The Here and Now: Mindfulness-Based Interventions to Reduce Symptoms of Anxiety in U.S. Veterans with PTSD

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I have no known conflict of interest to disclose.

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Abstract

Post-traumatic stress disorder (PTSD) is a prevalent mental health condition among veterans, often requiring inpatient treatment due to symptom severity. Mindfulness-based interventions (MBIs) have demonstrated efficacy in reducing PTSD symptoms, especially anxiety, by enhancing emotional regulation and stress resilience. This quality improvement (QI) project aimed to implement and evaluate a mindfulness intervention for veterans with PTSD in an inpatient setting. Guided by a QI implementation model, the project incorporated structured mindfulness sessions, and interdisciplinary collaboration to support adoption. A pre- and post-intervention design assessed changes in anxiety symptom severity, mindful awareness, and patient engagement. Data was collected using the Generalized Anxiety Disorder-7 (GAD-7) to assess anxiety symptoms and the Five Facet Mindfulness Questionnaire (FFMQ) to measure changes in mindfulness levels. Preliminary findings indicated a reduction in anxiety and improved mindful awareness among participants. These findings suggest that mindfulness interventions may serve as a valuable adjunct to conventional PTSD treatments in inpatient settings, solidifying the need for sustainable implementation strategies.

Keywords: mindfulness, PTSD, veterans, anxiety

The Here and Now: Mindfulness-Based Intervention to Reduce Symptoms of PTSD in U.S. Veterans

Veterans coping with post-traumatic stress disorder (PTSD) face a complex and formidable struggle that extends far beyond the battlefield. The impact of experiencing life threatening situations, witnessing trauma, and serving in austere environments can manifest in a myriad of ways, from intrusive memories and nightmares to persistent depression, anxiety, and substance abuse. For many veterans the ensuing discord stems not only in managing the emotional and psychological stress, but also in maneuvering self-conceived beliefs and stigmas surrounding mental health. Moreover, some veterans experience barriers to care access, such as geographical location, financial struggle, culture, and treatment delays. The continuous demands of daily life can trigger overwhelming stressors, exacerbating symptoms of depression, anxiety and suicidal ideations, thus hindering the path to recovery. Addressing the unique challenges faced by veterans with PTSD requires a comprehensive approach that encompasses first-line evidenced based treatment, medication management, and alternative therapies to reduce symptoms of PTSD.

Background and Significance

The prevalence of PTSD among military veterans has become a pressing societal issue as they frequently face obstacles in accessing timely and effective mental health care. While many veterans willingly seek mental health services, some are inhibited by a sense of pride, fear of being stigmatized, and a limited knowledge of services available (Hitch et al., 2023; Barr et al., 2022). Furthermore, many veterans terminate treatment early due to the length of treatment or the pain of re-experiencing past trauma required for most first-line therapy (Barr & Kintzle, 2019; Reyes et al., 2022). The impediments experienced create significant challenges to

veterans' overall well-being and lead to comorbid symptoms like depression, anxiety, and suicidal ideations (Paridaen, et al., 2023; Armenta et al., 2019; Knowles et al., 2019). Thus, promoting a holistic approach to treatment is imperative, with alternative therapy being a significant piece of the puzzle.

PTSD

In PTSD, exposure to traumatic events triggers dysregulation in the stress response system, particularly the hypothalamic-pituitary-adrenal (HPA) axis, which decreases cortisol levels and elevates corticotropin-releasing factor (CRF). Changes in the amygdala, hippocampus, and prefrontal cortex further contribute to heightened emotional reactivity, leading to difficulties in regulation. These difficulties are compounded by impaired fear extinction - the process by which a conditioned fear response decreases or disappears when the stimulus is repeatedly presented without the unpleasant stimulus. Additionally, elevated CRF levels cause alterations in neurotransmitter systems, such as serotonin and norepinephrine, and play a role in the development of comorbid disorders (Shapira et al., 2022).

Meeting the criteria for a PTSD diagnosis involves exposure to a traumatic event and subsequently experiencing symptoms such as intrusive thoughts, repeated nightmares, flashbacks, avoidance of triggers, negative changes in thoughts and mood, and heightened arousal for at least one month. Furthermore, the disorder leads to notable distress or detriment in various important aspects of life, such as social interactions, work, or other significant areas of functioning (American Psychiatric Association, 2022).

Treating PTSD symptoms, including anxiety, poses a significant challenge due to the intricate overlap of symptoms and primary neurobiological mechanisms. Comorbid diagnoses create a distinct risk of suboptimal therapeutic outcomes. Fortunately, evidence-based alternative

treatments for PTSD may ameliorate symptoms of anxiety and depression as well (VA, 2024; Rosen & Nemeroff, 2020; Dominguez et al., 2021). Because PTSD and ancillary symptoms are intertwined, the utilization of alternative therapies, such as mindfulness-based interventions, may provide veterans with another tool to combat symptoms.

Epidemiological Data

In 2022, there were 16.2 million veterans in the U.S and 26.5% of the population were age 75 and older, while 8.5% were age 35 and younger. (U.S. Census Bureau, 2023). Lifetime prevalence of PTSD among veterans is 7%, and of the 6 million veterans utilizing the Department of Veterans Affairs (VA) healthcare in 2021, 10% of men and 19% of women were diagnosed with PTSD, with the highest rate of PTSD among soldiers who served in Iraq and Afghanistan (VA, 2022) Furthermore, 52% of individuals diagnosed with PTSD have concomitant depression and anxiety (Paridaen et al., 2023; Armenta et al., 2019) and veterans with comorbid depression and anxiety have more serious PTSD symptoms (Knowles et al., 2019). Additionally, readmission rates for depressive disorders reached the 2018 top 20 list and included an average cost of $7,700 per incident (U.S. Department of Health & Human Services, 2021).

Comorbid symptoms are not the only consequence of a PTSD diagnosis. The financial impact of PTSD on the economy is significant as it extends beyond individual suffering to broader economic repercussions. The costs arise from increased healthcare expenditures, lost productivity in the workforce due to absenteeism or reduced efficiency, and, finally, the strain on families. In 2018, it was estimated that the overall cost of PTSD treatment in the U.S. was $232.2 billion, and veterans accounted for $41.8 billion of that burden (Richman, 2022). Moreover,

individual costs must be considered. In 2018, active-duty military and veterans diagnosed with PTSD had an annual cost of $25,684 (DeAngelis, 2023).

The financial imprint on individuals and families is exacerbated by a veteran's struggle with heightened anxiety and depressed mood. PTSD can hinder personal relationships, impair the ability to engage in normal activities, and ultimately lead to an increased risk of suicide. In 2020 the United States had 6,146 veteran suicides with a rate of 31.7 per 100,000, an increase of 42.15 percent from 2001 (VA, 2022). Furthermore, in 2021 it is estimated that 30,177 active military and veterans of the post 9/11wars combined have died by suicide, compared to more than 7,057 killed in post 9/11 operations (Suitt, 2021). In 2021, 278 veterans died by suicide in Arizona and between 2011 and 2021 there were 2,933 veteran suicides recorded, an increase of 9.9 percent, while the suicide mortality rate among this group experienced a 24.3 percent increase (Reamer et al., 2023).

Local and National Initiatives

Locally, the Arizona Coalition for Military Families (ACMF) undertakes initiatives designed to support and enhance the well-being of military members, veterans, and their families. These initiatives are deeply rooted in collaboration with community partners, aiming to create a supportive network that addresses the unique challenges faced by military populations. Through programs like Be Connected, ACMF offers direct support, resources, and training to ensure that military families and veterans have access to comprehensive services ranging from healthcare and education to employment and housing. The AMCF's efforts also include advocating for policies that benefit military families and raising public awareness about their needs and contributions (Arizona Coalition for Military Families, 2023).

Moreover, The National Center for PTSD spearheads several national initiatives aimed at advancing the understanding and treatment of the disorder. These initiatives include research efforts to enhance knowledge of PTSD's causes, symptoms, and effective treatments. The center also focuses on disseminating information to healthcare providers, policymakers, and the public to improve the quality of care for individuals with PTSD. Additionally, the National Center for PTSD plays a key role in developing and implementing evidence-based interventions and prevention strategies, with the ultimate goal of reducing the burden on individuals, families, and society as a whole (VA, 2023)

Internal Data

An organization serving veterans in the southwestern United States discerned recurring incidents of PTSD with associated anxiety on admission. The organization conducts group sessions daily, providing alternative therapy and life coaching as a means of teaching skills that may prevent future hospitalizations. Mindfulness sessions are included periodically, but not consistently. The organization desired an examination of simple mindfulness techniques and the value of adding them on a regular basis.

