran Affairs. During each group session, participants were led in guided mindfulness meditations, body scan exercises, mindful yoga, and group discussions with the intent to foster mindful awareness of one's own experience. In between sessions participants were asked to complete home practice sessions that required the daily practice of meditation for 45 minutes. MBSR requires physical space to hold groups and appropriate MBSR materials. For example, blankets, positioning pillows, yoga mats, and chairs were provided. For home practice sessions participants were given guided CDs to use for meditation practices. Home practice allowed for individual participants to create their own space and use materials that they found comforting.

Measurement Tools

Pain was assessed with the DVPRS. The DVPRS is an integrated pain scale and is a validated 5-item instrument to assess a veteran's pain experience, including severity and the biopsychosocial impact of pain prioritizing the influence on activity, sleep, mood, and levels of stress. The findings from Polomano et al. (2016) conclude that after psychometric testing the results demonstrated acceptable internal consistency reliability (Cronbach's alpha=0.871) and

test-retest reliability ($r=0.637$ to $r=0.774$). The DVPRS tool uses the traditional 11-point numerical rating scale (NRS) enhanced by functional word descriptors, color coding, and pictorial facial expressions matched to pain levels (Polomano et al., 2016). This tool quantifies levels of pain by highlighting traffic color coding to delineate mild, moderate, and severe pain (Buckenmaier et al., 2013). Based on standard tests literacy and comprehension the DVPRS is easily understood at the 8th and 9th-grade levels (Buckenmaier et al., 2013). A copy of this pain assessment and supplemental questions is available in appendix A. Permission has been granted for clinicians and researchers to use these tools without alteration

Evaluation Plan

Due to the scope of this pilot project, organizational and process measures were not measured. Methods used for evaluation included the DVPRS pain scale, informal individual interviews, observation, and an informal focus group. Patient compliance was measured using descriptive analysis, defined by MBSR attendance, and was reported as a percentage of participants who completed the MBSR program. Self-report use of opioids was used to determine reduction in prescribed opioids as an outcome of MBSR participation. An opioid reduction was measured using informal interviews at week nine. Patient satisfaction was measured using an informal focus group to determine satisfaction. Pain intensity, activity, sleep, mood, and levels of stress were measured each week for nine weeks and evaluated using a run chart to analyze for trends over time. Data was evaluated over the course of the nine weeks. These methods were used to determine participant satisfaction, organizational development, and pain outcomes. The minimal amount of change in pain intensity, activity, sleep, mood, and stress to determine a clinical difference was a 2-point difference on a 0-11 pain scale. This 2-point difference is the minimal amount of change that would be valuable to this project.

Ethical Considerations

The Doctoral Nursing Practice project proposal was submitted along with a request for Institutional Review Board (IRB) for Research Involving Human Subject and was approved by the IRB by a university in the Northwestern part of the United States. At the implementation site, the proposal was reviewed by the executive leadership team and did not require an internal IRB review because it was already approved by the university. All participants were voluntary and agreed to participate in the MBSR sessions over the course of nine weeks.

Results

Based on the data collected from the DVPRS pain scale, the self-reported data revealed improvements in self-reported pain levels. Pain intensity was the primary pain outcome measured to determine if there is a positive association between MBSR and chronic pain. (see Figure 1). The run chart reveals an impression of change of 2 points or more for each participant. The DVPRS questionnaire asked each participant in the last 24 hours how did pain interfere with: activity, sleep, mood, and perceived stress. Activity, sleep, mood, and perceived stress were secondary outcomes that could be influenced by the upstream and downstream influence of chronic pain. Veterans who participated reported improvement in activity, sleep, mood, and perceived stress over the course of nine weeks (see Figure 2,3,4 and 5).

