Sit, Breathe, Heal: Mindfulness for Post-Traumatic Stress

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Abstract

Adults who suffer from psychological distress after traumatic injury, either acute stress or PTSD, run the risk of delayed healing and poor health outcomes. In addition to a greater risk of chronic pain, there is also a significant cooccurrence with mood disorders and substance use. A literature review gathered high quality evidence supporting the use of mindfulness-based interventions to ameliorate symptoms associated with post-traumatic stress. Some of the endpoints with demonstrated efficacy that were explored in the studies in the literature review included mindfulness, resilience, self-compassion, pain, and inflammatory bio markers. Utilizing Richardson's Metatheory of Resiliency and Resilience as a guide, a mindfulness-based intervention was developed for patients manifesting symptoms of post-traumatic stress at a pain clinic in the Phoenix area. IRB approval was granted through ASU in November 2023. The study participants attended a thirty-minute online mindfulness class and participated in a two week independent practice period supported by online guided meditations. Participants journaled about their experience during the practice period. The PCL-5 was administered before and after the intervention. Results of a two tailed paired samples *t*-test indicated statistical significance and a large effect size (p= 0.002, d= 2.29). The journal results were positive as well. The results of this intervention support the conclusions drawn from the literature review. Mindfulness can be effectively leveraged to ameliorate symptoms of post-traumatic stress.

Keywords: adults, PTSD, acute stress disorder, pain, mindfulness

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Following traumatic events, healing progresses at variable rates. Many factors can influence the rates of healing. One subset of patients, those suffering from post-traumatic stress have a more complicated prognosis and more prevalence of sequelae when compared to patients that don't suffer from post-traumatic stress. The results of a literature review revealed that mindfulness practice can decrease the impact of symptoms of post-traumatic stress. This quality improvement project examined the impact of a brief mindfulness intervention delivered via the internet on symptoms of post-traumatic stress.

Problem Statement

Experiencing traumatic events is an unavoidable consequence of living in a chaotic world. A significant number of individuals suffer from post-traumatic stress because of these events. The Department of Veteran's Affairs estimates that six out of every one hundred people will have post-traumatic stress disorder at some point in their lives (Schnurr, 2022). It has been estimated that the cost of caring for patients suffering from PTSD will exceed those associated with more frequently encountered mental health conditions like depression and anxiety (Richman, 2022). A recent study conducted by the Department of Veterans Affairs estimated that the annual economic burden of PTSD was $232 billion (Richman, 2022). Prolonged healing due to the impact of PTSD, plays a role in driving up the costs associated with PTSD. Patients with PTSD are significantly more likely to develop chronic pain than individuals who suffer similar trauma but do not go on to develop the disorder (Andersen et al., 2022; Siqveland et al., 2017). Compounding the obstacles these patients face is the challenge associated with identifying someone likely to suffer from PTSD. Due to the heterogeneous nature of the disorder, its manifestations can be extremely difficult to identify and predict (Tesarz et al., 2020).

Purpose and Rationale

With the costs associated with PTSD treatment in mind, it is vital that patients at risk of development of the disorder be identified to facilitate early intervention. Further, given the association with PTSD and a host of other problems, there is a need to seek a means of effectively treating these patients to alleviate some of the burden on both providers and the medical system. Individuals suffering from post traumatic stress report significant difficulties with activities of daily living, social engagement, and limitations with work (Yong et al., 2022). The purpose of this paper is to discuss the challenges posed by untreated traumatic stress and to identify mechanisms by which these individuals may be treated to prevent a more circuitous healing process.

Background and Significance

Traumatic events can have lifelong consequences for the individuals afflicted by them. The individual that survives a car accident can be plagued by the pain from the injuries, both physical and psychological, for years. Of particular concern when analyzing injury sustained after physical trauma, is the increased risk for the development of chronic pain. It seems that one of the factors that can influence the progression from acute pain to chronic pain is the presence of PTSD (Andersen et al., 2022; Siqveland et al., 2017). Evidence suggests that the presence of post-traumatic stress leads to worse outcomes after a traumatic injury (Andersen et al., 2022).

Additionally, chronic pain as an outcome of inadequately recognized and treated post traumatic stress following a trauma is an unfortunate and potentially avoidable consequence. The number of United States citizens afflicted with chronic pain exceeds twenty-five percent (Dydyk & Conermann, 2022). Beyond the decrease in the quality of life for these individuals, there is a reported suicide rate that, by some estimates, is as high as 14% (Dydyk & Conermann, 2022).

The CDC's national initiative to address chronic pain acknowledges the multifaceted causes of chronic pain (Centers for Disease Control, n.d.). Among them is psychiatric comorbidity, which in the population suffering from chronic pain is as high as 67% (Dydyk & Conermann, 2022). Rates of PTSD have been reported to be as high as 35% compared to 3.5% in the general population (DeCarvalho, 2022).

Adults with Symptoms of Traumatic Stress

Patients seeking treatment for pain can have cooccurring symptoms of post-traumatic stress that impact their ability to heal. Both acute stress disorder and post-traumatic stress disorder have been identified as conditions that can result from traumatic events that result in physical pain (Visser et al., 2022). In addition, there is an association between post-traumatic stress and increased pain sensitization leading to protracted treatment times (Andersen et al., 2022). In stratifying risk profiles for patients liable to develop this post-traumatic stress, research has asserted that previously existing psychiatric comorbidity is common. Visser et al. (2022) identified traits of patients that developed symptoms concurrent with either PTSD or acute stress disorder. They found that at risk patients tended to be younger, with higher scores for neuroticism, anxiety, and depressive symptoms. They also noted that they tended to score lower in the domains of agreeableness and extraversion. Another potentially predisposing factor for the development of post-traumatic stress is the presence of adverse childhood experiences (ACEs) (Dempster et al., 2021). The theory of increased allostatic load posits that individuals with a history that includes ACEs are primed to develop post-traumatic stress in the wake of a traumatic injury (Dempster et al., 2021).

Non-Pharmacological Interventions for PTSD

There are currently multiple modalities via which symptoms of post-traumatic stress can be addressed. Identification of ASD as distinct from PTSD, though still an important harbinger of the potential for PTSD development, does not mean that the treatments are different (American Psychiatric Association, 2004). The modalities, excluding pharmacological treatment, fall into the realm of psychotherapy (American Psychiatric Association, 2004; Jain, 2019). Several options are available for the treatment of PTSD, one of the most well-known and widely used is cognitive behavior therapy (CBT). Specifically, falling under the umbrella of CBT for PTSD is prolonged exposure therapy (Jain, 2019). Prolonged exposure (PE) involves a skilled therapist walking the patient through their fear structure in order to activate them, and then addressing the aspects of the fear structure that are problematic. There is a wide base of research to recommend PE. One meta-analysis found that patients that had received PE had improved outcomes relative to 86% of patients receiving care as usual (Watkins et al., 2018).

Another avenue of treatment that shows promise is the use of mindfulness. A four-session mindfulness study offered to sixty-two veterans demonstrated significant decreases in PTSD and depressive symptoms with the results remaining at the eight-week follow-up (Jain, 2019). Mindfulness-Based Stress Reduction (MBSR) a program developed by Jon Kabat-Zinn to assist with a variety of psychiatric pathologies has been utilized effectively with patients suffering from PTSD. Subjects typically meet once a week for two-hour sessions that last for eight weeks (Liu et al., 2022). A recent meta-analysis, that included 10 randomized controlled trials (RCTs), with a total number of participants of 768, found that MBSR was effective in reducing PTSD symptoms (Liu et al., 2022). Further, research has been done to find the minimum effective dose for mindfulness in the treatment of PTSD. An RCT conducted on a total of 62 veterans with

PTSD symptoms reported a significant decrease in PTSD symptoms after only four short mindfulness sessions (Possemato et al., 2016).

Missed Screenings and Poor Outcomes

As far back as 2004, when the APA formulated PTSD treatment guidelines, they were aware of the need for early intervention in the wake of traumatic events to prevent the potential development of PTSD (American Psychiatric Association, 2004). Given the pace and expectations in the primary care environments, where patients with acute traumatic injury are likely to seek care, it is reasonable to assume that many patients aren't being effectively screened for either ASD or PTSD. As demonstrated above, failing to identify the presence of these psychiatric comorbidities in patients suffering from pain can have disastrous results for the patient's quality of life.