According to organizational data for the previous six months, 70.2 % of veterans admitted carry a diagnosis of PTSD and 50.2% served in the Army. The average age of admitted veterans was 50 and 90% were male. The average length of stay was 6 days and only 13% had a 30-day readmission.

PICOT Question

A review of the literature led to the clinically relevant PICOT question: “In veterans with PTSD, how does adjunctive mindfulness techniques affect anxiety and mindful awareness?”

Evidence and Synthesis

Keyword Selection and Search Yields

A comprehensive review of the most current evidence took place to answer the PICOT question. Three databases were chosen and extensively searched – PubMed, PsychINFO, and CINAHL – known for their relevant and reliable information.

The database search began by defining key concepts associated with the PICOT question, including: *Veterans, vets, PTSD, Post-traumatic stress disorder, depression, anxiety, mindfulness-based interventions and mindfulness.* Search results of PubMed utilizing the terms *veterans* and *PTSD* and *mindfulness* yielded too many results. The search strategy was adjusted to *veterans* and *PTSD* or *Post-traumatic stress disorder* and *depression* and *mindfulness-based* from 2018-2024 yielding 71 studies, of which many were not associated with veterans. The original search of PubMed with key terms *veterans* and *post-traumatic stress disorder* and *mindfulness-based stress reduction* only yielded 7 results. The expanded search using the terms *veterans* and *PTSD* and *mindfulness* from 2018-2024 yielded 55 results, most of which were not associated with veterans. The CINAHL database search utilizing the terms *veterans* and *PTSD* or *post-traumatic stress disorder* and *anxiety* and *mindfulness* or *mindfulness-based interventions* from 2018-2024 yielding 41 results. Filters applied included dates of publication, English language, and peer-reviewed articles. Boolean and mesh terms allowed for a broader search of the literature.

Limitations, Inclusion, and Exclusion Criteria

The final result yielded 167 studies between all three databases. Review of abstracts and titles in each database narrowed relevant studies to 52. Inclusion criteria were RCTs, systematic reviews, and meta-analysis from 2018-2024 utilizing MBIs for PTSD, depression, and/or

anxiety. Exclusion criteria included duplicate or feasibility studies, case studies, prospective studies, literature reviews, and studies involving participants less than 18 years of age. The remaining evidence was further reduced to the 10 most significant and high-quality studies (See Appendix A, Table 1). The 10 studies included five systematic reviews, three RCTs, one clinical trial, and one post-hoc exploratory analysis.

Critical Appraisal and Synthesis of Evidence

After an exhaustive literature search, the rapid critical appraisal process developed by Melnyk and Fineout-Overholt (2019) was used to determine the quality and strength of the selected articles that were included in the final analysis (See Appendix A, Table 2). Most studies are high-level, and include four RCTs and two systematic reviews. The remaining consists of three post-hoc studies and one mixed-methods. All 10 studies were recent (2018-2022) and most were conducted in the United States. Significant homogeneity appears in studies, as most participants were middle-aged Caucasian males. However, one study contains only female veteran participants (Saban et al., 2022) and one contains a majority of minority participants (Davis et al., 2019). The systematic reviews contained consistent moderate homogeneity with I^2 values above 50%.

Though none of the studies explicitly state the guiding theory, a common thread appears throughout; thus, they are inferred to be Mindfulness to Meaning, Social Cognitive, or Self-Efficacy Theory.

A majority of the studies include comorbid symptoms in conjunction with PTSD, and all 10 studies utilize a form of MBI. Most studies contain a control group and include a length of intervention from four to eight weeks, with one session per week, and lasting 90 minutes. One study incorporated a 3, 6, 9, and 16-week follow-up (Davis et al., 2019).

The key finding is that MBIs may decrease symptoms of PTSD, depression, and anxiety while increasing mindfulness skills, ultimately leading to a greater sense of well-being. It is important to discuss that one RCT had significant attrition rates, which could signify an overestimation or underestimate of program effectiveness. Some of the primary reasons listed were transportation issues and conflicting work schedules, while significant issues included inpatient admissions and suicidal ideations (outliers). While attrition rate was a limitation of these studies, the overarching results suggest MBIs demonstrate an effective adjunctive treatment for PTSD.

Purpose

The inclusion of alternative therapy in the treatment of PTSD is centered on a holistic view that recognizes the multifaceted nature of trauma's impact on an individual (VA, 2024). Traditional therapeutic interventions, such as psychotherapy and medication management, may not address all aspects of PTSD or resonate with every individual (Barr et al., 2022; Boyd & McKinnon, 2018). Alternative therapies, such as mindfulness practices, offer complementary avenues for healing that focus on the mind-body connection. These modalities empower individuals to explore and express their emotions in non-verbal ways, promoting self-awareness, emotional regulation, improving quality of life, and, conceivably, a reduction of psychiatric symptoms (Al-Ghabeesh & Mahmoud, 2022; Zhu et al., 2022). Furthermore, mindfulness practices don’t require a vast amount of time and provide a means of bring calming awareness in a simple manner.

The purpose of this project is to explore the merit of augmenting traditional treatment with mindfulness-based interventions. Integrating mindfulness into PTSD treatment plans creates

opportunities for individuals to conquer the tempestuous demons locked inside their head, while attempting to improve ancillary symptoms.

The gold standard of PTSD treatment includes the goal of reducing symptoms and increasing well-being. The literature suggests that MBIs hold promise as a complementary approach for veterans with PTSD. These interventions have shown beneficial effects on PTSD symptoms, as well as on comorbid conditions such as depression and anxiety, while not requiring lengthy interventional sessions. However, further research is needed to determine the specific mechanisms of action, optimal delivery formats, and long-term effects of MBIs. By continuing to explore these questions, clinicians and researchers can better understand how to effectively integrate mindfulness into the comprehensive care of veterans with PTSD.

Theory/Theoretical Framework Application

The core theory guiding the proposed intervention is the Mindfulness to Meaning Theory (MMT). The theory, newly developed by Dr. Eric Garland, proposes that mindfulness practice can lead to an increased sense of meaning in life and, by reducing rumination and negative thought patterns, facilitate positive emotional regulation (Garland et al., 2015). Thus, MMT was chosen because many veterans with PTSD struggle with these exact symptoms. Furthermore, the theory creates an upward spiral of decentering, attentional broadening, reappraisal, and savoring. The upward spiral is meant to increase overall well-being which, theoretically, increases treatment plan compliance (See Appendix B, Figure B1).

Implementation Framework

The ACE Star Model of Knowledge Transformation, introduced by Kathleen Stevens (2012), is a framework designed to guide quality improvement in healthcare. The model encompasses five interconnected components in the form of a star: Discovery research, evidence

summary, translation to guidelines, practice integration, and process outcome evaluation (see Appendix B, Figure B2). By progressing through these stages, healthcare professionals can effectively incorporate evidence-based practices into quality improvement. To begin, practitioners must cultivate a spirit of inquiry by asking pertinent questions. Subsequently, the model emphasizes the critical appraisal of evidence, ensuring that only the most relevant and reliable information is included. Next, the model promotes the translation of evidence into action, the integration of these actions into clinical practice, and finally, the evaluation of outcomes to assess the effectiveness of implemented interventions. Incorporating the ACE Star Model into the proposed project will provide a simple, yet structured, approach to enhance the success and impact upon the organization and veterans.

Methods

Ethical Considerations

The proposed project was submitted to the Arizona State University Institutional Review Board (IRB) and thoroughly examined for human rights and protection. The ASU IRB, as well as the VA IRB, determined the proposed project to be a non-study (exempt) and approved for implementation.

Autonomy was upheld by ensuring that veterans were fully informed about the mindfulness intervention, including its purpose, benefits, and potential risks. Informed consent was obtained, allowing veterans to voluntarily choose whether to participate. Furthermore, veterans had the autonomy to withdraw from the program at any time without any repercussions on their standard care. To protect human rights, confidentiality was strictly maintained with no personal data collected and surveys securely stored.

Setting and Participants

An organization serving veterans in the southwest United States houses two mental health units. One unit, utilized for mainly younger patients, became the focal point of the interventions. Inpatient veterans on the unit were ethically recruited through a process that included informed consent and respected their autonomy and well-being. Participants were veterans admitted to the hospital and who had a history of PTSD, aged 24-67, and were willing to participate. Participants were allowed to leave the group at any time or refuse the intervention entirely. Exclusion criteria involved severe cognitive impairments, acute psychiatric crises, or concurrent participation in other conflicting interventions, ensuring the safety and clarity of the study outcomes. This approach ensured that participants were fully aware of the study's purpose, procedures, and their rights, creating an ethical and respectful recruitment process.

