Evaluating the Effect of a Multimodal Residential Program for Treatment of Opioid Use Disorder on Chronic Pain Acceptance: A Feasibility Project

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Abstract

Opioid overdose is now the leading cause of unintentional injury related mortality in the U.S. with two people dying each day as a result of opioid overdose in Arizona. Among patients treated for opioid use disorder, chronic pain is frequently cited as the reason for opioid use. Treatment of chronic pain with long-term use of opioids is linked to increased medication tolerance, worsened pain sensitivity, and psychological symptoms. Acceptance of chronic pain is the individual's ability to be willing to endure pain and their ability and willingness to participate in activities despite experiencing chronic pain. Increased acceptance of chronic pain has been shown to lower pain intensity, promote recovery of individuals' emotional and physical abilities, and lessen use of pain medication including opioids. **Purpose:** The purpose of this evidence-based practice project was to examine the feasibility of using acceptance of chronic pain, pain severity, and pain interference as measures to evaluate the effectiveness of a multimodal residential treatment program for opioid abuse. **Methods:** Two surveys, the CPAQ and BPI were administered shortly after admission (T1) and after 21-25 days (T2) to evaluate project feasibility. **Results:** Six participants were enrolled. Three participants completed T1 and T2 surveys. Three participants were lost to follow-up. Mean scores for Chronic Pain Acceptance were T1 = 79 (SD = 17.0) and T2 = 78.67 (SD = 5.0). All surveys were easy to administer and participants answered all questions. **Conclusion**: Chronic pain acceptance may be a feasible and meaningful measure with which to evaluate residential treatment programs. Further research is needed to evaluate acceptance of chronic pain with long-term opioid abstinence and overdose deaths.

keywords: chronic pain, chronic pain acceptance, residential, tailored treatment, opioid, opioid analgesic, opioid use disorder, mindfulness, medication assisted treatment

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Introduction

Opioid overdose has increased at an alarming rate over the past decade with the Centers for Disease Control and Prevention (CDC) now calling it an epidemic. Between 1999 to 2014, 165,000 opioid overdose deaths occurred with an increase of 21.4% opioid overdoses occurring between 2015 to 2016 (CDC, 2016; Scholl et al., 2018). In Arizona, two people die per day as a result of opioid overdose according to the Arizona Department of Health and Human Services (ADHS, 2018). Drug overdose is now the leading cause of unintentional injury related mortality in the United States (Garcia et al., 2019).

Among patient populations treated for opioid use disorder (OUD), chronic pain is frequently cited as the reason for using illicit opioids (Mun et al., 2019). Chronic pain has an estimated prevalence of up to 116 million Americans (Pitcher et al., 2019). Chronic pain conditions have commonly been treated with opioid analgesia (OA), such as hydromorphone or morphine in the treatment of neuropathic pain (Stannard et al., 2015; Cooper et al., 2017). However, the treatment of chronic pain with long term use of OA is a significant factor in OUD (Kakko et al., 2018; VA/DoD, 2017). Studies show the treatment of chronic pain with long term use of OA is linked to increased medication tolerance, worsened pain sensitivity, and psychological symptoms (Stannard et al., 2015; Cooper et al., 2017; Kakko et al., 2018; Koller et al., 2019; VA/DoD, 2017). The CDC, Arizona Department of Health and Human Services (ADHS), and the Veterans Administration (VA/DoD), have issued clinical guidelines recommending that opioids not be prescribed for chronic pain but rather, that non-opioid pharmacological and non-pharmacological interventions be utilized.

Background and Significance

Residential Treatment Programs

Residential treatment for OUD may improve non-completion of treatment and relapse due to increased structure and a more protected environment during treatment compared to outpatient settings (Stahler et al., 2016). The "gold standard" for OUD treatment programs, whether residential or outpatient, remains continued abstinence. However, this measure is difficult to track over time. To evaluate treatment success, researchers often rely on completion of treatment program (Stahler et al., 2016) or overdose death rates post treatment (Morgan, et al. 2020).

Providing healthcare in the context of residential treatment programs for patients with OUD and chronic pain includes barriers, such as difficulties "to access therapy matched to [patients'] specific needs" (Kakko et al., 2018). Treatment of chronic pain in residential programs, for example, can be evaluated for patients' pain acceptance scores, rather than pain intensity scores, to improve OUD outcomes. It has been shown that the severity of OUD for individuals with chronic pain in residential treatment may be worse with poor pain acceptance scores and not correlated with pain intensity scores (Lin et al., 2015). Studies show that outcomes for chronic pain patients with OUD benefit most from "developing and introducing care pathways tailored to specific needs of the population" (Kakko et al., 2018).