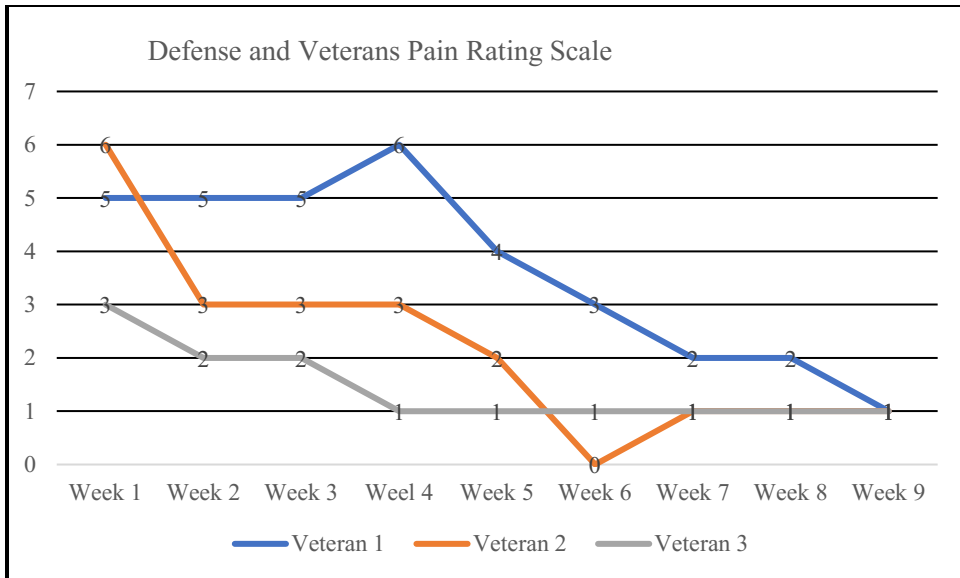


Figure 1. Defense and Veterans Pain Rating Scale

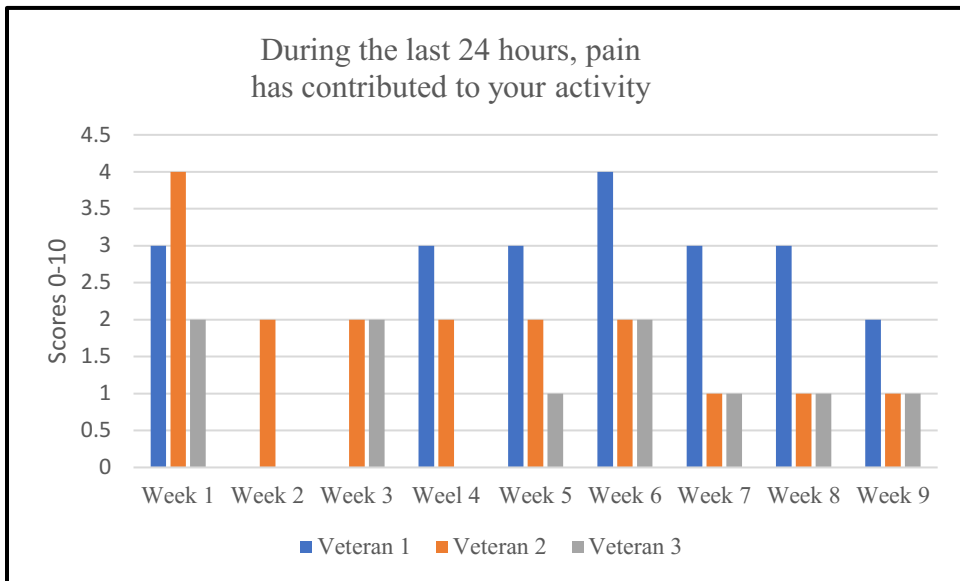


Figure 2. Supplemental Questions to Evaluate the Biopsychosocial Impact of Pain

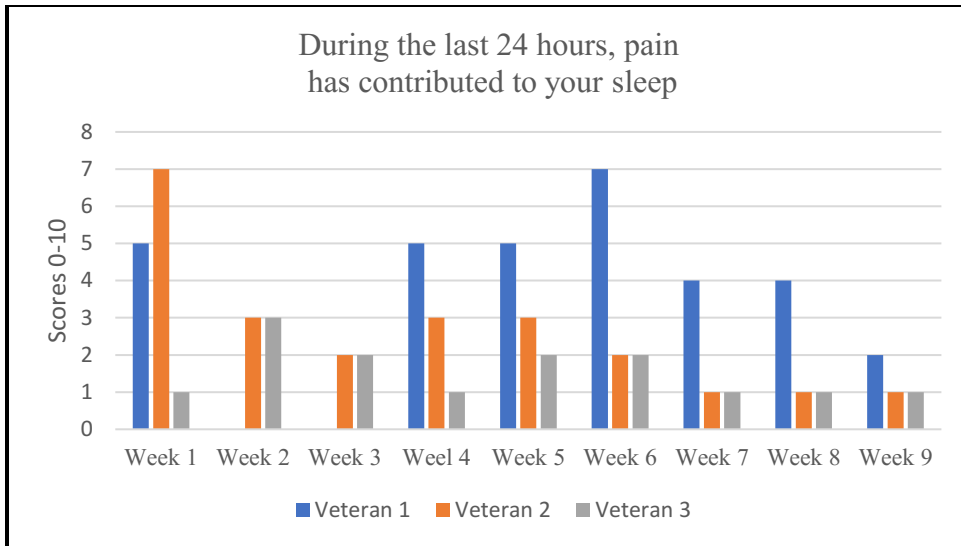


Figure 3. Supplemental Questions to Evaluate the Biopsychosocial Impact of Pain

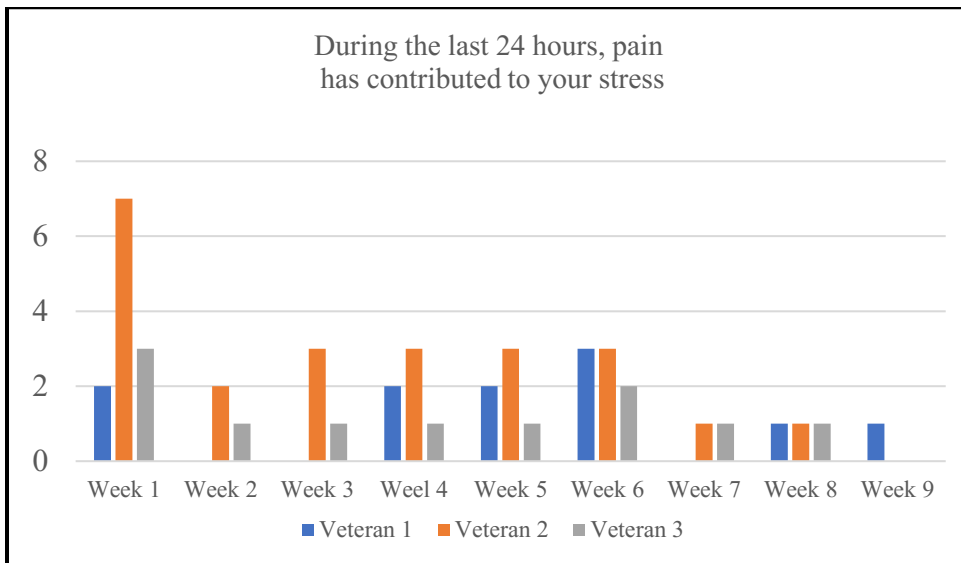


Figure 4. Supplemental Questions to Evaluate the Biopsychosocial Impact of Pain

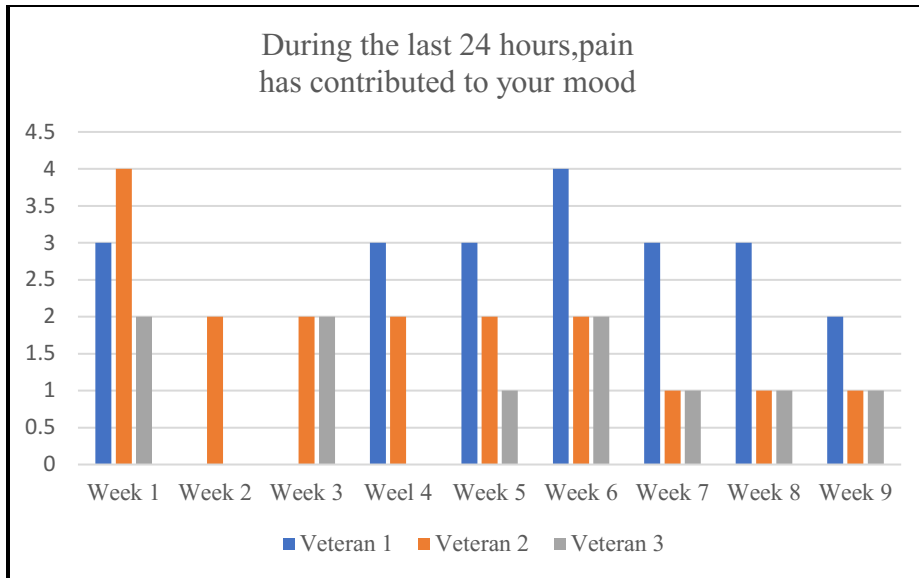


Figure 5. Supplemental Questions to Evaluate the Biopsychosocial Impact of Pain

Compliance

The drop-out rate during this pilot project was 50%, this is comparable to other studies, for example, Martinez et al. (2015) reported that the attrition rate for veterans varies from 3-40% among for MBSR. One person dropped out due to other commitments, and two people did not explain. Some common reasons cited in the literature from enrolling and staying enrolled was lack of time, scheduling difficulties, and aversions to groups (Martinez et al., 2015). Of the three MBSR participants who completed the program, two attended all nine sessions, and one attended seven of the nine sessions. One of the commitments to MBSR was a daily practice session for 45 to 60 minutes daily. On average the participation rate with home practice was less than 10% accounting for less than one day a week per participant over the course of nine weeks. By conducting an informal group