Project Design

The project incorporated short mindfulness sessions into the existing inpatient group meeting schedule within the organization of interest. The mindfulness techniques included progressive muscle relaxation, cognitive diffusion, and mindful breathing. Each mindfulness exercise consisted of 10-minute sessions. The project lasted three weeks, with two iterations per week, in order to collect the maximum amount of data. Participants were asked complete pre/post intervention surveys – the Generalized Anxiety Disorder -7 (GAD-7) and the Five Facet Mindfulness Questionnaire (FFMQ). The average total time to complete both pre and post surveys was 15 minutes. These tools provided quantitative data for analysis of the validity of the intervention. Additionally, participants were asked to meet briefly for a follow-up to complete a three-question survey to collect qualitative data.

Timeline

The project intended to evaluate how adjunctive mindfulness techniques, compared to treatment as usual, affects primary and ancillary symptoms and mindful awareness in veterans with PTSD (See Figure B1).

Needs Assessment (Summer 2024)

The project began with a comprehensive needs assessment to identify the specific requirements and challenges faced by inpatient veterans with PTSD. Key stakeholders, such as the group leader and site champion, were crucial to exploring needs of the veteran population in the organization. Key areas of focus included current PTSD management practices, patient readiness for mindfulness interventions, and barriers expected. The data collected assisted in tailoring the mindfulness intervention to address the unique needs of the veterans and the inpatient setting.

Program development (Summer 2024 – September 2024)

Based on the needs assessment, a simple mindfulness program was developed included a series of sessions scheduled on the group meeting schedule. The content was adapted to suit the veterans' needs, incorporating mindful breathing, progressive muscle relaxation, and cognitive diffusion.

Implementation (October 2024)

The mindfulness sessions were implemented over a three-week period. Sessions were conducted two times a week in the dedicated, quiet group room within the unit to minimize distractions. Each session followed a structured format beginning with a brief introduction, followed by the main mindfulness practices, and ending with a brief follow-up discussion.

Attendance and engagement were monitored, and any issues were promptly addressed to ensure participant satisfaction.

Data Collection and Instrumentation

Data was collected before and after sessions to evaluate the effectiveness of mindfulness techniques. This included pre- and post-intervention paper questionnaires utilizing the GAD-7 (See Table A1) and FFMQ (See Table A2).

The GAD-7 is a well utilized tool once copyrighted by Pfizer until 2010 when they released it to the public domain. The psychometric characteristics have been well studied, in diverse populations of outpatient and inpatient settings, and in a multitude of countries. The psychometric studies reveal strong internal consistency, test-retest reliability, and convergent and discriminant validity (Beard et al., 2014; Johnson et al., 2019; White et al., 2023; Bolgeo et al, 2023).

The FFMQ was spearheaded by Dr. Ruth Baer and her team in 2006. A multitude of studies exist that test the validity and reliability of the FFMQ in diverse settings, populations, and locations. However, studies on certain patient populations, like those with moderate to severe treatment resistant depression, found the validity of the tool to be in question (Sweeney et al., 2021). Although the FFMQ may not be suitable for all populations, most studies confirm strong internal consistency, test-retest reliability, and convergent and discriminant validity for various populace among several continents (Brady & Bailey, 2019; Lilja et al., 2020; Correa et al., 2023). Furthermore, the FFMQ demonstrates strong validity and reliability for the veteran population, making it a crucial piece to this project (Duffy et al., 2022).

Due to the known barriers, mainly short length of stays, these assessments were collected before and after each session to prevent possible missing or skewed data, as well as outliers.

Additionally, qualitative feedback, utilizing a three-question survey during a brief follow-up, were collected. The three questions were: “Did you have any previous experience with Mindfulness?” “How did you feel after the mindfulness session?” and “Would you consider utilizing mindfulness techniques when you are discharged home?” Additional demographic data was included on each survey and participants were asked to provide age, gender, ethnicity, marital status, branch of service, and service war-time.

Budget

The project received no outside funding. The budget consisted mainly of salary costs for individuals working for the organization and assisting with the project (See Appendix C). Small costs of paper and office supplies were provided by the VA.

Results

Intellectus Statistics software was used to complete the data analysis. Summary statistics were calculated for each interval and ratio variable. Frequencies and percentages were calculated for each nominal variable.

A total of 22 participants completed pre and post intervention surveys. Most participants ethnicity was Caucasian/white (n = 15, 68.18%), with male being the predominate gender (n = 19, 86.36%), and a marital status of divorced (n = 11, 50.00%). Frequencies and percentages are presented in Table 1.

Table 1

Frequency Table for Nominal Variables

Variable	*n*	*%*
Ethnicity		
Hispanic/Latino	4	18.18
African American/Black	2	9.09
Caucasian/White	15	68.18
Native American	1	4.55
Missing	0	0.00
Gender		
Male	19	86.36
Female	3	13.64
Missing	0	0.00
Marital Status		
Divorced	11	50.00
Separated	1	4.55
Single	7	31.82
Married	2	9.09
Widowed	1	4.55
Missing	0	0.00
Branch of Service		
Army	13	59.09
Marines	4	18.18
Navy	3	13.64
Air Force	2	9.09
Missing	0	0.00

The average age of participants was 41.91 with an age range of 24-67 years old (*SD* = 8.92). The summary statistics can be found in Table 2.

Table 2

Summary Statistics Table for Interval and Ratio Variables

Variable	*M*	*SD*	*n*	Min	Max
Age	41.91	8.92	22	24.00	67.00

Descriptive Statistics

Descriptive statistics were calculated for pre and post anxiety and pre and post mindfulness. The mean GAD-7 score of the 22 participants before intervention was 15.59 (*SD* = 4.98). The mean GAD-7 score of participants after intervention was 10.14 (*SD* = 3.43). The mean FFMQ score before intervention was 75.23 (*SD* = 14.19). The mean FFMQ score after intervention was 86.50 (*SD* = 12.60). The summary statistics can be found in Table 3.

Table 3

Summary Statistics Table for Interval and Ratio Variables

Variable	*M*	*SD*	*n*	Min	Max
Pre-Anxiety	15.59	4.98	22	3.00	21.00
Post-Anxiety	10.14	3.43	22	7.00	17.00
Pre-Mindfulness	75.23	14.49	22	45.00	120.00
Post-Mindfulness	86.50	12.60	22	61.00	120.00

Two-Tailed Paired Samples *t*-Test

A two-tailed paired samples *t*-test was conducted to examine whether the mean difference of participants anxiety level pre- and post-intervention and mindfulness pre- and post-intervention was significantly different.

Assumptions

A Shapiro-Wilk test was conducted to determine whether the differences in anxiety and mindfulness could have been produced by a normal distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test for anxiety were not significant based on an alpha value of .05, $W = 0.95$, $p = .251$. The Shapiro-Wilk test for mindfulness were not significant based on an alpha value of .05, $W = 0.98$, $p = .933$. This result suggests the possibility that the differences in the

two were produced by a normal distribution cannot be ruled out, indicating the normality assumption is met for both anxiety and mindfulness variables.

The result of the two-tailed paired samples *t*-test for anxiety was significant based on an alpha value of .05, $t(21) = 5.59$, $p < .001$, indicating the null hypothesis can be rejected. This finding suggests that the interventions reduced anxiety. The results are presented in Table 4. A bar plot of the means is presented in Figure 1.

Table 4

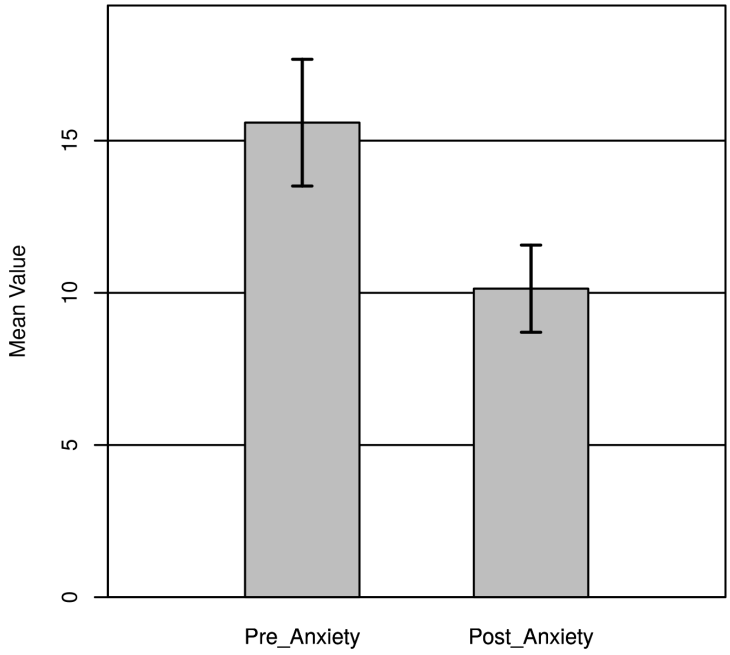
Two-Tailed Paired Samples t-Test for the Difference Between Pre_Anxiety and Post_Anxiety

Pre-Anxiety		Post Anxiety				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
15.59	4.98	10.14	3.43	5.59	< .001	1.19

Note. N = 22. Degrees of Freedom for the *t*-statistic = 21. *d* represents Cohen's *d.*

Figure 1

The means of Pre-Anxiety and Post-Anxiety with 95.00% CI Error Bars



The result of the two-tailed paired samples *t*-test for mindful awareness was significant based on an alpha value of .05, $t(21) = -5.85$, $p < .001$, indicating the null hypothesis can be rejected. This finding suggests the interventions increased mindful awareness. The results are presented in Table 6. A bar plot of the means is presented in Figure 2.