Chronic Pain

Chronic pain is defined as "pain that typically lasts greater than 3 months or past the time of normal tissue healing" (CDC, 2016) and is characterized as a "complex human experience strongly influenced by psychosocial factors" (VA/DoD, 2017). Chronic pain impacts the

individual's functional ability and may significantly interfere with social and work activities (Kakko et al., 2018).

While opioids effectively provide relief for acute pain, there has shown to be a worsening of pain in the setting of chronic pain (Kakko et al., 2018; Koller et al., 2019). Opioid use has also been shown to cause psychological symptoms, insomnia, fatigue, and adverse cognitive reactions (Kakko et al., 2018). Additionally, prolonged use of OA has been found to cause medication tolerance, as well as hyperalgesia, or worsened pain sensitivity (Koller et al., 2019).

Acceptance of Pain

Acceptance of chronic pain is characterized as the individual's ability to be willing to endure pain, as well as their ability to participate in activities, despite experiencing chronic pain (Kratz et al., 2018; Mun et al., 2019). For individuals with chronic pain, acceptance of chronic pain has been shown to lower pain intensity, promote recovery of individuals' emotional and physical abilities, reduce depression, and improve their quality of life (Kratz et al., 2018). Studies have shown that patients with higher pain acceptance used less pain medications, including OA (Kratz et al., 2018). Studies also demonstrate a negative correlation between pain catastrophizing and pain acceptance, as well as a reduction in pain severity upon improved pain acceptance (Mun et al., 2019). Pain acceptance, rather than pain intensity, is a greater predictor for the individual's participation in daily activities; a fundamental component of psychological and social wellness (Mun et al., 2019). While there is good evidence that acceptance of chronic pain among patients with OUD and chronic pain may be linked to less use of pain medications including opioids, no studies were found examining the effect of a multimodal program on acceptance of pain. Chronic pain acceptance may be a meaningful and feasible outcome measure to evaluate residential programs treating OUD in patients with chronic pain.

Problem Statement

There is a significant gap between published research and clinical practice in the treatment of individuals with OUD and chronic pain. There is strong evidence that interventions such as mindfulness, are effective in addressing both chronic pain and OUD. This led to the critical inquiry question: For individuals with OUD and chronic pain, do multimodal treatment plans improve chronic pain acceptance?

Evidence Synthesis

A literature review was conducted to evaluate current evidence. Three data bases, including Ebsco Host Academic Search Premier, PubMed, and PsychInfo were systematically searched using key terminology. Key terms searched included mindfulness, pain management, primary care, yoga, outcome, teaching, and education. Search criteria also included to sort for articles that were published in a peer-reviewed journal between 2014 to 2019 and in English.

The Ebsco Host Academic Search Premier search results included 247 results for chronic pain (and) mindfulness, and 30 results for pain management (and) mindfulness (and) education. The PubMed search results included 233 results for pain management (and) mindfulness, and 50 results for pain management (and) mindfulness (and) education. PsychInfo search results for chronic pain (and) mindfulness included 424 results, and 24 results for pain management (and) mindfulness (and) primary care. These results were evaluated for applicability to the clinical question. A total of ten articles were selected for this review, including two systematic reviews (SR) and eight random control trials (RCT).

The ten studies were critically appraised within this review of evidence, including two SR and eight RCT (Appendix A). All studies included high level evidence, either level I or level II evidence, and with the exception of one study published in 2010, all studies were published

within the past 5 years. These studies used many questionnaire screening instruments to evaluate participants' wellbeing pre and post mindfulness-based intervention. The screening tools specifically evaluated pre and post pain intensity, experience of chronic pain, mental health, functional ability, stress, coping, attitude, and perception of control (Appendix B). The evidence generated from the studies shows a variety of specific components of the participants well-being to nuance the individual's multifaceted chronic pain experience in the context of a biopsychosocial issue rather than a pathophysiological complaint.

The mindfulness interventions were similar across the studies and were designed in a manner that is highly applicable for the setting and population of patients with chronic pain in a residential setting. The mindfulness interventions are applicable given they are outpatient and designed for primary care providers to implement in the form of a referral for mindfulness education to impact patient outcomes. Most of the mindfulness interventions within the studies included are educational sessions with a trained mindfulness educator. Mindfulness interventions included the Mindfulness-based Stress Reduction (MBSR), Mindfulness Meditation (MM), Mindfulness- Oriented Recovery Enhancement (MORE), and Breathworks Program (Appendix B).