Early Identification and Streamlined Treatment

It is possible to identify patients at risk for the development of PTSD or ASD post-injury (Jaramillo et al., 2019). Utilizing this evidence to encourage screening in primary care environments would create a cohort of patients that could benefit from early intervention. Mindfulness has proven utility in the amelioration of symptoms associated with both chronic pain and traumatic stress (Jain 2019; Liu et al., 2022; Possemato et al., 2016). Formulating, an intervention that maximizes the efficiency of delivery would enable a practice to implement a program to treat the co-occurring disorders of pain and traumatic stress while minimizing the risk of patient dropout.

Common Themes

Patients suffering post-traumatic stress are more likely to have worse outcomes when compared to patients that do not suffer post-traumatic stress. Patients with PTSD are more likely

to have chronic pain than the general population. Addressing these cooccurring conditions earlier in the disease course via effective screening of vulnerable populations can decrease future morbidity and mortality. There are many possible interventions that can be employed in the service of treating these patients once they are identified. One that has proven efficacy as both a treatment for chronic pain and post-traumatic stress is mindfulness.

Internal Data

An integrative pain treatment clinic in the Southwestern United States that sees adult patients with both acute and chronic pain. The clinic identified a significant number of the patients seeking treatment evidenced symptoms associated with post-traumatic stress. Due to the current lack of screenings initiated at this facility, there is a paucity of data on the psychiatric comorbidities that these patients currently possess. Additionally, there is a lack of understanding about the outcomes for these patients relative to patients that do not exhibit these symptoms. It is essential to identify this patient population prior to the initiation of a mindfulness-based intervention.

PICOT Question

A review of the literature led to the clinically relevant PICOT question: "In adults suffering from post-traumatic stress (P) does a brief mindfulness intervention (I) compared to care as usual (C) decrease patient symptoms and improve prognosis (O)" and led to the following exhaustive search.

Search Strategy

A thorough review of the available evidence was undertaken to answer the PICO question. Three databases were searched for this purpose—PubMed, PsycINFO, and CINAHL. The selection of these databases was influenced by the potential amount of evidence available.

These databases are known for their significant contributions to disseminating medical research. Search terms included: *post-traumatic stress disorder, PTSD, acute stress disorder, pain, injury, traffic accident, pain, orthopedic injury, whiplash, TBI, mindfulness, MBSR, meditation.* Result limiting parameters included studies from the last five years, and randomized controlled trials.

An initial search of PsycINFO using the terms: *adults middle aged, post-traumatic stress, PTSD, acute stress* yielded over one million results. Using more specific search terms and limiting parameters, narrowed the results to 209.

An initial search of PubMed using the terms *pain, mindfulness, injury* yielded 102 results. Using the limiting parameters reduced the results from 55 to 102.

An initial search of CINAHL using the terms *PTSD, MBSR, Mindfulness, traffic accident, injury* yielded 115,994 results. Applying limits to these results reduced the number to 94,096. Adding terms *spinal cord, TBI, MBSR* yielded 3000 results after limits were applied. An additional search using the terms *adults, injury recovery, post-traumatic stress disorder, PTSD, acute stress disorder, MBSR, meditation* and utilizing above parameter limiters yielded 49 results.

As a result of these database searches, ten studies were selected. The studies were selected based on their level of evidence. Specifically, level one, systematic reviews and meta-analyses, or level 2, randomized controlled trials, were prioritized. Additionally, only studies published after 2018 were included in the results. Finally, studies that included PTSD, pain, depression, or mindfulness as dependent variables were also prioritized. Independent variables that included brief interventions or internet-based coaching were given priority.

Critical Appraisal and Synthesis of Evidence

The rapid critical appraisal process put forth by Melnyk and Fineout-Overholt (2019) guided the analysis of the quality of the selected studies. The bulk of the studies were RCT's conducted without risk of bias. A meta-analysis was also included in the studies to further bolster the quality of the evidence analyzed for this project. Several studies utilized single-group cohorts as a means to view the effects of mindfulness over time (see Synthesis Table Appendix A). All the studies recruited adult participants. However, there is a heterogenous mix of sample sizes ranging from 14 up to 646. There was a mix of genders represented among study participants, however overall, the sample leans male. The majority of the studies were not done on veterans, but the studies with the largest number of subjects were done on veterans. A mix of types of precipitating trauma were included in the recruitment process among the studies. The setting for the study was variable. Most were undertaken in the outpatient setting however there were several conducted on inpatient units.

Most of the studies looked at mindfulness to address symptoms of PTSD. However, other dependent variables commonly assessed included pain, mindfulness, depression, anxiety, and quality of life. Only one study was included that did not ostensibly assess for symptoms associated with affect, PTSD, pain, or something similar. Bloom- Foster & Mehl-Madrona (2020) conducted their research in a clinic providing medication-assisted therapy (MAT) for patients with opiate use disorders. For this study, the dependent variables included relapse rates, feasibility, and utilization rate. This study was included to demonstrate the potential efficacy of an ultra-brief mindfulness intervention. There was heterogeneity related to the mix of interventions deployed among the studies. Generally, MBSR was the most common format used to teach mindfulness to the participants. However, to address the efficacy of a shorter

intervention several studies were included that utilized various types of brief mindfulness meditation curricula.

In the studies included in the appraisal mindfulness generally had a statistically significant impact on symptoms associated with PTSD. The studies that also tested for effects on mood disorders demonstrated mixed effects. The strongest affective effect was seen in a statistically significant reduction of depressive symptoms in 3 of the 5 studies as seen in the synthesis table located in Appendix A. Generally, weaknesses of the included studies include a mix of sample sizes, issues with generalizability, and as is the case with MBSR, feasibility of the proposed intervention given the time constraints imposed by the setting for this project. Frequently, the study authors mention the need for more studies to be done on mindfulness as an intervention.

Guiding Frameworks

Theoretical Framework

This intervention is guided by Richardson's Metatheory of Resilience and Resiliency, see Appendix B. Resilience is classically regarded as the process by which an individual encounters adversity and can grow as a result (Fleming & Ledogar, 2008). Richardson's theory asserts that individuals are seeking wisdom, self-actualization, and spiritual harmony (Richardson, 2002). The theory identifies three possible phases in the process of understanding resilience. The first phase is concerned with the identification of qualities that are exemplary of resilience. The second is focused on attaining those qualities. Finally, the third phase seeks to assist individuals to harness their drives toward resiliency. The process of integration from maladies (Richardson, 2002).

Individuals that have suffered from post-traumatic stress have suffered an insult to their ability to be resilient in the face of stress. This disruption results in a decrease below their normal homeostatic level of functioning. Resilience theory posits that several outcomes are possible in this situation. It is possible that subjects faced with challenges can continue to function but in a decreased capacity. They can, as a result of intentional reintegration return to homeostasis, or they can potentially improve their capacity and functioning as a result of their reintegration. Instituting a mindfulness practice to improve prognosis in recovery from acute injury has the potential to have a host of positive outcomes on their lives and elevate the subjects to a higher level of function. Overcoming their post-traumatic stress can have the effect of increasing their ability to cope and be resilient in the future.

Implementation Framework

For this project the guiding implementation framework is A Model for Evidence-Based Practice Change developed by Rosswurm and Larrabee, see Appendix B. Within the context of the model, the implementation of any practice change is guided through six steps. Assessing is conducted first. This was completed in the initial meetings with stakeholders. The second phase involves linking the problem with an intervention. This was completed during the literature review. It was at this point that mindfulness was selected. Synthesis, the third stage involved seeking evidence from diverse sources on the efficacy and feasibility of the proposed intervention and a discussion of the intervention with stakeholders. Stage four involves the design of the project. In this instance, a pre and post design was utilized. Followed by implementation in stage five and integration and maintaining the change in stage six. Implementation occurred in the winter of 2023. Finally, the maintaining the practice change involved working with stakeholders to identify staff that can continue to screen patients and

provide the training. This model works well for this project due to its straightforward process from problem identification through intervention generation and implementation. The six stages outline the necessary work to successfully bring the intervention to fruition in a smaller outpatient setting.