interview, some reasons cited by the participants for not doing the home practice sessions were: time, noise, family commitments, and lack of space. These observations were recorded in field notes. One participant shared a specific experience that illustrates this:

"I was not able to relax enough to benefit from the meditation or body scanning because my dog was always scratching at the door or barking, and this interrupted my ability to pay attention."

Qualitative Findings

The group process of MBSR facilitated a bond between participants. By having a bond participant were able to openly share their feelings about mindful practices, and how their practice of mindful awareness was bringing attention to their own experiences of pain. One specific observation that demonstrates how mindfulness increases one's ability to be present and experience their lives more fully is described as follows: During the first week of MBSR, a male participant who was older than 75 years of age arrived at class pushing his front wheel walker, had several musculoskeletal injuries that contributed to his chronic pain, and shared that his pain was debilitating. He was not able to get on the floor because of hip and knee pain, but he participated each week adjusting how he participated, and by week six he was able to get on the floor and perform yoga exercises and complete sitting meditation and body scan activities. When asked how he was able to do this he teared up and said it was

"through my awareness, when I realized that I had paralyzed myself from my pain, and when I realized this, I was able to explore my abilities and there I was on the floor with all of you."

This personal testimony provides insight into the effects of mindfulness practices and the psychological mechanisms and characteristics associated with chronic pain.

Summary and Implications

MBSR offers a patient-centered, integrative approach to veterans with chronic pain by addressing multiple domains of health and well-being. This DNP project had a primary focus on

pain outcomes yet revealed that chronic pain and stress share commonalities; however, most patients do not recognize their stress as a sequela to their chronic pain or chronic pain as a sequela to their stress. One of the distinguishing features of MBSR is that MBSR offers an educational component to teach participants about the psychology and physiology of stress reactivity and how to apply mindfulness practice as a method for responding to stress, pain, and challenges associated with pain (Day, Jensen, Ehde, & Thorn (2014). Because this pilot study involved a small sample size, it would be advisable to conduct a study with a larger sample size to help determine an effect. This data would help to strengthen the validity of MBSR for populations with chronic pain. MBSR is a practical behavioral approach to manage chronic pain in a Veteran population across the continuum of healthcare.