Additional studies have been reviewed to update and add to information on the multimodal therapies to treat OUD. An updated literature search was conducted using key words chronic pain (and) pain acceptance. An additional five articles were added regarding pain acceptance, including four high level evidence studies published within the past three years. The studies included a systematic review (Koller et al., 2019), a cross-sectional analysis (Kratz et al., 2018), and two cohort studies (Kanzler et al., 2019; Mun et al., 2019).

Pharmacological Therapies

The CDC, ADHS, and VA/DoD have issued clinical guidelines for healthcare providers linking OA prescribing habits and the current opioid epidemic. There are increased guidelines addressing the appropriateness of OA use and emphasis on non-opioid pharmacological and non-pharmacological interventions. OUD is a complex and multicausal issue that may stem from both prescribed and illicit opioid use.

Individuals with chronic pain and OUD may be treated with Medication-Assisted Treatment (MAT) medications, such as buprenorphine, methadone, and naltrexone, which are prescribed to treat OUD by reducing physical dependence symptoms, such as withdrawal or cravings (CDC, 2016). MAT medications may also have a therapeutic effect to treat pain, both acute as well as chronic. For patients with chronic pain receiving MAT who continue to experience chronic pain, treatment strategies, such as splitting doses, increasing the dosage, or changing medication between MAT medications have been shown to reduce chronic pain symptoms (Koller et al., 2019).

However, despite practice guidelines and recommendations by the Department of Veterans Affairs, less than 35% of veterans were found to receive pharmacotherapy for OUD in 2012 (Finlay et al., 2016). Finlay and colleagues (2018) found that across 97 residential programs studied, that the average rate of pharmacotherapy prescribed for OUD was 21% that in 11 programs studied, none of the patients received pharmacotherapy for OUD. Reasons cited for lack of prescribing was prescribers' lack of knowledge about appropriate pharmacotherapy for OUD and/or a philosophy against prescribing the medications.

Integrative Therapies

Studies have suggested the use of integrative therapies, such as mindfulness, are associated with continued improvement of pain acceptance (Turner et al., 2016). Mindfulness is

characterized as “the awareness that emerges through purposeful non-judgmental attention to the present moment” (Turner et al., 2016). Mindfulness has been shown to improve chronic pain outcomes specifically, acceptance of pain and decreased physical and emotional symptoms (Kratz et al., 2018; Turner et al., 2016). Evidence based mindfulness programs, such as Mindfulness-Based Stress Reduction (MBSR), Breathworks Mindfulness-Based Pain Management Programme, and Mindfulness-Oriented Recovery Enhancement (MORE), incorporate a variety of mindfulness techniques for chronic pain treatment into standardized programs (Cusens et al., 2010; Garland et al., 2014; Omidi et al, 2014; Turner et al., 2016). MBSR sessions include sitting meditation, body scan practice, breath focus exercise, raisin exercise to train being in the present moment, observing thoughts and feeling technique, as well as educational information on depression and the concept of acceptance (Omidi et al, 2014). In Breathworks, techniques also include breath-awareness, body-scan, mindful movement, kindly awareness, and mindfulness in daily life (Cusens et al., 2010). Similarly, MORE mindfulness techniques include mindful breathing, body scan, as well as attention to positive information (Garland et al., 2014).

Physiotherapy is another integrative therapy shown to improve chronic pain outcomes (Booth et al., 2017; USDHHS, 2019; Pedersen and Saltin, 2015). Patients with chronic pain who participated in physical therapy have outcomes shown to result in reduction of chronic pain, or to be pain free (Pullen, 2017). The American Physical Therapy Association (APTA) clinical practice guidelines recommend evidence-based physical therapy interventions for individuals with chronic back pain. Aerobic low intensity exercise therapy modalities and patient education especially have been shown to decrease pain for individuals with chronic pain (Hayden et al., 2005). Evidence-based physical therapy patient education and counseling for the treatment of

chronic pain recommended in the APTA clinical guidelines includes anatomical and structural strength teaching, pain perception neuroscience, early resumption of activities of daily living, a goal setting for increasing activity levels rather than decreasing pain intensity (Bier et al, 2017; Delitto et al., 2012).

Internal Evidence

Internal evidence includes anecdotal discussions with executive leadership at the residential facility. The residential facility's Nurse Practitioners report an estimated 25% prevalence rate of chronic pain in their patient population. In development of the treatment plan for patients with substance use disorder (SUD), addressing chronic pain per clinical guidelines contraindicate prescribing opioids (CDC, 2016). A specific priority for the program is cultivating evidenced based non-pharmacological pain management practices that can be implemented to improve chronic pain syndrome outcomes.