Methods

Ethical Considerations

Based on the principles outlined in The Belmont Report, four ethical principles guided this project: respect for persons, beneficence, nonmaleficence, and justice (Barrow et al., 2023). Respect for persons is the moral principle that posits the need to respect the choices of decision makers that are autonomous. Further, this ethical principle asserts the need to protect the interests of subjects with limited autonomy (NIEHS, 2022). The project honored this principle by obtaining informed consent during a Zoom interview with each prospective subject as well as providing them with written project information during the initial recruitment discussion with the nurse practitioner. This assisted in ensuring that the subject thoroughly understood the risks of the project. During the initial screening the project was outlined in detail from the initial education sessions and pretest through the project end and posttest. Patients were provided with easy-to-understand information on the purpose risks and benefits of the project at that time. Beneficence is the ethical principle that requires healthcare professionals do good and abstain from causing harm (NIEHS, 2022) The project adhered to this principle by analyzing the potential risks to the subjects and eliminating them. Some possible sources of risk included physical discomfort, emotional distress, and loss of time (Barrow et al., 2023). For this project the subjects were explicitly briefed on these risks in the written consent. Existing side by side with beneficence is the ethical principle of non-maleficence, meaning to do no harm (Morrison

& Furlong, 2018). Protecting subjects from harm was accomplished by ensuring vigilant attention to the potential harms inherent in the project. Finally, justice is concerned with treating people fairly (NIEHS, 2022). The project adhered to this principle by ensuring that the selection of participants is done in an inclusive manner and patient privacy is maintained (Barrow et al., 2023).

The practice of mindfulness meditation is a low risk activity but it is not devoid of risk. Physical discomfort associated with maintaining a static position during meditation is possible. Working with trauma in meditation can result in distressing mental states associated with reliving the trauma. The first safeguard to address these risks was to emphasize to participants that this study was voluntary and participants could stop the study at any time. Additionally, if participants had worsening symptoms, they were encouraged to reach out to study investigators for referral to a trauma therapy service previously utilized by the project site. With regard to high level human subjects' protection, Citi training was completed in June of 2023. Further, the study protocol was approved by the ASU IRB in September 2023. However due to difficulties recruiting patients with post-traumatic stress in the aftermath of a recent traumatic injury, the study inclusion criteria was broadened to include any patients with symptoms of post-traumatic stress. The new protocol was approved by the ASU IRB in November 2023.

Setting and Stakeholders

The setting for this project was an integrative pain clinic located in the Phoenix metro area. The mission of this pain clinic is to seek modalities that allow the patient's natural healing mechanism to heal the body. To that end, there is a significant focus placed on the use of alternatives to traditional analgesia e.g., opioid analgesics. Within this context the effects of post-

traumatic stress on the patient outcomes have been recognized. However, to this point the deleterious effects of this phenomenon have not been quantified by the staff.

The stakeholders at the site are most prominently the providers. They are on the front lines of patient care and are most affected by the challenging prognosis presented by patients with psychological distress secondary to physical injury. The psychological burden of inadequate treatment response is significant for providers invested in patient care. Additional stakeholders on the clinical team include the medical assistants. They are involved in patient interaction and are invested in the success of the patients that they see as well. Additionally, some of the duties associated with screening for post-traumatic stress would inevitably incorporate in their workflow in the future and it is essential that they are invested in the potential benefits of the additional work. The owners of the business are also stakeholders in this endeavor. For them, an improved patient experience that more fully addresses the needs of more difficult to treat patients, not only means increased patient satisfaction but also more time available to bring in new patients.

Participants and Recruitment

Participants in this study were adults who are suffering from symptoms of post-traumatic stress. The initial screening asked about any symptoms of psychological distress after their injury. The screener and the provider seeing the patient for their pain appointment in the clinic identified the patient. Participants weren't required to meet the criteria for PTSD or ASD. Exclusion criteria for this project included minors and non-English speaking individuals.

Planning the Intervention

A longitudinal pre/post study fits well with the research question. Looking at pre and post intervention measures of post-traumatic stress via the psychometrically validated screening tool,

the PCL-5, effectively answered the question of whether mindfulness is an effective intervention for patients with post-traumatic stress. A brief mindfulness intervention was implemented to address symptoms of post-traumatic stress among the identified patients. After meeting the criteria for inclusion study participants were given an informational flyer explaining the benefits and risks of the project. Participants were then contacted for the purpose of obtaining informed consent.

After the final sample of six participants were recruited, then an educational session on the benefits of mindfulness practice and the process of meditation was held via Zoom. In this session participants were guided through several mindfulness exercises, including breath awareness, non-judgement, grounding, and loving kindness meditation practices to determine which type of practice will meet their needs. Participants were encouraged to practice for ten minutes per day for two weeks. The synchronous education was bolstered with a bevy of online resources that participants were given the option to view. In addition, each participant was given a journal to write about their experiences with mindfulness and its impact on their symptoms of post-traumatic stress. After the two weeks of independent practice study participants completed the PCL-5 again to determine the effects of the intervention on their symptoms.

Factors that ensured successful implementation of the project revolved around the enthusiasm and participation of the provider in the initial screening process. It was essential to locate patients willing to undertake the rigor of the two-week practice period. Further, subjects had to be interested in the benefits of the training to be willing to engage with the project at all. Therefore, a lack of participant interest would have stifled participation. Finally, a potential barrier was the continued engagement of participants with the practice of mindfulness.

Mindfulness practice can be challenging, and its benefits can be subtle leading to a lack of desire to continue to engage with the practice.

Data Collection Plan

Demographic Data

In order to draw more accurate conclusions about the efficacy of the intervention across diverse groups demographic data were collected. Demographic data for this study included age, gender, race, and insurance status, and was collected prior to the initial administration of the PCL-5

Privacy

To protect the privacy of the subjects recruited for the study all identifying information was kept confidential, with the exclusion of the demographic information necessary for the study design. Identifying information for individual participants was replaced with numerical designations to further ensure accuracy of pre and post intervention results and subject anonymity.

Data Storage

Data storage integrity was ensured by maintaining study data in a locked file cabinet in a locked office on the ASU campus during the study duration. Study records were kept until May 2024, after the conclusion of the study and then destroyed.

Questionnaires Used

Beyond the psychometrically validated screening tool employed to assess for symptoms of PTSD, a brief screening interview was conducted in the initial encounter with the nurse practitioner at the clinic. The interview briefly assessed for increased psychological stress

relative to traumatic events. Patients who screened positive on this initial interview were contacted to gain informed consent and to initiate additional screening via the PCL-5.

Outcomes Measures Measurement

The outcome measure for this study was based on symptoms of post-traumatic stress. This fits with the theoretical framework in that post traumatic stress due to traumatic event represents a dysfunctional reintegration after traumatic event, and this correlates to decreased overall resilience. With this in mind, a tool used to assess for symptoms of PTSD, the PCL-5 was used. The patients in this study have not been formally diagnosed with PTSD. It is possible that the patients would not meet criteria or would meet criteria for ASD. However, the similarity in the symptomatology and lack of widely available ASD screening instruments necessitates the use of a PTSD screen.

Instruments

Quantifying the symptoms of post-traumatic stress requires a sensitive and accurate screening tool to avoid missing or misdiagnosing patients. In the field of screening tools used to assess for the symptoms of this disorder the PTSD checklist 5 (PCL-5) is widely used. It has been in use since its inception at the National Center for PTSD in 1990 (Blevins et al., 2015). The PCL-5 is a twenty-question self-report checklist that utilizes the DSM 5 PTSD criteria as a guide in the formulation of each item. The most recent revision based on the DSM 5 criteria was developed in 2010 (Blevins, 2015). The questions ask the patient to rate each statement on a scale from 0-4. Higher scores indicate greater severity of symptoms. There is a generally agreed upon minimum threshold score of thirty-three to diagnose PTSD (Reyes et al., 2022). Reyes et al. (2022) deployed the PCL-5 in their study on the effects of an internet-based mindfulness app on adult patients with a history of PTSD diagnosis. Their study utilized a decrease in the

symptoms of PTSD as one of the dependent variables, and for the purpose of measuring this phenomenon the study authors felt that the PCL-5 was an ideal choice.

Blevins et al (2015) have written about and analyzed the psychometric properties of the PCL-5. To accomplish their analysis two separate studies were employed. Both studies looked at the PCL-5's psychometric properties in a population of trauma exposed college aged adults. Of relevance to the ongoing DNP project for which this instrument will be deployed, is the fact that the most frequent trauma that the adults were exposed to in the sample of both studies was automobile accidents. This type of traumatic event is a frequent source of post-traumatic stress at the pain clinic that is the setting for the DNP project. When considering the validity and reliability of the PCL-5 it was noted to have convergent (rs= 0.74-0.85) and discriminant (rs= 0.31-0.60) reliability. Indicating that the PCL-5 produces similar outcomes to other validated tools and measures a distinct phenomenon. Further the PCL-5 demonstrates strong internal consistency (α=0.94) and test/retest reliability (r=0.82). Additionally, there was strong correlative consistency with the responses from previous versions of the PCL (Blevins, 2015).