Lessons Learned

Compliance with home practice may have affected outcomes; however, despite the low compliance with home practice, there was a perception among the participants of reduced pain intensity and improvement in the biopsychosocial components measured. Pain intensity may not have been the best outcome to measure. In the future, MBSR should focus on quality of life and physical well-being outcomes. Highlighting pain intensity alone limits the value of MBSR and how it reframes individual's response to pain. One limitation of this project was collecting pain data from a point in time, whereas collecting pain data before and after MBSR sessions may have strengthened the cause and effect of MBSR as an intervention. In determining outcome measures, having IRB approval for surveys, individual interviews, and focus groups can enhance the strength and validity of results using these methods for evaluation.

For this DNP project, IRB approval did not include these methods for evaluation, and therefore the data is presented as observational. Because the IRB process takes time,

resubmitting the application to include interviews, surveys, and focus groups would have slowed down the progress of this project, and the consequence of this decision impacted the significance of the data.

This pilot study demonstrates that MBSR has adaptability, making this intervention feasible for all veterans. The small sample size made it impossible to show statistical significance, but the fact is MBSR had clinical significance on pain intensity, and quality of life measures. While the number of participants was not significant, those who participated found MBSR to be a positive experience and would recommend this program to other veterans. Finally, three out of the three participants reported using fewer opioids at week nine compared to week one.

Conclusion

This DNP project was conducted in a rural VA Medical Center, and after completion of this pilot project where MBSR was offered to veterans with chronic pain, the VA site adopted MBSR as an adjunct treatment for chronic pain. MBSR benefits the veteran population because it provides an intervention that addresses the sensory, cognitive, and emotional processes associated with chronic pain. Because of this project, MBSR is now available for 100% of the veterans who are treated in the primary care setting for chronic pain.

For sustainability, the organization should consider a MBSR instructor train the trainer program for interested stakeholders. Having more instructors would increase access for MBSR and prevent burnout and fade out of this program by having one instructor. In addition, with more instructors this would promote a flexible schedule and provide opportunities to offer MBSR to a women-only group and explore a telehealth MBSR group to address scheduling, and group-dynamic barriers. Overall, this DNP project demonstrates that MBSR offers a low-cost

approach that increases non-pharmacological options for patients who are experiencing chronic pain and improves pain outcomes.