Theoretical Framework

The conceptual model used to guide this Doctorate of Nursing evidence-based practice project was the Acceptance and Commitment Therapy (ACT) Relational Frame Theory (RFT) (Appendix C). ACT was developed over 35 years ago to "promote behavioral effectiveness" (Hayes, 2019) rooted in RFT research (Barrett and McHugh, 2019) that "focuses on the context of an act and suggests the meaning of an act is directly related to its context, history, and purpose" (Knowlton et al., 2019). ACT RFT has been studied frequently with transdiagnostic approaches and numerous chronic health condition management, such as chronic pain and headache, which are found to be some of the leading causes of disability throughout the world (Eysenbach et al., 2019; James et al., 2018; Lin et al., 2019). ACT promotes increased "psychological flexibility and workability in individuals via the acceptance of all private events

(thoughts, emotions, sensations, etc.,) cultivating present moment awareness and a stable sense of self, and clarifying and acting upon personal values—even in the presence of illness" (Karekla et al., 2019).

ACT targets six core processes with the goal of increasing psychological flexibility (Hayes et al., 2015). One of the six core processes is acceptance (Hayes et al., 2015). Acceptance is characterized through ACT as occurring "when an individual willingly experiences automatic, and sometimes unwanted, emotions or sensations without attempting to control the form, frequency or situational sensitivity of these experiences" (Zhang et al., 2018). According to ACT, it appears increased pain acceptance improves both activity and disability (Kanzler et al., 2019). Pain acceptance improves function regardless of pain severity (Kanzler et al., 2019; Lin et al., 2019).

Evidence-Based Practice Framework

Rosswurm and Larrabee's (1999) evidence-based practice model was used to guide implementation of this project (Appendix D). Initial steps to apply this project included conversations with stakeholders in Arizona's healthcare community, such as clinicians and government officials, to identify problems, issues, and gaps in current practice. Next, identifying multimodal treatment plans, such as mindfulness education, as a possible intervention with measurable outcomes. This led to a critical evaluation of current evidence in the SR and RCT studies, as well as the risks and benefits of implementation. With the evidence, the evidence-based project was designed to evaluate multimodal treatment regarding acceptance of chronic pain. The data collected was then analyzed. Lastly, the quality improvement project findings were then communicated to the clinic leadership to inform operations.

Purpose

The purpose of this project was to examine the feasibility of evaluating the effectiveness of a multimodal residential living program for residents with OUD and chronic pain using chronic pain acceptance, pain severity and interference to measure outcomes.

Methods

Ethics

Human subjects protection approval from the Arizona State University Institutional Research Board (IRB) was obtained on October 24, 2019. No demographic data was obtained as recommended by the IRB to maintain strict confidentiality with this highly vulnerable population.

Setting

The project was conducted at an adult residential treatment facility, located in the metropolitan Phoenix, Arizona area. The facility focuses on the treatment of substance use disorders. Program goals are accomplished within the context of an interdisciplinary collaborative structure model involving three universities located in Arizona. The goal of this team-based interprofessional model is to positively address significant and local social issues.

Residents are evaluated by an admitting Nurse Practitioner (NP) and if needed, are provided with referrals to primary care providers in the local community for continuity of care upon discharge. During the resident's stay, registered nurses are available to provide routine health maintenance assessments. Residents have access to psychiatric mental health care providers and may be prescribed non-opioid analgesic pharmaceuticals, antidepressants, as well as referred to a local MAT provider to evaluate and continue or initiate MAT. Additional services include social services, physical therapy, and occupational therapy. Residents also have access to mindfulness education.

Population

The population included residents admitted to the facility who agreed to participate in the project. In addition to OUD, clients had to have a diagnosis of chronic pain as diagnosed by the admitting Nurse Practitioner, be able to speak and read English, and be age 18 years or older. Exclusion criteria included clients with a diagnosis of pain related to cancer or acute pain (pain that has lasted for less than three months.)

Recruitment

Residents were evaluated by an admitting Nurse Practitioner at the facility's corporate office intake who determined if an individual met eligibility criteria. The admitting NP then notified non-clinical staff who gave eligible clients a flyer with project information and asked if they were interested in participating in the project. Interested residents were then referred to the project manager.

The project manager met with potential participants to explain the project and answer any questions. Residents who agreed to participate in the program were asked to complete two questionnaires measuring chronic pain acceptance and pain severity shortly after admission (T1) and to complete a second set of questionnaires after 21-25 days (T2). The second set of questionnaires consisted of the same surveys completed during T1 with the addition of a questionnaire created by the project manager asking about number and type of treatment sessions in which the patient participated during their stay.