Data Analysis and Plan

Descriptive statistics were used to describe the sample and outcome variables. Inferential statistics for this project incorporated the paired t-test. Data analysis was accomplished with the assistance of the Intellectus statistics software.

Budget

Direct Costs

Direct costs associated with the implementation of the intervention included the formulation and printing of materials, the procurement of asynchronous exercises, and the purchase of journals and pens for the participants. There were significant costs associated with

shipping the journals to and from study participants. Also, included in this section of the budget is the time to create materials and curricula, teach the information, and analyze the data (see Appendix C).

Indirect Costs

Indirect costs, the costs associated with the issue being addressed, include the lost productivity from the subjects suffering from post-traumatic stress. Also, the inefficiency in the clinic related to the hypothesized decreased productivity associated with caring for these patients. However, additional cost benefit analysis could further illuminate the reduced costs to the clinic.

Funding

This project was self-funded. In the future if this practice change is continued the clinic could choose to provide funding due to the potential for long term impacts on their costs and efficiency. Another option would be to seek a grant or other external funding source.

Revenue/Cost Savings

The indirect costs to the clinic of the challenges related to patients with co-occurring post-traumatic stress remain largely unquantified. However, additional cost benefit analysis would shed more light on the current budget impacts related to this patient group. Given that there is an association with the genesis of chronic pain and PTSD the data supports the supposition that there is some level of impact. Further, given the impact that mindfulness has on decreasing the symptoms of post-traumatic stress it is reasonable to assume that this intervention will improve costs in this area. Finally, because the cost implementing the project, at this stage, is relatively small, there is a potential for significant revenue generation. While this revenue will

not be immediately tangible it should be possible to quantify it using data on clinical costs before and after implementation of the intervention.

Sustainability

Initiating a practice change to improve patient outcomes is a challenging endeavor. However, sustaining the practice change, in a manner that allows for growth of the intervention, while remaining adherent to the evidence base that supported the change in the first place, is an equally daunting task. Some planning for the sustainability of the mindfulness course were necessary to prevent unwanted surprises at the conclusion of the initial project.

In the setting of the pain clinic where the initial project took place, the site champion was appropriate due to their role in the design of the intervention. For this project, the nurse practitioner served as the initial point of contact with the patients. Further, they were the vanguard of the project as they were responsible for screening the patients as well as promoting the intervention.

At the conclusion of the project the site retained the printed materials formulated to recruit patients and obtain informed consent. Additionally, any educational materials remained with the clinic. These included printed education materials from the live session and the suite of asynchronous web-based mindfulness exercises. Finally, detailed instructions on how to conduct the live session were provided so that the session could be delivered in a standardized way

Results

Quantitative Results

Descriptive statistics were used to describe the sample and outcome variables. Inferential statistics for this project incorporated the paired t-test. A two tailed test was run and the *p* value was set at less than 0.05. Data analysis was accomplished with the assistance of the Intellectus

statistics software for analysis and data storage. The PCL-5 was administered prior to the intervention and after the two week independent practice period. Any missing data was analyzed using intent to treat (Armijo-Olivo et al, 2009). Of the participants that signed consents to participate in the study six (n=6) individuals completed the entire intervention. The average of the sample was 48 (SD= 10.57). The ages of participants ranged from 36 to 63 years of age. The most frequently observed category of Gender was Female (*n* = 5, 83.33%). The most frequently observed category of Ethnicity was Caucasian (*n* = 4, 66.67%). The most frequently observed category of Insurance was Private (*n* = 5, 83.33%). Frequencies and percentages are presented in Table 1.

Table 1

Frequency Table for Nominal and Ordinal Variables

Variable	*n*	*%*
Gender		
Male	1	16.67
Female	5	83.33
Missing	0	0.00
Ethnicity		
Caucasian	4	66.67
Hispanic	2	33.33
Missing	0	0.00
Insurance		
Private	5	83.33
No Insurance	1	16.67

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

As mentioned previously, the PCL-5 is 20 question self-administered screening tool. The questions mirror the DSM-5 criteria for PTSD. Items are scored 0 to 4 with higher scores indicating greater severity of symptoms. The observations for Pre-Intervention had an average of 28.83 (*SD* = 10.34, Min = 16.00, Max = 47.00). The observations for Post-Intervention had an

average of 17.13 (*SD* = 8.69, Min = 9.00, Max = 31.00). 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-Intervention	28.83	10.34	6	16.00	47.00
Post-Intervention	17.13	8.69	6	9.00	31.00

Note. '-' indicates the statistic is undefined due to constant data or an insufficient sample size.

Additionally, a two tailed paired samples *t*-test was conducted to examine whether the mean difference of Pre-Intervention and Post Intervention was significantly different from zero. The result of the two-tailed paired samples *t*-test was significant based on an alpha value of .05, $t(5) = 5.61$, $p = .002$, indicating the null hypothesis can be rejected. This finding suggests the difference in the mean of Pre-Intervention and the mean of Post-Intervention was significantly different from zero. The mean of Pre-Intervention was significantly higher than the mean of Post Intervention. The results are presented in Table 4. A bar plot of the means is presented in Figure 1 (Intellectus Software, 2023).

Table 4

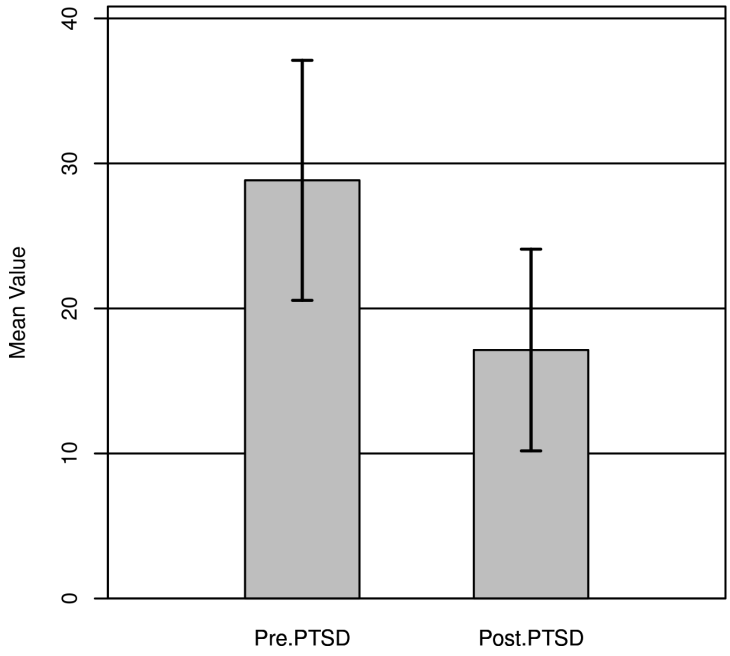
Two-Tailed Paired Samples t-Test for the Difference Between Pre.PTSD and Post.PTSD

Pre.PTSD		Post.PTSD				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
28.83	10.34	17.13	8.69	5.61	.002	2.29

Note. N = 6. Degrees of Freedom for the *t*-statistic = 5. *d* represents Cohen's *d*.

Figure 1

The means of Pre.PTSD and Post.PTSD with 95.00% CI Error Bars



Qualitative Results

Each of the six participants were given a journal to record their thoughts on the experience of mindfulness and its impact on their symptoms and daily life. Based on the reading of the journals some common themes were noted. Patients reported experiences that fell into four general domains: insights into their trauma, increased patience, improved relationships, and negative perceptions associated with meditation practice.

One participant noted " It helps so much not have things constantly moving in your head." Another chose to meditate in the midst of a tough time and wrote "I heard a news story that set me down on this negative line of thought and I was getting upset, and like I do with my meditation, I recognized the emotion. I noted that it did not serve me and moved on, and that was it." While most of the journal entries were positive some reflected the challenges associated with

sustaining a mindfulness practice. One participant wrote “I enjoy the meditations, but I wish I didn’t get so tired. It can be a challenge to stay awake for a full session at times.” However, in general the participants noted increased patience and awareness, as well as decreased symptoms associated with their post-traumatic stress.