Table 6

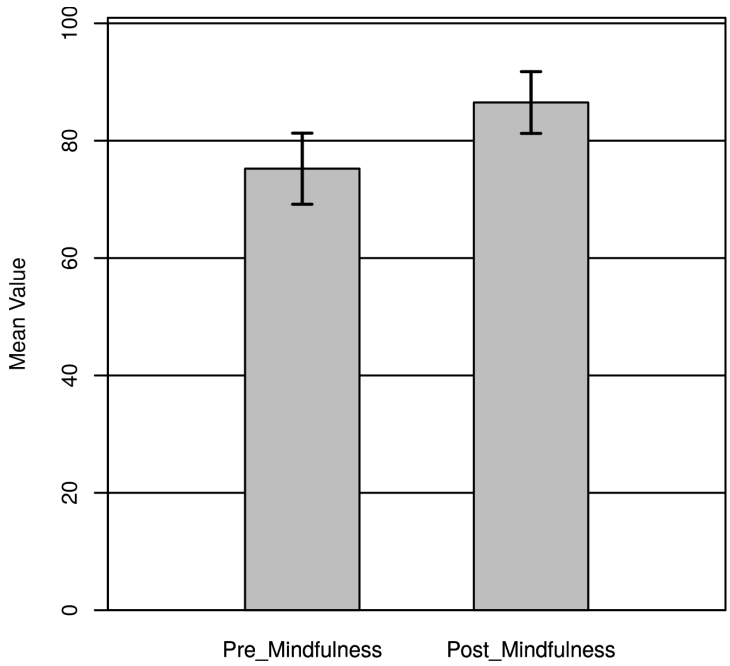
Two-Tailed Paired Samples t-Test for the Difference Between Pre-Mindfulness and Post-Mindfulness

Pre_Mindfulness		Post_Mindfulness				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
75.23	14.49	86.50	12.60	-5.85	< .001	1.25

Note. N = 22. Degrees of Freedom for the *t*-statistic = 21. *d* represents Cohen's *d.*

Figure 2

The means of Pre_Mindfulness and Post_Mindfulness with 95.00% CI Error Bars



Frequencies and percentages were calculated for participants prior experience of mindfulness, how the participants felt after mindfulness activities, and whether or not participants might utilize mindfulness activities at home. Frequencies and percentages are presented in Table 7.

Table 7

Frequency Table for Nominal Variables

Variable	*n*	*%*
Prior Experience		
None	14	63.64
Some	2	9.09
A little	3	13.64
Utilized in the past	3	13.64
How did you feel		
Calm	12	54.55
Good	1	4.55
No difference	6	27.27
Sleepy	3	13.64

Utilize at home		
Not sure	6	27.27
Yes	11	50.00
No	5	22.73

Note. Due to rounding errors, percentages may not equal 100%.

Discussion

Summary of Findings

The results of this study indicate that a structured mindfulness intervention for veterans with PTSD in an inpatient setting led to statistically significant reductions in anxiety and increased mindful awareness. These findings support the hypothesis that mindfulness-based interventions can enhance psychological well-being among veterans suffering from PTSD and anxiety. Participants reported improved emotional regulation, a consistent calmness, and greater present-moment awareness, all of which align with the core principles of mindfulness. These outcomes contribute to the growing body of evidence that mindfulness can serve as an effective, non-pharmacological adjunct to traditional PTSD treatment modalities.

Limitations and Challenges Encountered

Despite the promising results, several limitations and barriers were encountered throughout the study. First, the study was conducted in a single VA inpatient facility, which may limit generalizability to other settings, particularly outpatient or community-based veteran populations. Second, while the intervention was delivered by trained facilitators, variations in instructor experience and participant engagement may have influenced outcomes. Third, no follow-up was conducted to assess whether anxiety levels remained low for extended periods after mindfulness activities.

Several barriers during implementation were identified. A significant challenge was that approximately half of the patients admitted to the mental health floor were there for substance abuse detoxification, which impacted their willingness or ability to engage in mindfulness practices. Additionally, the short length of stays, averaging around three days and often including weekends, limited the opportunity for consistent participation. During the mindfulness activities, there were several moments of distraction as nurses and doctors came to talk with patients. Furthermore, the study was confined to one unit as the second unit houses older patients who have shown greater reluctance to participate in mindfulness activities; thus, limiting the potential number of participants.

Although not a limitation, the veterans who participated in the sessions responded extremely well to the moderator due to the fact that he was a veteran himself.

Relation to Existing Literature

The findings of this study are consistent with previous research demonstrating the efficacy of mindfulness-based interventions for PTSD. The current study adds to this literature by highlighting the specific benefits of mindfulness in an inpatient VA setting, where veterans may experience more acute PTSD symptoms and require structured interventions.

Recommendations for Further Study

Future research should focus on expanding the sample size and including a more diverse veteran population to improve the generalizability of findings. Longitudinal studies assessing the sustained impact of mindfulness interventions over time would provide valuable insights into the long-term benefits and adherence rates among veterans. Additionally, investigating the integration of mindfulness with other evidence-based treatments, such as cognitive processing therapy (CPT) or prolonged exposure therapy, could offer a more comprehensive approach to

PTSD management. Future studies should also explore strategies for overcoming institutional barriers, such as streamlining approval processes or incorporating mindfulness into standard VA treatment protocols.

Conclusion

This study provides compelling evidence that mindfulness interventions can be an effective tool in reducing anxiety and enhancing mindful awareness among veterans with PTSD. Despite challenges related to participant distraction, follow-up, and setting-specific limitations, the findings align with existing literature supporting mindfulness as a viable treatment approach for PTSD. Given the growing emphasis on non-pharmacological interventions for PTSD, and mental health in general, mindfulness-based programs should be further explored and integrated into routine care for veterans. Future research should focus on optimizing delivery models, assessing long-term benefits, and addressing potential implementation barriers to maximize the impact of mindfulness interventions for this vulnerable population.

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Appendix A

Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	Theoretical Framework	Design/ Method/ Purpose	Sample/Setting	Variables/Definitions	Measurements/ Validity	Analysis	Results/ Change from baseline	Level of Evidence; Application to practice
Blanck et al., 2018 Effects of mindfulness exercises as stand-alone intervention on symptoms of anxiety and depression: Systematic review and meta-analysis. **Country**: Germany **Funding**: German Research Foundation **Bias**: None identified	Not clearly stated; inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** Systematic Review and meta-analyses **Purpose:** Aggregate the evidence regarding the reduction of depression and anxiety via SAMs	**N=** 18 **Subjects=**1,341 **Demographics:** M age= 30.45 Mostly Caucasian females (75.48%) **Inclusion:** SAM vs. control; repeated performance of mindfulness exercises, English or German language, anxiety/depression. **Exclusion:** MBSR, MBCT, compassion-focused approaches **Attrition:** N/A	**IV1:** SAM **IV2(Control)**: Varied **DV1:** Anxiety **DV2:** Depression	**Tools:** PRISMA **Validity/ Reliability:** Evidence-based and reliable tool.	**Statistical Tests Used:** Hege's *g*; Q statistic; R version 3.3.3; funnel plots; Rosenthal's *fail-safe N; Trim and fill*	**Results:** **DV1:** Significant effects (SMD=0.39; CI: 0.22, 0.56; PI: 0.07, 0.70; $p < .001$, I^2=18.90%). **DV2:** (SMD=0.41; CI: 0.19, 0.64; PI: −0.05, 0.88; $p < .001$; I^2=33.43%)	**LOE:** I **Strengths**: one specific component of MBIs in greater detail and applied a transparent definition of mindfulness; thorough literature review by screening more than 9000 records and independently assessing more than 500 records for eligibility. **Limitations:** Unable to locate any studies in the grey literature; observed effect sizes interpreted with caution - only a small number of studies contributed to meta-analyses **Feasibility/Application**: SAMs can affect anxiety and depression. May not need full MBSR/MBCT