Instruments

The Chronic Pain Acceptance Questionnaire Revised (CPAQ-R) is a revised version of the original CPAQ developed in 1992 for individuals with chronic pain (McCracken et al., 2004). The 20-question survey evaluates the individual's overall pain acceptance and includes

two subscales measuring the individuals activity engagement defined as the pursuit of activities regardless of pain, and pain willingness, defined as the recognition by the individual that avoidance and control of pain may be not be effective methods of adapting to chronic pain (McCracken et al., 2006). Studies have shown a correlation between participation in activity and willingness to endure pain as a predictor for how well the individual will adjust to chronic pain (Baranoff et al., 2014; la Cour and Peterson, 2015; McCracken et al., 2004; Turner et al, 2016; Vowles et al., 2008). The CPAQ-R uses a seven-point Likert scale for the patient to rate each of the 20 statements as never true (0) to always true (6) rating. Possible scores for total pain acceptance range from 0-140, activity tolerance range from 0-66, and pain willingness range from 0-54. Higher scores indicate higher levels of acceptance. Studies have shown good to internal consistency with alphas of .82 for activity engagement and .78 for pain willingness. Validity has been demonstrated with moderate to high correlations with measures of avoidance, distress and daily functioning and predictive validity has been demonstrated by significant prediction of pain-related disability and distress using the CPAQ-R (McCracken et al., 2006).

The Brief Pain Inventory (BPI) was developed for evaluating pain intensity and interference through an 11-item (0-10) Likert-scale. Pain severity is measured by the first four question and pain interference is measured by measuring seven components of the individual's life affected by pain (Mun et al., 2019). The BPI reliability and validity has been evaluated for patient populations with chronic nonmalignant pain and determined to be a recommended questionnaire (Tan et al., 2004). The first component was scored averaging the four pain severity questions. The pain severity questions use an 11-point Likert scale for the patient to rate each answer as no pain (0) to "pain as bad as you can imagine" (10) (Tan et al., 2004). The second component of pain intensity was scored by averaging the seven questions for pain interference.

Possible scores for total pain interference range from 0-10, as well, with “does not interfere” (0) and “completely interferes (10) (Tan et al., 2004). Higher scores indicate higher levels of pain severity and pain interference.

A therapy participation survey was created by the project manager to assess if clients participated in MAT, PT, OT or mindfulness education and to quantify participation. The survey was self-report. Answers were yes/no with a range of number of sessions for PT, OT, and mindfulness education sessions.

Data collection

A master list was created by the project manager once clients agreed to participate in the project. The master list only contained participant names in order to follow-up with participants for the second data collection. Participants created their own unique code number using the month and day from date of birth and the first three numbers of their phone number. All survey forms were identified only by the participant’s unique code. The master list did not include participant codes so that names and codes would not be linked. The master list was only stored on the project manager’s password protected USB device. Surveys completed by participants were scanned to the password protected USB device. Once each survey was scanned, it was immediately shredded. Data entered were entered into an Excel spread sheet using unique participant codes. No names were entered into the database. The password protected USB device was stored in a locked container that was only accessed by the project manager at her home office. Upon completion of the project, the USB device was stored to be destroyed in May 2020 by ASU IT personnel.

Time One (T1) data was collected within a few days of admission and Time Two (T2) data was collected 21-25 days after T1. Between T1 and T2, participants lived in the residential

treatment facility receiving treatment as usual (TAU). Information was disclosed to the facility administration in aggregate form only. No names or other identifying information of participants was disclosed.

Data analysis

Data was entered in an Excel file. Data was analyzed using descriptive statistics. Inferential statistics were not performed due to small sample size.

Table 1
Pain acceptance upon initial and follow up survey collection (N=3)

Measure	Initial assessment T1 *M* (SD)	Follow up assessment T2 *M* (SD)
Pain intensity	6.47 (1.8)	5.43 (2.3)
Pain interference	6.30 (0.8)	5.42 (1.0)
Activity engagement	39 (19.3)	45 (7.8)
Pain willingness	40 (4.0)	33.67 (3.5)
Chronic pain acceptance	79 (17.0)	78.67 (5.0)

Note: Pain Intensity and Pain Interference scores were obtained from the Brief Pain Inventory and Activity Engagement, Pain Willingness, and Chronic Pain Acceptance scores were obtained from the Chronic Pain Acceptance Questionnaire.

Results

Participants

A total of six participants were consented. All six participants completed all items of the initial CPAQ-R and BPI questionnaires. Three participants were lost to follow up. Three of the participants completed T2 CPAQ-R and BPI questionnaires, as well as the therapy participation survey.