Discussion

Summary of Findings

The results of this study demonstrated a statistically significant reduction in the symptoms of post-traumatic stress and a large effect size for the intervention. This decrease in symptoms was reflected in the qualitative results collected from the patient’s journals. The use of a mindfulness intervention of brief duration can be effective in the reduction of symptoms for those suffering from post-traumatic stress. This concept is consistent with what has been reported in other studies about the efficacy of brief duration mindfulness interventions (Bloom-Foster & Mehl-Madrona, 2020).

Limitations and Barriers

Limitations of this study include the length of the intervention. One of the challenges associated with mindfulness is the effort required to sustain the practice over time and the duration of this study didn’t allow for long term follow up of participants. Another limitation revolves around the small sample size. This coupled with the relative homogeneity of the sample limits the generalizability of the results. Finally, the support inherent in the way the intervention was delivered could represent a confounding factor. The understanding of social support and its enhancing effect on the efficacy of clinical interventions is not a new concept (Caron & Guay, 2005). In this instance the synchronous class was structured in a supportive manner and supportive emails were sent to the participants at the beginning, middle, and end of the

independent practice period. It is possible that some of the efficacy observed and attributed to the intervention is the result of this phenomenon.

Indications for future study would include a longer practice period with a larger sample size wherein the challenges of adherence could be more fully assessed. Additionally, using two cohorts with different styles of implementation on the part of the individual delivering the content would be useful to assess whether the level of support in the content delivery playsa role in the efficacy of the intervention.

Conclusion

In a chaotic world traumatic events are inevitable. For those that suffer the protracted effects associated with post-traumatic stress, a bevy of complications can have a deleterious effect on their life course. Mindfulness is a viable intervention to facilitate recovery from post-traumatic stress, and due to its efficacy and minimal risk ought to be disseminated widely as a treatment option.

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Appendix A
Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Bagheri et al., (2021), Adding Mindfulness Practice to Exercise Therapy for Female Recreational Runners with Patellofemoral Pain: A Randomized Controlled Trial **Country:** Iran, UK, USA **Funding:** Research university study from Iran.	Self Efficacy Theory is implied	**Design:** RCT **Purpose:** To determine the efficacy of an 8-week mindfulness intervention in conjunction with exercise therapy for female runners with patellofemoral pain	**N= 30** **Demographics:** Recreational female runners. Mean age 28. **Setting:** University lab **Exclusion:** Intraarticular condition, lower limb injury, hx of dislocation, knee surg, Osgood Schlatter syndrome, Sinding Larsen	**IV1:** Mindfulness and exercise rehab **DV1:** Knee pain **DV2:** Knee function **DV3:** Pain Catastrophizing	**Tools:** Visual Analog Pain Scale, KOS Sports activities scale and KOS ADL's scale used to assess function, Global Rating Change Scale, Tampa Scale of Kinesiophobia, Pain Catastrophizing scale, Coping Strategies Questionnaire **Validity/**	**Statistical Tests Used:** Shapriro-Wilk and Levene tests Mixed model analysis of variance Repeated measures factor on dependent variables Pair wise comparisons with the	**DV1:** Pain decreased sig greater for mindfulness group. **DV2:** Greater improvement in knee function seen in mindfulness group. **DV3:** Pain catastrophizing decreased in intervention group but not in control group	**Level of Evidence:** RCT = level 2 **Strengths:** RCT, statistical sig of intervention on DV's, **Weakness:** sample demo and size limit generalizability, limited control on pain medications utilized by participants

Key: **PTSD**: post-traumatic stress disorder, **RCT**: randomized controlled trial, **MA**: meta-analysis, **CAPS**: clinical administered PTSD scale, **PCL**: PTSD check list, **TAU**: treatment as usual, **KOS ADL**: knee outcome survey activities of daily living, **MBSR**: mindfulness based stress reduction, **PCGT**: patient centered group therapy, **FFMQ**: five facet mindfulness questionnaire, **PHQ 9**: patient health questionnaire, BPI: brief pain inventory, **HADS**: hospital anxiety and depression scale, **MAAS**: mindful attention awareness scale, **AAQ-II**: acceptance and action questionnaire, **RSS**: rumination response scale, **CES-D**: center for epidemiological studies depression scale, **STAI**: state trait anxiety inventory, **BMM**: brief mindfulness meditation, **WHO 5**: WHO wellbeing index. **DTS**: Davidson trauma scale

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Bias: University study probably minimal financial bias			syndrome, effusion, **Attrition:** 1 of 30 dropped out d/t illness		**Reliability:** Generally reliable and valid, GRoC has been found to be unreliable and not temporally stable	Bonferroni correction Sig at .05		**Feasibility:** Yes feasible **Application:** Demonstrates the applicability of mindfulness to the treatment of pain and injury.
Liu et al., (2022), 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	Health belief Model is implied	**Design:** Meta analysis of nine RCTs **Purpose:** To examine the efficacy of MBSR for PTSD symptom reduction	**N= 646** **Demographics:** Veterans (6 studies), Intimate partner violence victims (2 studies), Survivors of traffic accidents (1 study) **Setting:** Various **Exclusion:** 137 studies excluded	**IV1:** MBSR **DV1:** Post-traumatic stress disorder symptoms **Definitions:** PTSD symptoms defined by the criteria in the screening tool used for each study.	**Tools:** CAPS, PCL-C, PSSI PCL-5 **Validity/ Reliability:** CAPS: structured interview, strong interrater reliability, extensively validated PCL C and 5: self-report checklist excellent test/re-test reliability,	**Statistical Tests Used:** sensitivity analysis to remove outliers, random effects model, Cohens D, funnel plots for risk of publication bias	**DV1:** Significant effect was found between the MBSR groups in. the included studies and the TAU groups on PTSD symptoms.	**Level of Evidence:** Meta analysis level 1 **Strengths:** MA of only RCTs **Weakness:** Compression and adaptation of the training cycle, length of MBSR at 8 weeks, lack of pre-registered protocol

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Funding: National Social Science Fund of China **Bias:** Funding secured by a government grant			due to duplication, non – RCT studies excluded, lack of adherence to MBSR curriculum, **Attrition:** N/A		high internal consistency PSSI: semi structured interview, demonstrated reliability with three PTSD tools including the CAPS 5			**Feasibility:** Yes **Application:** Demonstrates the efficacy of MBSR in the treatment of PTSD from a variety of sources.
Davis et al, (2018). A multisite randomized controlled trial of mindfulness based stress reduction in the treatment of post-traumatic stress disorder Country: USA	Self efficacy theory is implied	**Design: RCT** **Purpose: To compare the efficacy of MBSR against PCGT**	N= 214 Demographics: Veterans with a diagnosis of PTSD, aged 19-65 years, CAPS 5 score > 45 Setting: VA medical cetners across the Southeastern US	**IV 1: MBSR** **IV 2: PCGT** **DV1 PTSD symptoms,** **DV2: Inherent mindfulness** **DV3: Depression**	Tools: CAPS sub scales: IV, B,C,D PCL FFMQ PHQ-9 Validity and Reliability: CAPS: structured interview, strong interrater reliability, extensively validated	Statistical Test Used: T tests for continuous demographic variables, Wilcoxan tests for ordinal, chi squared for categorical	**DV 1: PTSD CAPS IV: No sig diff PCL: sig difference in favor of MBSR** **DV2: FFMQ scores correlated to decreases in CAPS IV scores between groups**	**LOE: RCT level 2** **Demonstrates efficacy of both interventions. Postulates that MBSR should be utilized in the presence of additional trauma focused therapies.**

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Funding: Most likely funded by the VA Bias: Limited possible bias as this was funded by gov and academic institutions			Exclusion: SUD, BD, Schizophrenia, SA, DTS,DTO, psychosis, unstable/severe medical condition, changing dose of pain medications, receiving concurrent therapy elsewhere Attrition: MBSR group had 68% completion rate PCGT 88% completion		PCL: 17 item self report checklist excellent test/re-test reliability, high internal consistency FFMQ: 39 item questionnaire assessing measures of mindfulness, high validity and reliability PHQ-9: 9 item questionnaire	Cohens D 95%CI Linear regression to compare MBSR and PCGT	**DV 3: PHQ9: reduction between arms occurred at similar rates** **Overall effect size for MBSR -0.34**	**Generalizability;** **Study is applicable to adults, primarily male, who have suffered trauma**