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Appendix A

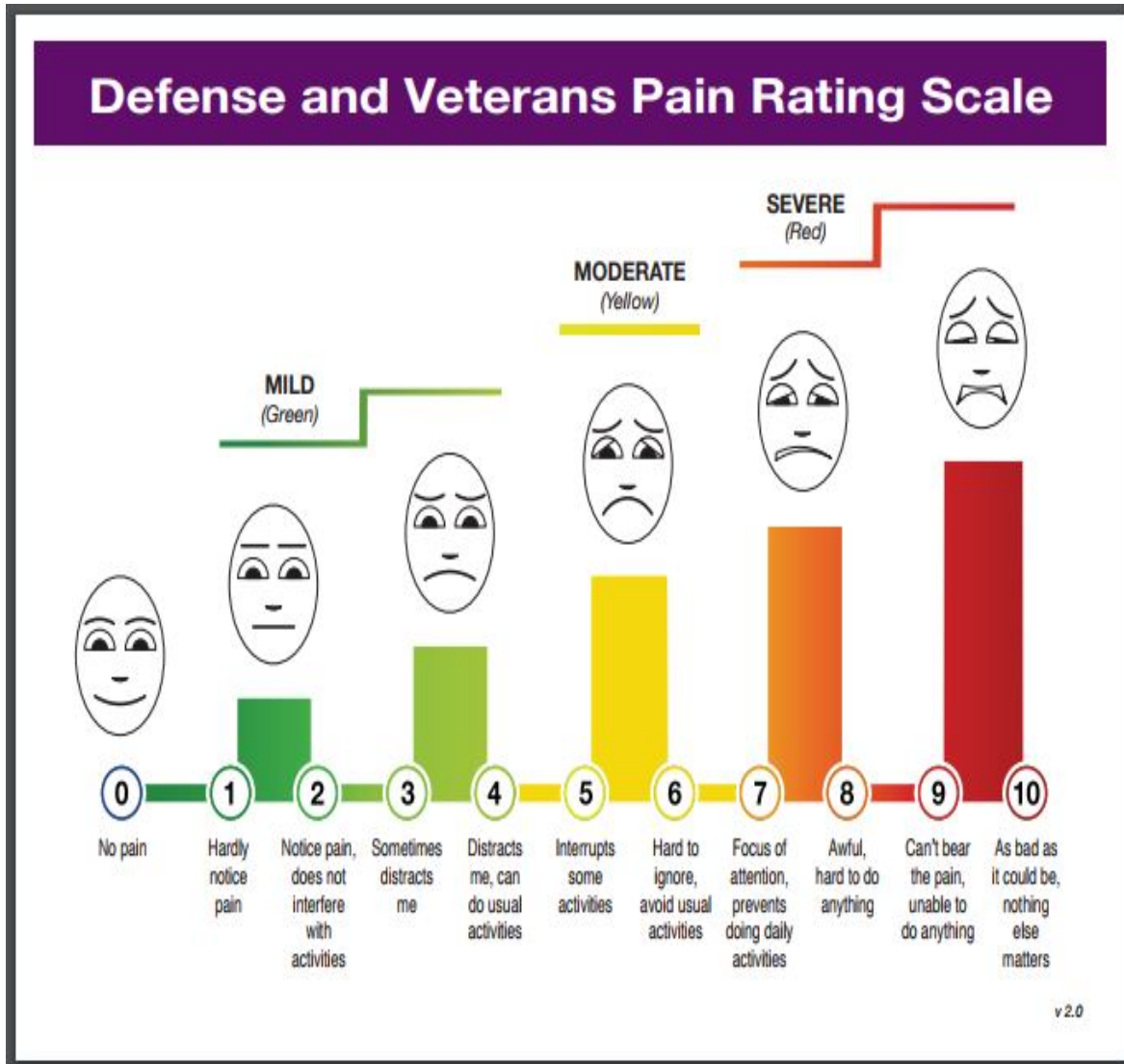


Figure 1: Defense & Veterans Center for Integrative Pain Management (2013).

DoD/VA PAIN SUPPLEMENTAL QUESTIONS

For clinicians to evaluate the biopsychosocial impact of pain

1. Circle the one number that describes how, during the past 24 hours, pain has interfered with your **ACTIVITY**:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not interfere Completely interferes

2. Circle the one number that describes how, during the past 24 hours, pain has interfered with your **SLEEP**:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not interfere Completely interferes

3. Circle the one number that describes how, during the past 24 hours, pain has affected your **MOOD**:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not affect Completely affects

4. Circle the one number that describes how, during the past 24 hours, pain has contributed to your **STRESS**:

0 — 1 — 2 — 3 — 4 — 5 — 6 — 7 — 8 — 9 — 10

Does not contribute Contributes a great deal

*Reference for pain interference: Cleeland CS, Ryan KM. Pain assessment: global use of the Brief Pain Inventory. Ann Acad Med Singapore 23(2): 129-138, 1994. v 2.0

Figure 2: Defense & Veterans Center for Integrative Pain Management (2013).