Acceptance of Chronic Pain

Chronic Pain Acceptance scores were obtained by summing the activity engagement and pain willingness scores (range = 0-140). Mean scores for Chronic Pain Acceptance were T1 = 79

(SD = 17.0) and T2 = 78.67 (SD = 5.0) (Table 1). For the subscales, mean activity engagement scores increased slightly, T1 = 39 (SD = 19.3) and T2 = 45 (SD = 7.8). This was primarily due to one participant who had a score of 18 at T1 which increased to a score of 41 at T2. Pain willingness scores decreased slightly, T1 = 40 (SD = 4.0) and T2 = 33.67 (SD = 3.5).

Pain Intensity and Pain Interference

Pain intensity and interference scores showed a slight improvement (Table 1). Pain intensity scores decreased from T1 = 6.47 (SD = 1.8) and T2= 5.43 (SD = 2.3). Pain interference scores also decreased from T1= 6.30 (SD = 0.8) and T2 = 5.42 (SD = 1.0).

Therapy Participation

Of the three participants who completed T2 data, only one participant received MAT which was prescribed prior to admission. None of the three participants reported receiving OT, PT, or attending mindfulness classes.

Discussion

Due to the small sample size, no inferences can be made from this data. Anecdotally, one participant's score on the Activity Engagement scale improved from a score of 18 at T1 to a score of 41 at T2. This individual did have higher pain intensity and pain interference scores than the mean scores at both T1 (7.25, 8.40) and T2 (6.25, 7.40) respectively. However, there was no improvement for any of the participants on pain willingness.

Unexpectantly, while one of the participants did receive MAT, none of the participants reported receiving PT, OT, or participating in mindfulness education. It is unknown if this was underreported by participants, if participants declined the therapy, or whether participants were not aware of, or not offered these treatment modalities.

Project Strengths

Selected instruments were well supported by current literature. Participants were able to complete surveys within 30 minutes. This was important as participants were known to have significant levels of chronic pain and suffering from OUD. Participants did not seem to have difficulty with any of the survey items and answered all questions on each survey. Additionally, organization administration and staff were supportive of the project.

Limitations and Opportunity for Improvement

The greatest limitation was the small sample size. This may have been because recruitment and data collection occurred primarily during the holidays in November and December. During the month of January, there was also a decreased number of physical therapy students on site because of semester break. Additionally, data collection was terminated in early March due to the COVID-19 pandemic.

Other limitations included an inconsistent process of recruiting participants and obtaining T2 data. Additionally, the therapy participation survey did not include an option for clients to report if they were aware of or why they did not participate in a specific treatment modality.

Implications and Recommendations for Future Study

It is feasible to use chronic pain acceptance as measured by the CPAQ-R and pain intensity and interference as measured by the BPI for evaluating treatment effectiveness in the residential setting. In the future, a longer period of time is recommended to collect data and strategies for recruitment and follow-up need to be improved. The Therapy Participation survey should also be revised to include a more nuanced description of treatment modalities to clarify if participants declined services, were unaware of, or not offered treatments.

Conclusion

Research supports that higher levels of acceptance of chronic pain are associated with lower pain intensity, increased emotional and physical ability, reduced depression, and decreased use of pain medication, including opioids. No studies of residential opioid treatment facilities were found that used pain acceptance as an outcome measure to evaluate programs. Studies relied primarily on program completion or overdose death as outcome measures. This project provides beginning data on the feasibility of using acceptance of chronic pain and pain severity and interference to evaluate residential treatment program effectiveness. Further research is needed to evaluate acceptance of pain with long-term opioid abstinence and overdose deaths.

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Table 2

Evaluation Table

Citation	**Theory/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Measurement/ Instrumentation**	**Data Analysis**	**Findings/ Results**	**Level of evidence/ Decision for Use/Application to Practice**
La Cour, et al., 2015). Effects of MM on CP: A RCT. **Country**: Denmark **Funding:** TrygFonden Axel Muusfeldts Fond Fabrikant Mads Clausens Fond Fonden af 1870. **Conflicts/Bias**: None	MMT	**Design:** Standard RCT **Purpose**: Inv effect of MBSR for CP vs UC	**N=** 109 IG: 55 CG: 54 **Demographics:** *M age-* CG: 48.84 IG: 46.52 *M-* CG:13% IG: 17% *Em-* CG: 36% IG: 39% *Co-* CG: 64% IG: 67% **Setting:** Multidisciplinary pain center. **Inclusion:** Diagnosed with severe CP by	**IV1:** Group of pts eval for FL, pain, QOL. **DV:** MBSR protocol by certified instructor **MBSR:** psychosocial treatment approach increases awareness and acceptance of physical and psychological pain and discomfort.	BPI, SF36, HADS, CSQ, CPAQ.	SPSS, ITT, X^2 test, independent sample t-test, Kolmgorov-Smirnov test, histogram, Q-Q plots.	SF36 score: IG – pre 28.3 post 36.9 CG – pre 26.9 post 27.8 *p* value - 0.05	**Level of Evidence**: II **Strengths:** # of parts; RCT. **Weaknesses:** Attrition rate of 22 participants. Possible bias of correlation to pts level of motivation w/ willingness to participate in study. **Harm:** None **Conclusions:** Lower levels of anxiety, increased ability to control pain and readiness for activities, and mental QOL with MBSR.