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Miller-Matero et al., (2019). A brief mindfulness intervention for medically hospitalized patients with acute pain: A pilot randomized clinical trial. Country: USA Funding: Henry Ford Health System Bias: Potential bias relative to the organizational objectives of the Henry Ford Health System	Mindfulness to meaning theory is implied	**Design Pilot RCT** **Purpose: To explore the efficacy of a brief mindfulness intervention on acute pain**	N= 60 Demographics Hospitalized adults, median age 55, various etiologies precipitating hospital admission. Setting: Inpatient hospital unit Exclusions: opioid use in last three months, cognitive difficulties, communication barriers, previous mindfulness experience, psychosis, traumatic stress Attrition	**IV1:** 10 min mindfulness training IV2: Educational training on gate control pain theory **DV1:** Pain **DV2:** Stress	**Tools:** BPI, Stress rating scale from 1-10 **Validity/ Reliability:** **BPI:** Widely used pain rating scale with applications for multiple types of pain. Strong test re-test reliability. **Stress:** in the assessment of stress related to acute pain a 1-10 stress assessment has demonstrated validity and reliability.	**Statistical Tests Used:** Independent Samples T-Tests Paired samples t tests Cohens d effect sizes	**DV1:** Pain reduced but not sig diff between groups. **DV2:** statistically significant reduction in stress for mindfulness group compared to control group. **:**	**Level of Evidence**: RCT = Level 2 **Strengths**: Demonstrates the efficacy of brief interventions. Compared to an actual intervention not just waitlist. **Weakness**: small sample size, diverse conditions as confounding factor, lack of statistical separation from control on pain **Feasibility**: yes **Application**: Significant application for time

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Citation	**Theoretical/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Variables**	**Measurement/ Instrumentation**	**Data Analysis**	**Results/ Findings**	**Level of Evidence; Application to practice; Generalization**
								limited circumstances
Hearn et al., (2019). Efficacy of internet delivered mindfulness for improving depression in caregivers of people with spinal cord injuries and chronic neuropathic pain: A randomized controlled feasibility trial **Country**: UK	Self efficacy theory is implied.	**Design:** RCT **Purpose:** To assess the efficacy of an internet delivered mindfulness program.	**N= 55** **Demographics:** Adults in their mid 40's, mix of both genders who are caregivers for individuals with spinal cord injury **Setting:** Community Setting **Exclusion:** cognitive impairment, mental illness, head injury, language barrier, previous mindfulness practice	**IV1:** Internet based Mindfulness Course IV2: Weekly email with psychoeducational materials **DV1:** Anxiety and depression **DV2:** Quality of life	**Tools:** HADS, QOL, FFMQ **Validity/ Reliability:** HADS: reliable across clinical and non-clinical populations QOL: validity across multiple domains Cronbach's alpha 0.55-0.87 FFMQ: good psychometric qualities including reliability.	**Statistical Tests Used:** Significance set at P<0.5 Multiple univariate analyses of covariances	**DV1:** Significant improvement in anxiety and depression over control **DV2: Significant improvement in some aspects of QOL**	**Level of Evidence**: RCT = level 2 **Strengths**: Variable sample size, results demonstrate statistically significant superiority of the intervention over the control **Weakness**: small sample size, niche group of people studied, high attrition rate **Feasibility**: Less than other studies

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Funding: University medical study in the UK **Bias**: None listed			**Attrition: 47%**					due to length of intervention **Application**: Less potential application due to niche group being studied
Reyes et al., (2020). Testing the acceptability and initial efficacy of a smartphone app mindfulness intervention for college student veterans **Country**:USA **Funding**: Not explicitly stated.	None explicitly mentioned but the health belief model is implied	**Design:** Single Arm Feasibility Study **Purpose:** Evaluate the acceptability and efficacy of a mindfulness app for the treatement of PTSD	**N= 23** **Demographics:** Male and female college students between 23 and 42. Mean age 31.22. **Setting:** college campuses **Exclusion:** No exposure to traumatic events,	**IV1:** Mindfulness app **DV1:** Resilience **DV2:** Avoidance **DV3:** Mindfulness **DV4:** PTSD symptoms **DV5:** Rumination	**Tools:** PCL-5, MAAS, AAQ-II, RSS **Validity/ Reliability:** PCL-5: Discussed previously MAAS: good internal consistency, strong test/re-test reliability	**Statistical Tests Used:** Generalized estimated equation (GEE) models used to evaluate efficacy of the app, resilience, rumination as compared across three assessment points.	**DV1:** Statistically significant increase **DV2:** Statistically significant decrease **DV3:** Statistically significant increase **DV4:** Statistically	**Level of Evidence**: Level 3 **Strengths**: statistically significant results, feasible intervention with a low attrition rate, demonstrates increases in multiple dependent variables **Weakness**: Not an RCT therefore lower quality of

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Study conducted at UNLV **Bias**: Authors don't explicitly list financial conflicts that would bias the results.			lack of PTSD symptoms **Attrition:** one participant withdrew		AAQ-II: good internal consistency, strong test/re-test reliability RSS: good internal consistency		significant decrease **DV5:** Statistically significant decrease	evidence, small sample size **Feasibility**: Highly feasible, low attrition, easily accessible **Application**: Demonstrates the acceptability of phone/online based interventions.
Wu et al., (2019), Brief mindfulness meditation improves emotion processing **Country**: China **Funding**: Study funded by the	Self efficacy theory is implied	**Design:** RCT **Purpose:** To test the effect of a brief mindfulness meditation (BMM) intervention on emotional processing and	**N=** 46 **Demographics:** Adults between the ages of 18-25, **Setting:** **Exclusion:** Mental or physical illness of	**IV1:** BMM group **IV2:** Emotional Regulation Education (ERE) **DV1:** Depression **DV2:** Anxiety **DV3:** Emotional intensity	**Tools:** CES-D, STAI **Validity/ Reliability:** CES-D: validated for Chinese young adults STAI: validated as a good	**Statistical Tests Used:** Mood state and emotional processing: independent t-test to test intergroup difference	**DV1:** No significant difference between groups **DV2:** No significant difference between groups **DV3:** Significant	**Level of Evidence**: RCT Level 2 **Strengths**: RCT, Significant effects on emotional processing, brevity of the intervention **Weakness**: sample consists of healthy

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Military Medical Research Project and the Shanghai Philosophy and Social Science Project **Bias**: Possible bias related to the military funding		mood on healthy college students.	any type, major life event within the last month, depression, previous meditation experience, failure to participate in all the sessions **Attrition:** 4/46	**DV4:** Emotional memory **DV5:** Emotional attention bias **Definitions:** Emotional attention bias: the weight given to faces displaying negative and positive emotions BMM: 15 minute vipassana based meditation session utilized once a day for seven days	psychometric index	Pre/post intervention intragroup differences: dependent sample t-test Sig= 0.05	intergroup and pre post differences in emotional intensity **DV4:** Significantly faster emotional memory time observed in BMM group **DV5:** Decreased negative attention bias seen in BMM group	adults, CES-D validated with Chinese pop. only, lack of statistical sig on emotional state between IV 1 and 2 groups, **Feasibility**: Increased due to short intervention **Application**: demonstrates the efficacy of a brief intervention to affect emotional processing
Bloom Foster & Mehl-Madrona (2020), An ultra brief mindfulness-based	None explicitly mentioned but the health belief model applies	**Design:** prospective feasibility single group cohort pilot study	**N=** 40 **Demographics:** Median age 32, 62% female,	**IV1:** BMM **DV1:** Feasibility /Acceptability	**Tools:** none used for this study **Validity/ Reliability:**	**Statistical Tests Used:** Chi squared to compare proportion of	**DV1:** Feasibility demonstrated via sustained enrollment and post	**Level of Evidence**: Cohort study Level IV