Appendix B

Table 1

Evaluation Table of Evidence

Citation	C F o r T F	Design/Method	Sample Setting Characteristics	IV DV and Definitions	Measurement	Data Analysis	Findings/Results	Worth to Practice: LOE Strengths Limitations Applicability Feasibility
Kearney et al. (2016) Mindfulness-based stress reduction (MBSR) in addition to usual care is associated with improvements in pain, fatigue, and cognitive failures among veterans with gulf war illness		RCT	N=55 w/GW Randomized to TAU+MBSR or TAU. Met GW illness criteria who self-report at least 2 Sx fatigue that limits usual activity; MSK pain, CI between the years 8/90-8/91 lasted >6M Exclusion Criteria: DSM-IV Axis I disorders, hx. Of psychosis, current mania, current suicidal/homicidal ideal, active.	DV- Pain, Fatigue, Cognitive Failures IV- MBSR + TAU MBSR was delivered in 8-weekly 2.5 hr. Sessions, plus a 7-hr. Wkend session .	Pain SF McGill-Fatigue-MFI Cognitive -CFI Measured at baseline, after tx. @ 8 wks, and 6-months.	Pain (f=0.33, P=.049) Fatigue(f=0.32) (p=.027) CF (f=0.40, P =.001)	Intention to treat at 6 month f/u Vet R to MBSR=TAU reported greater reductions in pain (f=0.33; P = 0.49)	Study is a level II with randomization. The tools to measure the outcomes are valid and reliable, and the subject has similar clinical variables. Valuable to practice, applicable to PICOT, and population-Feasible to practice setting
<p>GW-Gulf War, R-Random,TAU-Treatment as Usual, MBSR-Mindfulness-Based Stress Reduction, SX-Symptom, CI-Cognitive Impairment, Hx-History IV-Independent Variable, DV-Dependent Variable MFI-Multidimensional Fatigue Inventory, CFI-Cognitive Function Inventory, Tx-Treatment, CFQ-Cognitive Failure, R-Random Assigned, RCT-Randomized Control Studies, MSK-Musculoskeletal, N-Number of sample size, SF-Standard Form, P-Significance (0-1 value) F-ANOVA value, CF-Cognitive Failure, Vet-Veteran</p>								

Citation	CF or TF	Design/Method	Sample Setting Characteristics	IV DV and Definitions	Measurement	Data Analysis	Findings/Results	Worth to Practice: LOE Strengths Limitations Applicability Feasibility
Maglione et al. (2016) Mindfulness meditation for chronic pain- A systematic review		SR to identify RCTs testing the efficacy and safety of mindfulness meditation for chronic pain	M/F>18 yrs old, with CP. Studies were not limited by setting; study design was limited to the parallel group, individualized randomized, or cluster randomized	IV-MBI DV-Pain Outcomes, use of analgesics, functional status, QOL Intervention: MBSR, Comparators: Waitlist control, no treatment, or standard care	VAS, SF-HS MGPQ	Hartung - Knapp-Sidik-Jonkman to estimate RE, SMDs, and 95%CI-QOE is GRADE approach	28 studies met inclusion criteria, seven studies obtained the Good rating, ten studies rated fair, and 11 rated poor quality 24 RCTs that met IC and reported continuous pain measures (SMD 0.26; CI 0.06, 0.46) Subgroup analyses of comparators, MBSR significantly reduced pain scale scores compare	Level I Studies reviewed were RCTs, and the analysis provided a detail description of the search strategy used. The results were consistent across the studies. Pts. Have similar demographics compared to veterans? Implementing these findings in my practice setting is feasible. There is little to no risk associated with this TX. Considering the potential benefits

							d to TAU. (SMD 0.45; CI 0.02, 0.88;)	
<p>SR-Systematic Review, RCT-Randomized Control Trials, M/F-Male and Female, CP-Chronic Pain, Ind-Individualized, IV-Independent Variable, MBI-Mindfulness-Based Interventions, DP-Dependent Variable, QOL-Quality of Life, TAU-Treatment as Usual, MBSR-Mindfulness-Based Stress Reduction, SMD-Standard Mean Difference, CI-Confidence Interval, TX-Treatment, IC-Inclusion Criteria, QOE-Quality of Evidence, GRADE-Grades of Recommendation, Assessment, Development and Evaluation, RE-Random Effects, SMD- Standardized Mean Difference, CI-Confidence Interval, VAS-Visual Analog Scale, SF-36-Short Form Health Survey, MGPQ-McGill Pain Questionnaire</p>								

Appendix C

Table 2

Synthesis Table

Article	Population	Intervention	Duration of Study	Change	Level of Evidence
Kearney et al. (2016)	Gulf War I Veterans with chronic pain	MBSR + TAU	8 Weeks of Tx-6M F/U	↑	II
Maglione et al. (2016)	Male or Female >18 years old with chronic pain	MBI + TAU	8 Weeks of Tx	↑	I