AA – African American, **Anx-** Anxiety, **API**–Attention to Positive Information Score, **APNIS**–Attention to Positive and Negative Information Score, **AS:** Asian, **ATT-** Attitudes Toward Treatment, **b/w** – between,– **BP-** back pain, **BPI**–Brief Pain Inventory, **C-SOSI-** Calgary Symptoms of Stress Inventory, **CBT**–Cognitive-behavioral therapy, **CERQ—**Cognitive Emotion Regulation Questionairre, **CG-** Control group, **CI** – Confidence interval, **CLBP**–Chronic low back pain, **Co:** coupled or married, **COMM**–Current Opioid Misuse Measure, **Commu** – Communication, **CP-** chronic pain, **CPAQ**–Chronic Pain Acceptance Questionnaire, **CR** – Caucasian race, **CSQ**–Coping Strategies Questionnaire, **DAPOS**— Depression Anxiety and Positive Outlook Scale, **Dep-** Depression, **DV1** – Dependent variable 1, **DV2** – Dependent variable 2, **Em:** Employed, **ES** – Educational session, **Eval** – Evaluation, **f** – female, **FA -** Functional ability, **FFMQ**–Five Facet Mindfulness Questionnaire, **FL -** Functional limitation, **FS** – Functional status, **F/U** – Follow Up, **GAD**–Generalized Anxiety Disorder scale, **GCPS**–Graded Chronic Pain Scale, **H** – Hispanic, **HADS**–Hospital Anxiety and Depression Scale, **IG-** Intervention group, **Int-** Intervention, **Inv-** Investigate, **ITT**–Intent to Treat, **IV** – Independent variable, **m** – Male, **M** –Mean, **MAAS—** Mindfulness Attention Awareness Scale, **MAP**–Mind-Body Approaches to Pain, **MBI**–Mindfulness-based interventions, **MBSR**–Mindfulness-based stress reduction, **Med-** Medication, **Mi-** Mindfulness, **MM-** Mindfulness meditation, **MMT**–Mindfulness-to-meaning theory, **MORE-** Mindfulness- Oriented Recovery Enhancement, **MRDQ**–Modified Roland Disability Questionnaire, **N** – Sample (population), **n** – Sample size (studies), **OCRS-R**– Obsessive-Compulsive Drug Use Scale, **ODI**—Oswestry Disability Index, **OpM-** Opioid Misuse, **OS** – Observational Study, **PCP**– Primary care provider, **PCS**–Pain Catastrophizing Scale, **PE -** Patient education**, PGIC**–The Patient Global Impression of Change Scale, **PHQ**–Patient Health Questionnaire, **PSEQ**–Pain Self-Efficacy Questionnaire, **PSS**— Perceived Stress Scale, **Pt** – Participant, **QOL** – Quality of life, **Quest** – Questionnaire, **RCT** – Randomized Controlled Trial,, **S1:** study group one, **S2:** study group two, **S3:** study group three, **SD** – Standard deviation, **SF12**–Short-Form Health Survey 12, **SF36**–Short-Form Health Survey 36, **SMD-** Standardized Mean Difference **SPSS -** Statistical Package for the Social Sciences, **UC-** usual care, **w/ -** with, X^2 – Chi square, **Yrs** – years, **# -** Number of

			trained physician. **Exclusion:** Pts w/ unstable clinical situation, severe cognitive or psychosocial issues. **Attrition:** 22					**Feasibility:** High likelihood of applicability in PCP setting. **Utility to PICOT:** Supports applicability treating CP pts with MBSR with good response
Citation	**Theory/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Measurement/ Instrumentation**	**Data Analysis**	**Findings/ Results**	**Level of evidence/ Decision for Use/Application to Practice**
Cherkin. D. et al. (2016). Effect of MBSR vs CBT or UC on BP and FL in adults w/ chronic BP **Country**: U.S. **Funding:** NICCIH of NIH	MMT	**Design:** RCT, interviewer blinded. **Purpose**: To evaluate MBSR versus CBT vs UC with CP	**N=** 342 IG: 113 CG1: 116 CG2: 113 **Demographics:** f- 65.7% M age – 49.3 CR: 82.5% AS: 3.9% AA:3.3%	**IV:** Group of pts eval for BP related FL, BP bothersome, dep, anx, pain intensity, impression of change, general physical and mental health. **DV1:** MBSR by certified	MRDQ, RS, LBP, PHQ8, GAD2, SF12, GCPS, PGIC.	SPSS, ITT Poisson regression model, Fisher approach, Baron and Kenny, mixed method GEE, X^2 test.	RDQ score at 26 weeks: IV: 44.1%, DV1: 60.5%, DV2: 57.7% *p* value- .04 PBR score at 26 weeks	**Level of Evidence**: II **Strengths:** Large sample size. **Weaknesses:** Sample from population of continuing member of Group Health Cooperative easier identification,