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
intervention for patients in treatment for opioid addiction with buprenorphine: A primary care feasibility study **Country**: USA **Funding**: AAFP grant **Bias**: No conflicts reported by authors		Mixed methods study **Purpose:** To demonstrate the feasibility and efficacy of a single session mindfulness training	receiving MAT services for OUD **Setting:** Community clinic **Exclusion:** Not receiving MAT services, not early in recovery process. **Attrition:** 10 patients relapsed but stayed in the study 3 left treatment for reasons other than relapse	**DV2:** Intervention behavior uptake. Measured as number of sessions independently initiated at home **DV3:** Relapse rates **State type used.** Interrater reliability **Major Themes Studied:** Challenges/barriers to practice, common general positive themes from post study interviews		relapse between high and low volume practice groups	intervention surveys **DV2:** Rose in aggregate over the course of the study **DV3:** Greater frequency of at home mindfulness practice associated with decreased risk of relapse	**Strengths**: Mixed methods study provides a glimpse into the experiences of the participants, demonstrates the efficacy of BMM in this context **Weakness**: Pilot study, OUD patients, not an RCT, **Feasibility**: Due to short length of intervention this feasible **Application**: BMM could be used well tolerated by participants

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Müller-Engelmann et al., (2019), A trauma-adapted mindfulness and loving-kindness intervention for patients with PTSD after interpersonal violence: a multiple-baseline study **Country**: Germany **Funding**: Supported by a grant from Angelika Küspert - Acclivio GmbH **Bias**: No financial bias reported by authors. No	Mindfulness to meaning theory is implied	**Design:** Single Cohort Multiple Baseline **Purpose:** Assessing the effects of a MBSR based loving kindness intervention on PTSD symptoms related to IPV	**N= 14** **Demographics:** 11 women, 3 men, avg age 41.14 **Setting:** **Exclusion:** current psychotherapy, dx of schizophrenia, schizoaffective d/o, BD, BMI < 17.5, acute suicidality, life threatening self injurious behaviors in last year, SUD, danger to others **Attrition:** 2 participants	**IV1:** Mindfulness and loving kindness meditation intervention **DV1:** PTSD symptoms **DV2:** Well being **DV3:** Depressive symptoms **DV4:** Mindfulness skills **DV5:** Self compassion	**Tools:** CAPS-5, self report: DTS WHO 5 FFMQ BDI **Validity/ Reliability:** Tools used demonstrated good psychometric qualities including internal consistency, inter rater reliability, and convergent/ discriminant reality.	**Statistical Tests Used:** Cronbach's Alpha, Tau-U analysis, t Tests and repeated measures MANOVA, Pearson correlation	**DV1:** Statistically significant reduction **DV2:** Significant increase **DV3:** Significant reduction **DV4:** Inverse relationship noted to DV1 **DV5:** Non statistically significant increase	**Level of Evidence**: Quasi experimental level 3 **Strengths**: Demonstrates efficacy across multiple domains, slightly abbreviated treatment length **Weakness**: Small sample size, lack of generalizability **Feasibility**: somewhat feasible due to intensity of intervention. **Application**: Intervention and population are relevant

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
obvious funding bias noted								
Shapira et al., (2022), Biomarker response to mindfulness intervention in veterans diagnosed with posttraumatic stress disorder **Country**: USA **Funding**: VA Office of Clinical Science Research **Bias**: none declared	Self efficacy theory implied	**Design:** RCT/ post hoc analysis **Purpose:** To determine the effect of a mindfulness based intervention on levels of circulating stress hormones in veterans with PTSD	**N=** 210 **Demographics:** Largely male sample 84%, age 55 **Setting:** VA medical center **Exclusion:** DTO, psychosis, SUD, BD, serious cognitive d/o, unstable medical condition **Attrition:**	**IV1:** MBSR **IV2:** PCGT **DV1:** Biomarkers: cortisol, IL-6, CRP **DV2:** PTSD **DV3:** Mindfulness **DV4:** Depression	**Tools:** CAPS-4 PCL, FFMQ, PHQ-9, **Validity/ Reliability:** Tests utilized for this study have been psychometrically validated as valid and reliable.	**Statistical Tests Used:** Mixed effects linear regression analysis for intergroup comparison	**DV1:** Cortisol: inverse relationship to PTSD symptoms. Less increase in MBSR CRP/IL6: No intergroup difference **DV2:** Significant improvement in PTSD compared to control **DV3:** Significant increase in mindfulness	**Level of Evidence**: RCT level 2 **Strengths**: RCT with active control, large sample size, biomarker analysis adds information on mechanism of effect **Weakness**: potential limits on generalizability due to sample being veterans **Feasibility**: Generally not very feasible

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
							DV4: significant decrease in depressive symptoms	**Application**: Relative inclusion based on the new mechanistic information provided by the results

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Table A2

Synthesis Table

Study (Author, year)	Bagheri et al., 2021	Bloom-Foster 2020	Davis et al., 2018	Hearn et al., 2019	Liu et al., 2022	Miller-Matero et al., 2019	Muller- et al., 2019	Reyes et al., 2020	Shapira et al.,2022	Wu et al., 2019
Design	RCT	SGCS	RCT	RCT	Meta Analysis	RCT	SCMB	SAFS	RCT	RCT
LOE	2	4	2	2	1	2	3	3	2	2
Sample										
n subjects	30	40	214	55	646	60	14	23	210	46
M-Age	28	32	19-65	44	Middle age	55	41.14	31.22	55	21.64
M/F%	0/100	48/62	83/17	52/43	Mostly male	50/50	27/73	60/40	84/16	24/76
Veterans			X		Some			X	X	
Setting										
Country	Iran	USA	USA	UK	Various	USA	Germany	USA	USA	China
Setting	University lab	Outpatient MAT clinic	VA Medical centers	Home	Various	Inpatient surgical unit	Outpatient clinic	University campus	VA Medical center	University campus
Screening Tools										
	VAPS, KOS-SA, KOS ADL's, GRCS, TSK, CSQ	None	CAPS – 4, PCL, FFMQ, PHQ-9	HADS, QOL, FFMQ	CAPS-5, PCL, PSSI	BPI, Stress rating scale	CAPS-5, DTS, WHO 5, FFMQ, BDI	PCL, MAAS, AAQ-11, RSS	CAPS-4, PCL, FFMQ, PHQ-9	CES-D, STAI
Interventions										
MBSR	X		X		X				X	
BMM		X				X				X
Mindfulness Course				X				X		
Mindfulness/LKM							X			
Exercise	X									
PCGT			X						X	
Educational Training				X						X

SAFS: single arm feasibility study, **SGC**S: single group cohort study, **SCMB**: single cohort multiple baseline, **RCT**: randomized controlled trial, **MBSR**: mindfulness based stress reduction, **BMM**: brief mindfulness meditation, **LKM**: loving kindness meditation, **PCGT**: person centered group therapy, **IBM**: inflammatory bio markers, **IBU**: intervention behavior uptake, **VAPS**: visual analog pain scale, **KOS-SA**: sports activities scale, **KOS ADLs**: activities of daily living scale, **GRCS**: global rating change scale, **TSK**: Tampa scale of kineseophobia, **CSQ**: coping strategies questionnaire, **FFMQ**: five facet mindfulness questionnaire, **PHQ 9:** patient health questionnaire, **BPI**: brief pain inventory, **HADS**: hospital anxiety and depression scale, **MAAS**: mindful attention awareness scale, **AAQ-II**: acceptance and action questionnaire, **RSS**: rumination response scale, **CES-D:** center for epidemiological studies depression scale, **STAI**: state trait anxiety inventory,