Key: **AC-**Active Control; **AIC–**Akaike Information Criterion; **AUDIT–**Alcohol Use Disorders Identification Test; **BIC–**Bayesian Information Criterion; **CAPS–**Clinically Administered PTSD Scale; **CBT–**Cognitive Behavioral Therapy; **CCRB–**Cochrane Collaboration Risk of Bias; **CEBM–**Centre for Evidence-Based Medicine; **CFI-**Comparative Fit Index; **CI–**Confidence Interval; **CIH –** Complementary and Integrative Health; **CPT–**Cognitive Processing Therapy; **CRP–**C-Reactive Protein; **CSQ-8-**Client Satisfaction Questionnaire; **DASS–**Depression Anxiety Stress Scales **FFMQ-**Five Facet Mindfulness Questionnaire; **HEBR-**Heartbeat-Evoked Brain Response; **HI–**Homicidal Ideation; **HPLP-**Health Promoting Behaviors; **IA–**Integrative Awareness; **IL-6–**Interlukin-6; **LDS–**Latent Difference Score; **MASS–**Mindful Attention to Awareness Scale; **MBI–**Mindfulness-Based Intervention; **MBSR–**Mindfulness-Based Stress Reduction; **MST-**Military Sexual Trauma; **NCCH-**National Center for Complementary and Integrative Health; **NIH–**National Institute of Health; **NIMH –** National Institute of Mental Health; **NSSFC–**National Social Science Fund of China; **PCBMT-**Primary-Care Based Mindfulness Training; **PCGT–**Present-Centered Group Therapy; **PCL–**PTSD Checklist Self-Report; **PE–**Prolonged Exposure **PHQ–**Patient Health Questionnaire; **PRISMA-**Preferred Reporting Items for Systematic Reviews and Meta-analyses**; PSS-**Perceived Stress Scale; **PSSI–**PTSD Symptom Scale Interview; **PTSD–**Posttraumatic Stress Disorder; **RAS-**Recovery Orientation; **RMSEA–**Root Mean Square Error of Approximation; **SAM –** Stand-alone Mindfulness Exercises; **SEM-**Structural Equation Modeling; **SI–**Suicidal Ideations; **SRMR–**Standardized Root-Mean-Square Residual; **SRT–**Self-Regulation Theory; **SUD-**Substance Use Disorder; **TAU–**Treatment As Usual; **THS–**Trauma History Screen; **VA–**Department of Veterans Affairs

Davis et al., 2019, A multisite randomized controlled trial of mindfulness-based stress reduction in the treatment of posttraumatic stress disorder. **Country**: U.S **Funding**: Allergan, Forest, Merck, the Substance Abuse and Mental Health Services Administration, Tonix, VA **Bias**: None identified	Not clearly stated; inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** RCT (pre/post intervention) MBSR vs. PCGT with baseline, 3, 6, 9, and 16-week follow-ups. **Purpose:** Determine the efficacy of MBSR vs. PCGT in the treatment of PTSD in U.S. veterans	**N=** 214 MBSR(N=96) PCGT(N=95) **Demographics:** Veterans PTSD CAPS-IV score >45 Mean age=51 Male (84%) African-American (66%) **Setting:** 3 VA Medical Centers in SE U.S. **Exclusion:** SUD 2 weeks prior; BD; Schizophrenia; HI/SI; psychosis; dementia; TBI; concurrent CBT/CPT/PE **Attrition:** MBSR -32%. PCGT – 19%	**IV1:** MBSR **IV2(Control)**: PCGT **DV1:** CAPS-IV (primary) **DV2:** CAPS-B **DV3:** CAPS-C **DV4:** CAPS-D **DV5:** PCL (secondary) **DV6:** FFMQ **DV7:** PHQ-9 **MBSR –** 90-min mindfulness based weekly group meetings; 8 weeks; final one day retreat **PCGT** weekly group therapy; final group lunch	**Tools:** CAPS; PCL; FFMQ; PHQ-9 **Validity/ Reliability:** Evidence-based and reliable tools.	**Statistical Tests Used:** Dallal Software; *t*-test, Chi-square analysis, Wilcoxon test, 3 level mixed - effects linear regression	**Results:** 95% CI Significant reduction CAPS (MBSR p=0.734; PCGT p=0.741) increased FFMQ (MSBR p=0.01 PCGT p=0.001) **Between Group Differences:** Rates of remission, defined as CAPS-IV score <45, did not statistically differ between groups (30.7% MBSR vs. 27.3% PCGT, p=0.662, between-group NNT=30). MSBR significant reduction of PCL (p=0.04) while PCGT did not	**LOE:** II **Strengths**: RCT, multi-site design, active control group, blinded primary outcome ratings, fidelity monitoring, large minority representation, randomized approach **Weakness**: High attrition rate, brief MSBR group sessions. **Feasibility/Application**: Study conducted at multi-site VA medical centers infers applicability and feasibility.

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Goldberg et al., (2020) Efficacy and acceptability of mindfulness-based interventions for military veterans: A systematic review and meta-analysis **Country:** U.S. **Funding:** National Center for CIH; NIMH **Bias:** None identified	Not clearly stated; inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** Systematic Review and Meta-analysis **Purpose:** Clarify efficacy and acceptability of MBIs for veterans	**N** = 20 Studies **N** = 898 participants **Demographics:** Veterans mean age 49.27; Mostly Caucasian (86%) males (95.9%) **Inclusion:** MBI, veterans, RCT **Exclusion:** acceptance and commitment therapy, DBT, non-mindfulness mind-body practices, active-duty military, military families **Attrition:** N/A	**IV:** MBI **IV2(Control)**: TAU or specific intervention **DV1:** PTSD **DV2:** Depression **DV3:** Psychiatric symptoms – anxiety, SUD **DV4:** QOL **DV5:** Mindfulness	**Tools:** PRISMA **Validity/ Reliability:** Evidence-based and reliable tool.	**Statistical Test Used:** Cochrane tool; Cohen's *d*; Becker's del; Hedge's *g; I²*; Peto's Method; *Trim-and-Fill*; Jadad study quality	**Results:** MBIs compared favorably to specific active controls at posttreatment on measures of PTSD (g = 0.25) and psychological symptoms (g = 0.19) High attrition rates for MBIs compared to TAU or other interventions (log OR = 0.68, [0.27, 1.09] Converting to odds ratio, MBI participants were 98% more likely to drop out compared to participants in active control conditions (OR = 1.98).	**LOE:** I **Strengths:** first meta-analysis to quantify the acceptability of MBIs relative to other interventions in veterans **Limitations:** Relatively small number of comparisons reduced statistical power; number of studies limited proper testing of moderators; no generalizability; unable to test research allegiance for bias **Feasibility/Application**: Understanding acceptability of MBIs important to proposed project; efficacy essential as well.

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Kang et al., 2022. Interoception underlies therapeutic effects of mindfulness meditation for posttraumatic stress disorder: a randomized clinical trial **Country:** United States **Funding:** VA **Bias:** none recognized	Not clearly stated; inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** parallel-design mechanistic clinical trial (pre/post intervention) MBSR vs. PCGT focus on PTSD symptoms & neurophysiology **Purpose:** Determine efficacy of MBSR vs. PCGT on PTSD symptoms	**N** = 98 MBSR (N=47) PCGT (N=51) **Demographics:** U.S. veterans >18yo; diagnosis of PTSD; agree to no other psychotherapy; stable medication regimen for >2 months. **Setting:** Minneapolis VA Medical Center **Exclusion:** current substance dependence; psychotic disorder; prominent current suicidal or homicidal ideation; cognitive impairment; medical illness might interfere with treatment. **Attrition:** MBSR=22.4% PCGT=6.9%	**IV1:** MBSR **IV2(Control)**: PCGT **DV1:** PCL **DV2:** CAPS **DV3:** PHQ-9 **DV4:** Cerebral function (EEG/ECG) **MBSR –** Mindfulness based weekly group meetings for 8 weeks with final one day retreat. Included an orientation. **PCGT** weekly group therapy with final group lunch	**Tools:** CAPS; PCL; FFMQ; PHQ-9 **Validity/ Reliability:** Evidence-based and reliable tools.	**Statistical Tests Used:** RM-ANOVA; independent *t*-test, mediation analysis - LDS modeling	**Results:** 95% CI MBSR significantly better improvement of PCL, CAPS vs. PCGT ($p<0.001$) MBSR significantly better improvement of PHQ-9 vs PCGT ($p<0.005$) MBSR increased posterior alpha power across EEG; MBSR improved flanker task–related frontal theta responses; frontal theta HEBR increased in the MBSR group during meditation; PCGT group did not result in improvement	**LOE:** II **Strengths:** Clinical trial, randomized design with active control, neuronal imaging **Limitations:** Limited number of daily treatment adherence measurements; temporal overlap between the changes in the mediator and the clinical outcome; only about 40% of patients treated with 8-week MBSR had PCL improvements greater than the minimum clinically important difference of 10. **Feasibility/Application:** Clinical trial showing more evidence for utilization of MSBR in the treatment of PTSD. Neurophysiological evidence substantiates the claim.

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Liu et al, 2021 The efficacy of mindfulness-based stress reduction intervention 3 for post-traumatic stress disorder (PTSD) symptoms in patients with PTSD: A meta-analysis of four randomized controlled trials **Country:** China **Funding:** NSSFC; Xidian University **Bias:** None identified	Not clearly stated; inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** Systematic Review and Meta-analysis **Purpose:** Examine therapeutic effects of MBSR; determine which aspects of MBSR most effective	**N=** 9 studies **N=** 768 subjects **Study Characteristics:** All 8-week intervention RCT's – population: 6 veteran studies; 2 IPV studies; 1 survivors of traffic accidents. 3 MBSR vs inactive control 4MBSR vs active control. Mean age=51.7 **Attrition:** N/A	**IV1:** MBSR **Control:** TAU; no intervention **DV1:** CAPS-V **DV2:** PCL **DV3:** PSSI	**Tools:** PRISMA **Validity/ Reliability:** Evidence-based and reliable tool	**Statistical test used:** Comprehensive Meta-analysis 3.0 software; Q and I2; CCRB; Egger's; Duval & Tweedie's trim-and-fill analysis; mixed-effects meta-regression; Hedges *g*	95% CI; low heterogeneity; PTSD symptoms significantly reduced in all studies. Moderate effect vs. inactive control ($N = 263$) $g = 0.514$ (95% CI: 0.01–1.94) Moderate effect vs. active control ($N = 505$) $g = 0.447$, (95% CI: 0.27–0.62)	**LOE:** I **Strengths:** RCT's only; Systematic review and meta-analyses utilizing evidence-based tools. **Limitations:** MBSR 8-week intervention only; English and Chinese language only; no pre-registered protocol. **Feasibility/Applicability:** At least 9 RCT's indicating MBSR reduces symptoms of PTSD, 6 studies veteran focused – feasible and applicable to veteran population.

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Marchand et al., 2021 Mindfulness-based interventions for military veterans: A systematic review and analysis of the literature **Country:** U.S. **Funding:** Unfunded **Bias:** None identified	Not clearly stated; Inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** Systematic review and meta-analysis **Purpose:** Discover gaps in provider knowledge regarding MBI and veterans	**N=** 27 studies **N=** 2,147 subjects **Demographics:** Veterans 18 yo; mostly Caucasian (76%) male (85%). **Inclusion:** Studies with MBI; peer-reviewed; English language; **Exclusion:** duplicates, dissertations, commentaries, non-veteran populations, simultaneous non-mindful interventions, review articles **Attrition:** N/A	**IV:** MBI **IV2(Control)**: TAU or no control **DV1:** CAPS-V **DV2:** PCL **DV3:** PHQ-9 **DV4:** GAD-7	**Tools:** PRISMA **Validity/ Reliability:** Evidence-based and reliable tool	**Statistical test used:** CEBM Quality Assurance	**Average sample =** 79.51 (SD=79.91) **Retention =** 77.47% (SD = 15.13) **MBSR =** 13 studies **Quality =** quantitative range 1-5 (M = 3.17; SD = 1.46) Qualitative range 9-10 (M = 9.33; SD = 0.58 **Outcomes:** MBI large effect size on PTSD symptoms	**LOE: I** **Strengths:** Search terms assistance from VA experts and Health Services Research and Development evidence maps. Quality assurance utilizing senior experts of mindfulness techniques. **Limitations:** English language only; search strategy may have excluded articles **Feasibility/Applicability:** Veteran focused review results implicate decreased PTSD/depressive symptoms. Studies lacking diversity but applicability still evident.

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Possemato et al., 2022 Randomized clinical trial of brief primary care-based mindfulness training versus a psychoeducational group for veterans with posttraumatic stress disorder **Country:** U.S. **Funding:** NCCIH, NIH, VA **Bias:** None identified	Not clearly stated; Inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** RCT -PCBMT vs. psychoeducation (EDU) 5 cohorts over 12-month span with 6-month follow-up **Purpose:** Determine feasibility of PCBMT and evaluate PTSD and depression symptom reduction	**N=** 55 PCBMT (*n*=28) EDU (*n*=27) **Demographics:** Veterans PTSD diagnosis or positive screen Caucasian (85%) Male (87%) Mean age: 56 yo **Setting:** 3 VA outpatient facilities in NY **Exclusion:** Gross cognitive impairment, suicide attempt<1 month, PTSD outside VA<2 months, preference for specialty mental health referral **Attrition:** 5%	**IV:** PCBMT **IV2(Control)**: EDU **DV1:** PCL **DV2:** PHQ-9 **DV3:** RAS **DV4:** HPLP **DV5:** CSQ-8 **PCBMT –** Brief intervention derived from MBSR; 4 90-minute group classes with psych provider and veteran peer specialist. Fewer hours of care (6 hours vs. full MBSR – 24 hours) **EDU –** 4 sessions providing psychoeducation by psych provider and veteran peer specialist	**Tools:** PCL; PHQ-9; HPLP; CSQ-8 **Validity/ Reliability:** Evidence-based and reliable tools.	**Statistical test used:** SAS 9.4 Proc Mixed and MI software Multilevel models; random intercept and slope effects;	**Results:** medium effect sizes significant improvement in PCBMT group with fewer hours of care **DV1:** p =0.02 **DV2;** 16 weeks (p=0.02, d = 0.29) 24 weeks (p=0.03) **DV3:** p=.08 **DV4:** p=0.008 **DV5:** 93% PCBMT group and 84% EDU group reported intervention helped	**LOE: II** **Strengths:** Pragmatic RCT with active control, use of staff in clinics suggesting generalization, few exclusion criteria, low attrition rate **Limitations:** Small sample size, participants mostly older white males, less structured EDU with no assessment of provider fidelity, **Feasibility/Applicability:** Brief MBSR with improvement of all variables suggesting a shorter version is still viable

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Saban et al., 2022 Impact of a mindfulness-based stress reduction program on psychological well-being, cortisol, and inflammation in women veterans **Country:** U.S. **Funding:** VA **Bias:** None identified	Not clearly stated; Inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** RCT MBSR vs. health education program (AC) Baseline, 4week, 8-week, and 6-month follow-up **Purpose:** Examine effectiveness of MBSR to reduce perceived stress, depressive symptoms, loneliness, symptoms of PTSD, and to lower diurnal salivary cortisol, inflammatory cytokines in women veterans	**N=** 164 MBSR (*n*=87) AC (*n*=77) **Demographics:** Female veterans >18 yo, one risk factor for CVD 47% non-white **Setting:** Chicagoland area **Exclusion:** history of MI, ischemic heart disease/coronary artery disease, left ventricular hypertrophy, ischemic stroke, pregnant, planned on becoming pregnant, gave birth in prior 6 weeks, lactating, prior MBSR training, active infection, major autoimmune disorders, current cancer, suicide attempt <1 year **Attrition:** 55%	**IV:** MBSR **IV2:** AC **DV1:** PCL **DV2:** PSS **DV3:** IL-6 **DV4:** Salivary cortisol **DV5:** Observing **DV6:** Describing **DV7:** Awareness **DV8:** Non-reactivity to inner experience **MBSR –** Mindfulness based weekly group meetings for 8 weeks with final one day retreat. Included an orientation. **AC –** 8-week, group-based health promotion education program weekly for 2.5-h in small groups (4 to 8 participants). Topic experts taught classes (i.e., nutritionist, physical therapist) using standardized content.	**Tools:** PCL; PSS; FFMQ; Biomarker lab tests **Validity/ Reliability:** Evidence-based and reliable tools.	**Statistical test used:** IBM SPSS 27.0 software; HLM 8.01 software; growth curve modeling; goodness-of-fit; intent-to-treat; linear model fixed effects	**Results:** medium effect sizes for MBSR group (increase of FFMQ items, decrease PTSD and stress symptoms, decrease salivary cortisol) **DV1:** p=0.01 **DV2:** p=0.02 **DV3:** no difference between groups **DV4:** p=0.02 **DV5:** p=0.01 **DV6:** p=0.043 **DV7:** p=0.02 **DV8:** p=0.03 **Between group differences:** statistically significant difference MBSR group **DV8:** p=<0.04	**LOE: II** **Strengths:** RCT, diverse sample, first study female veterans only (preferred by females based on previous studies), biomarker data **Limitations:** High attrition rate, tested only combat exposure as stressful life event, not generalizable **Feasibility/Applicability:** Veteran population and utilization of evidence-based tools suggest applicability