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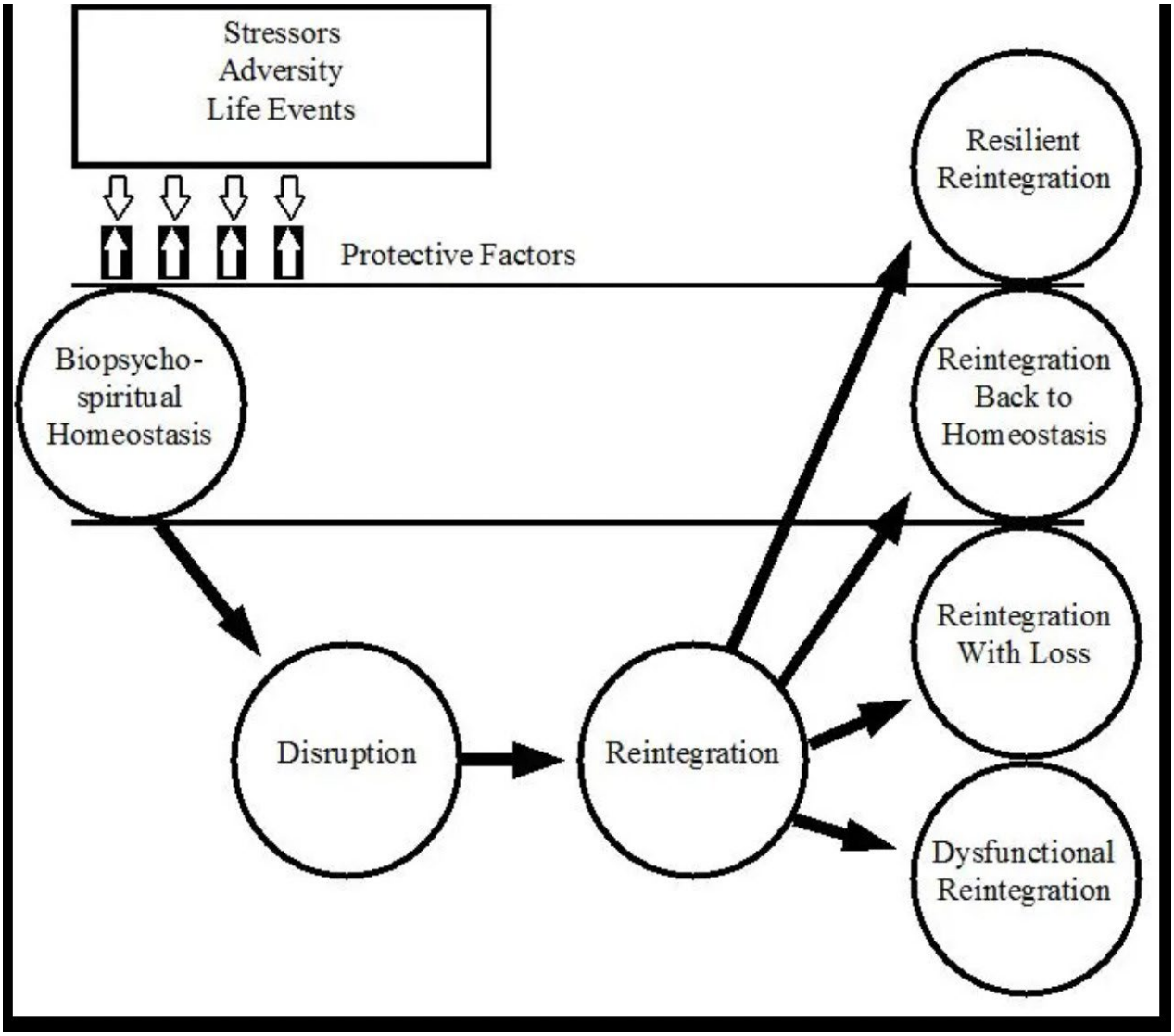
Outcomes/ Themes- Red Arrow = Statistically Significant Effect ; X = Not Statistically Significant										
Pain	▼					X				
Stress						▼				
Catastrophizing	▼									
PTSD			▼		▼		▼	▼	▼	
Mindfulness	▲		▲				▲	▲	▲	
Depression			X	▼			▼		▼	X
Anxiety				▼						X
Quality of Life				X			▲			
Resilience								▲		
Avoidance								▼		
Rumination								X		
Emotional Intensity										▼
Emotional Memory										▲
Emotional Attention Bias										▲
Feasibility		X								
IBU		▲								
Relapse Rate		▼								
Self Compassion							X			
Inflammatory Bio Markers									X	

SAFS: single arm feasibility study, **SGCS**: single group cohort study, **SCMB**: single cohort multiple baseline, **RCT**: randomized controlled trial, **MBSR**: mindfulness based stress reduction, **BMM**: brief mindfulness meditation, **LKM**: loving kindness meditation, **PCGT**: person centered group therapy, **IBM**: inflammatory bio markers, **IBU**: intervention behavior uptake, **VAPS**: visual analog pain scale, **KOS-SA**: sports activities scale, **KOS ADLs**: activities of daily living scale, **GRCS**: global rating change scale, **TSK**: Tampa scale of kineseophobia, **CSQ**: coping strategies questionnaire, **FFMQ**: five facet mindfulness questionnaire, **PHQ 9:** patient health questionnaire, **BPI**: brief pain inventory, **HADS**: hospital anxiety and depression scale, **MAAS**: mindful attention awareness scale, **AAQ-II**: acceptance and action questionnaire, **RSS**: rumination response scale, **CES-D:** center for epidemiological studies depression scale, **STAI**: state trait anxiety inventory,

Appendix B
Models and Frameworks

Figure B1

Richardson's Metatheory of Resilience and Resiliency Model

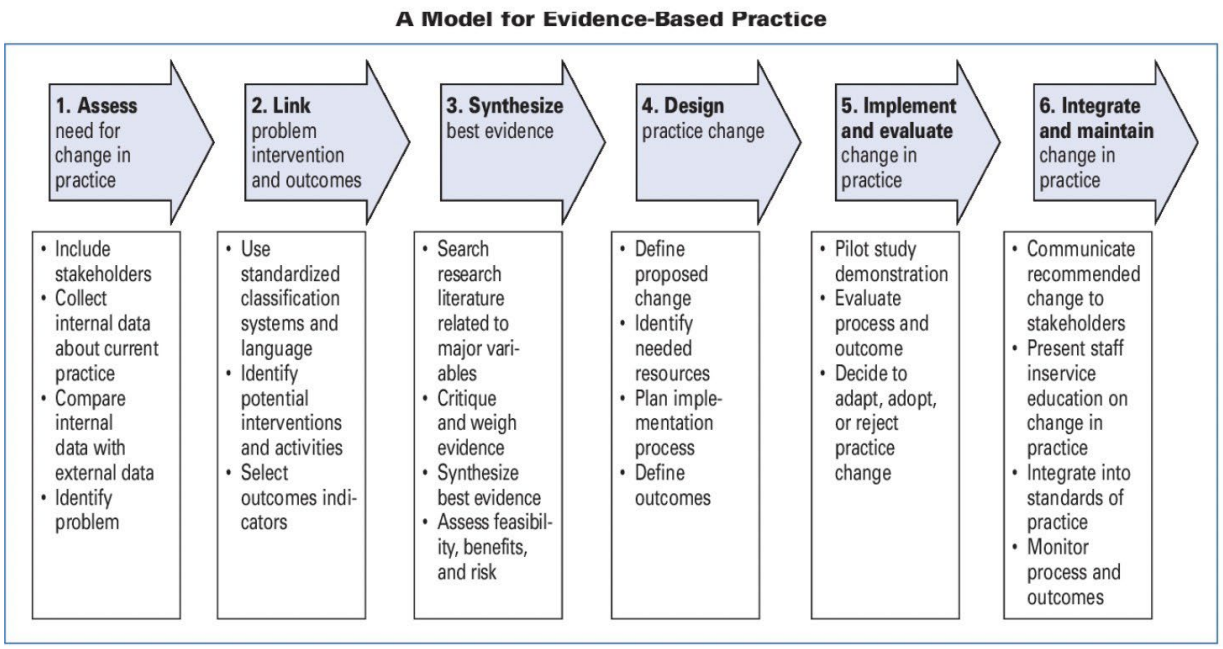


Most people exist in biopsychospiritual homeostasis untill acted upon by an outside stressor. There are protective factors that buffer them in these instances but when those factors fail they move to a state of disruption. Utlizing the three stages of resilience leads to reintegration which can have several potential otucomes, as depicted on the right, that either increase or decrease a patient's overall funcitioning.

(Richardson, 2002)

Figure B2

Rosswurm and Larrabee Model for Evidence Based Practice



A depriction of the six stages of the Rosswurm and Larrabee Model

(Rosswurm & Larrabee, 1999)

Appendix C
Project Budget Table

Phase	Activities	Cost	subtotal	Total
Preparation	Design and print consents, promotional fliers (approx. 50 of ea)	$100		
	Creation of in person session curriculum @ $20/hr	$60		
	Suite of asynchronous materials -Cost of Insight Timer Member Plus Membership	$60		
	Purchase mindfulness journals and pens	$25	**$245**	
Delivery	Time to deliver in person session @ $20/hr	$20		
	Time for weekly check in with participants @ $20/hr	$20		
	Incentives for participants $10 gift card for 20 participants	$200	**$240**	

Evaluation	Time to administer the PCL-5 @ $20/hr	$40		
	Review and analysis of results (10hrs@20/hr)	$200	**$240**	**$725**