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Zhu et al., 2022 Mind–Body exercises for PTSD symptoms, depression, and anxiety in patients with PTSD: A systematic review and meta-analysis. **Country:** China **Funding:** Ministry of education of Humanities and Social Science project; the Fundamental Research Funds for the Central Universities **Bias:** None identified	Not clearly stated; Inferred to be Mindfulness to Meaning; Social Cognitive; Self-Efficacy	**Design:** Systematic Review and Meta-Analyses **Purpose:** to review the effects of mind–body exercises on PTSD	**N** = 16 **Subjects** = 871 **Demographics:** Mix of male and female participants with diagnosis of PTSD Mean age = 49.5 **Inclusion:** RCTs, adults, PTSD, mind-body exercises vs. control groups, outcome results target PTSD, depression, anxiety, English or Chinese language **Exclusions:** Repeats, abstracts only, reviews, non-RCT, vague or no data, SUD, other psych disorders, taking *a* or *b* blockers	**IV1:** Mind-body exercises **IV2:** TAU/Control **DV1:** PTSD (PCL/CAPS-5) **DV2:** PTSD + Depression (PHQ-9/ **DV3:** PTSD + Anxiety (STAI/DASS)	**Tools:** CAPS; PCL; PHQ-9; STAI; DASS **Validity:** Evidence-based and reliable tools.	**Statistical tests used:** Forest map; fixed- or random-effect meta-analyses; regression analysis; Physical Therapy Evidence Database scale; Stata 14.0; sensitivity analysis; covariates	**Results:** **DV1:** Moderate heterogeneity (I2 =17.5%, p = 0.282; SMD = −0.28, 95% CI: −0.46, −0.10) significant differences between the groups (p < 0.001). Significantly improved PTSD symptoms (SMD = −0.41, 95% CI:−0.64 to −0.19, p < 0.001). **DV2**: low level of heterogeneity (p = 0.259, I2 = 19.4%). Difference between groups significant (p < 0.001). Significantly improved depression (SMD = −0.35, 95% CI: −0.55 to −0.15, p < 0.001). **DV3:** moderate heterogeneity (p =0.095, I2 = 49.5%). significant differences between the groups (p < 0.001). Improved anxiety symptoms (SMD = −0.31, 95% CI: −0.74 to −0.12, p < 0.001).	**LOE – I** **Strengths:** **Limitations:** Several studies employed small sample sizes; Only three studies sample allocation used hidden allocation-could cause systematic bias; only three studies used assessor blinding measuring outcomes; for anxiety, unable to determine optimal frequency, timing, duration, and type of exercise for improving anxiety due to the limited number of eligible RCTs; methodological differences in the timing, frequency, duration, and outcome of the interventions contributed to the differences in outcomes and led to the difficulties interpretation. **Feasibility/Applicability:** Mind-body exercises include mindfulness and can contribute to evidence of applicability for the proposed project

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Table A2

Synthesis Table

Study (Author, year)	Blanck et al., 2018	Davis et al., 2019	Goldberg et al., 2022	Kang et al., 2022	Liu et al., 2021	Marchand et al., 2021	Possemato et al., 2022	Saban et al., 2022	Shapira et al., 2022	Zhu et al., 2022
Design	SR+MA	RCT	SR+MA	Parallel CT	SR+MA	SR+MA	RCT	RCT	Post-hoc EA	SR+MA
LOE	I	II	I	II	I	I	II	II	II	I
Sample										
N = Subjects	1,341	214	2,688	98	768	2,147	55	164	210	871
M Age	30.23	51	49.27	59	51.7	79.51	56	56	55	44.65
Country	Germany	U.S.	U.S.	U.S.	U.S.	U.S.	U.S.	U.S.	U.S.	China/U.S.
Veteran		X	X	X	X	X	X	X	X	
PTSD Diagnosis		X	X	X	X	X	X	X	X	X
Depression	X	X	X			X	X		X	X
Anxiety	X	X	X			X	X		X	X
Setting										
VA Facility		X	X	X	Varied	X	X		X	
Non-VA Facility	X							X		X
Interventions										
MBSR		X	X	X	X			X	X	X
Mindfulness/MBI	X		X			X				X
MBCT			X							
PCBMT							X			
Control										
PCGT		X		X					X	X
Education			X				X	X		
TAU	X		X		X	X				X
No control	X				X	X				X
Length (Intervention)	Varied	8 weeks	Varied	8 weeks	Varied	Varied	4 weeks	8 weeks	8 weeks	Varied
Length per session	Varied	90-minutes	Varied	90-minutes	Varied	Varied	90-minutes	90-minute	1.5/2.5 hrs	Varied
Sessions per week	Varied	1	Varied	1	1	1	1	1	1	Varied
Outcomes/ Themes										

Key: **AUD–**Alcohol Use Disorder; **AUDIT–**Alcohol Use Disorders Identification Test; **CAPS–**Clinically Administered PTSD Scale; **CF-**Cerebral Function **CRP–**C-Reactive Protein; **CS-**Cross-Sectional; **CSQ-8-**Client satisfaction Questionnaire; **CT-**Clinical Trial; **DASS–**Depression Anxiety Stress Scales; **EA-**Exploratory Analysis; **FFMQ-**Five Facet Mindfulness Questionnaire; **HPLP-**Health Promoting Behaviors; **IL-6–**Interlukin-6; **IMF-**Individual Mindfulness Factors; **MASS–**Mindful Attention to Awareness Scale; **MBI–**Mindfulness-Based Intervention; **MBSR–**Mindfulness-Based Stress Reduction; **MM-**Mixed-Methods; **MST-**Military Sexual Trauma; **PCBMT-**Primary-Care Based Mindfulness Training; **PCGT–**Present-Centered Group Therapy; **PCL–**PTSD Checklist Self-Report; **PHQ–**Patient Health Questionnaire; **PRISMA-**Preferred Reporting Items for Systematic Reviews and Meta-analyses**; PSS-**Perceived Stress Scale; **PTSD–**Posttraumatic Stress Disorder; **QOL-**Quality of Life; **SA-**Secondary Analysis; **SEM-**Structural Equation Modeling; **SI–**Suicidal Ideations; **SS-**Satisfaction Survey **TAU–**Treatment As Usual; **VA–**Department of Veterans Affairs

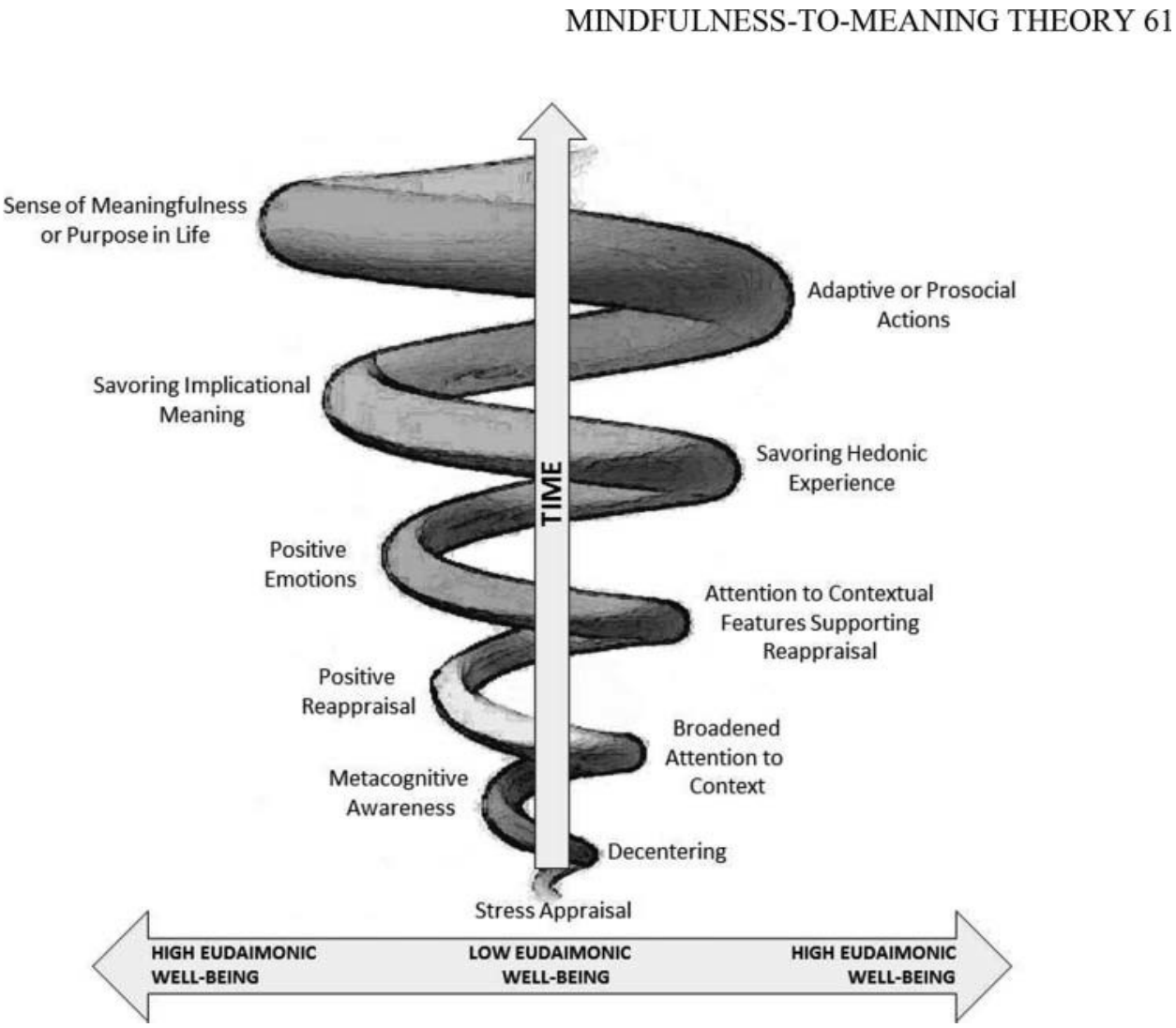
Study (Author, year)	Blanck et al., 2018	Davis et al., 2019	Goldberg et al., 2022	Kang et al., 2022	Liu et al., 2021	Marchand et al., 2021	Possemato et al., 2022	Saban et al., 2022	Shapira et al., 2022	Zhu et al., 2022
CAPS-5		↓↓	↓↓	↓↓	Moderate effect	Large effect			↓↓	↓↓
PCL		↓↓↓	↓↓	↓↓	Moderate effect	Large effect	↓↓	↓↓	↓↓	↓↓
PHQ-9/Depression	↓↓	↓↓	↓↓	↓↓		Large effect	↓↓		↓↓	↓↓
FFMQ		↑						↑↑	↑↑	
Anxiety	↓↓		↓↓							↓↓
Cortisol								Decrease salivary	Increased morning blood	
PSS						Moderate effect		↓↓		
DASS						Moderate effect				
IL-6								↔	↔	
HPLP							↑↑			
QOL			↑↑							
CF				↑↑						
CSQ-8/SS							93% helpful			

Key: **AUD–**Alcohol Use Disorder; **AUDIT–**Alcohol Use Disorders Identification Test; **CAPS–**Clinically Administered PTSD Scale; **CF-**Cerebral Function **CRP–**C-Reactive Protein; **CS-**Cross-Sectional; **CSQ-8-**Client satisfaction Questionnaire; **CT-**Clinical Trial; **DASS–**Depression Anxiety Stress Scales; **EA-**Exploratory Analysis; **FFMQ-**Five Facet Mindfulness Questionnaire; **HPLP-**Health Promoting Behaviors; **IL-6–**Interlukin-6; **IMF-**Individual Mindfulness Factors; **MASS–**Mindful Attention to Awareness Scale; **MBI–**Mindfulness-Based Intervention; **MBSR–**Mindfulness-Based Stress Reduction; **MM-**Mixed-Methods; **MST-**Military Sexual Trauma; **PCBMT-**Primary-Care Based Mindfulness Training; **PCGT–**Present-Centered Group Therapy; **PCL–**PTSD Checklist Self-Report; **PHQ–**Patient Health Questionnaire; **PRISMA-**Preferred Reporting Items for Systematic Reviews and Meta-analyses**; PSS-**Perceived Stress Scale; **PTSD–**Posttraumatic Stress Disorder; **QOL-**Quality of Life; **SA-**Secondary Analysis; **SEM-**Structural Equation Modeling; **SI–**Suicidal Ideations; **SS-**Satisfaction Survey **TAU–**Treatment As Usual; **VA–**Department of Veterans Affairs

Appendix B

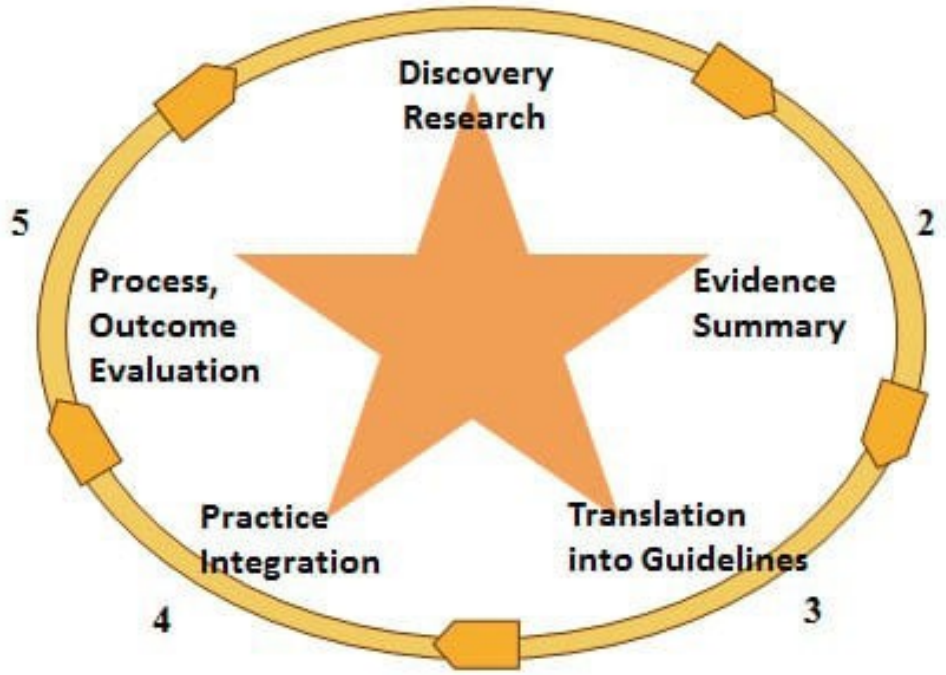
Models and Frameworks

Figure B1
Mindfulness -To-Meaning Theory



(Garland et al., 2015)

Figure B2
The ACE Star Model of Knowledge Transformation



(Stevens, 2012)

Appendix C

Budget

BUDGET CATEGORIES	Justification	TOTAL FOR PROJECT
COSTS		
PERSONNEL COSTS		
SALARY ESTIMATES		
Site Champion - Mental Health Educator	$70+/hr*2 hrs/week*4 weeks (intervention) + $70+/hr*16 hours (administrative, meetings, VA approval process) total over 16 weeks	**$1,680**
Group Leader - Psychologist	$60+/hr*2hr/week*4 weeks (intervention) + $60+/hr*4 hours (meetings) total over 16 weeks	**$720**
CNL - EBP Council Co-chair	$70+/hr*4 hrs total (review project paper, present to council, advise on improvements)	**$280**
Project Lead - ASU DNP Student	VA requires a Without Compensation (WOC) appointment separate from current appointment as a nurse manager. No pay will be adminstered for time spent on the project.	**$0**
Sub-total		**$2,680**
TRAVEL COSTS		
Travel to and from site	(28 miles round trip*4 days/week*4 weeks) * $0.65 per mile (IRS standard rate)	**$291**
Sub-total		**$291**
MATERIALS & SUPPLIES/CONSUMABLES		
Office Supplies	2 packages of generic pens for survey completion	**$10**
Office Supplies	2 packages of file folders to hold surveys (will be locked in file cabinet owned by project lead	**$10**
Office Supplies	$0.10/sheet*20 sheets/week* 4 weeks to print surveys	**$24**
Food	Snacks for staff that are assisting with project	**$50**
Food	Snacks for participants of the project	**$50**
Sub-total		**$144.00**
EQUIPMENT/NON-CONSUMABLES		
Operational - Electricity/AC	Average cost for hospitals around $420/hr. Utilizing 1/10 of the hospital or less = $42/hr*8 hours total over 4 weeks	**$336**
Sub-total		**$336.00**
	Total Operational Costs	**$3,451**
POTENTIAL SAVINGS		
COST SAVINGS		
Admissions	Average daily cost for an inpatient mental health admission (2023) at the hospital is $3,861. Average length of stay the past 6 months is 6 days. $3,861*6/days = $23,166 per admission. A sustainable intervention that prevented even one less admissions could save the hospital substantially.	**$23,166**
Sub-total	**Total Potential Savings**	**$23,166**
The salaries will be covered by the VA, as well as operational costs. Project lead will fund travel and material costs. The need for grants or outside funding is minimal.		
	Total Operational Costs	**$3,451**
	Total Potential Cost Savings	**$23,166**
	Possible Return on Investment	**$19,715**