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Conflicts/Bias: None			Other: 10.4% H: 6.8% Co: 73% Em: 77.1% **Setting:** Classrooms at Group Health facilities 2-hour groups/week x 8 weeks. **Inclusion:** Age 20-70 years old with IC9 suggestive of unspecified BP >90 days. **Exclusion:** Specific diagnoses, litigation, language, pain <3 months, blindness, deafness, transportation, scheduling, minimal self-concern, interference with activities.	instructor per designated protocol **DV2:** CBT by trained PhD psychologists per designated protocol **MBSR:** psychosocial treatment approach increases awareness and acceptance of physical and psychological pain, and discomfort. **CBT:** instructions on sleep hygiene, changing thought patterns, education on CP, coping skills			IV: 26.6 %, DV1: 43.6%, DV2: 44.9% *p* value- .01	recruitment, and f/u. **Harm:** None **Conclusions:** MBSR improves BP, dep, and FL in comparison w/ UC. CBT also produces this effect. **Feasibility:** Applicable to provide MBSR education to PCP setting. **Utility to PICOT:** Supports applicability of educating with MBSR for CP. Informs regarding comparison to CBT.

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			Attrition: 1,767 screened with 342 enrolled. Total attrition of enrollees 20%.					
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Priddy, et al., (2018). Dispositional Mi and OpM prescription among CP patients: Craving and attention to positive information as mediating mechanisms. **Country**: U.S. **Funding:** National Institute on Drug Abuse **Conflicts/Bias:** None	MMT	**Design:** Systematic review cross-sectional analysis **Purpose**: Analyze relationship between dispositional Mi and rx OpM among opioid treated CP pts.	**N=** 300 n=3 S1: 115 S2: 141 S3: 44 **Demographics:** S1: M age 48.3, f- 68% S2: M age 51.3, f-62.7% S3: M age 33, f-11.4%	**IV:** Pts with CP OpM **DV:** Evaluation of pt Mi	COMM, FFMQ, APNIS, BPI	SPSS, Pearson correlation, path analysis.	COMM r = -0.36 *p* value - 0.001	**Level of Evidence**: I **Strengths:** Systematic review cross-sectional analysis **Weaknesses:** S3 smaller sample size. **Harm:** None **Conclusions:** Dispositional Mi inverse relationship w/ OpM **Utility to PICOT:** Supports Mi intervention for CP treatment.

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Citation	Theory/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Major Variables Studied and Their Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level of evidence/ Decision for Use/Application to Practice
Ball, E. F., et al., (2017). Does MM improve CP? A systematic review. **Country**: U.K. **Funding:** Rod Flower Vacation Scholarship **Conflicts/Bias:** None	MMT	**Design:** Systematic Review Meta-Analysis **Purpose**: Eval Mi to mitigate CP	**n=** 13 RCT **N**= 862 **Demographics:** Female/male 1. 40/17 2. 22/17 3. 33/7 4. 23/7 5. 91/0 6. 21/16 7. 15/5 8. 177/0 9. 23/7 10. 93/16 11. 26/16 12. 112/12 13. 19/0 **Meta-analysis SG:** SG1 n= 183 SG2 n= 183 SG3 n= 374	**IV:** Mindfulness program SG1: affective pain SG2: sensory pain SG3: pain intensity SG4: pain acceptance SG5: dep SG6: anx SG7: mental QOL SG8: physical QOL **DV:** UC	Unspecified	Forest plots, Meta-analysis with random effect model, Review Manager 5.3, Funnel plots	Improved SG1: *SMD -0.13* Improved SG2: *SMD -0.02* Improved SG3: *SMD 0.14* Improved SG4: *SMD 0.34* Improved SG5: *SMD -0.31* Improved SG6: *SMD -0.21* Improved SG7: *SMD 0.04* Improved SG8: *SMD 0.57*	**Level of Evidence**: I **Strengths:** Meta-analysis of 13 RCTs **Weaknesses:** Unspecified instruments; gender **Harm:** None **Conclusions:** Effective most for dep. Effective for anx, affective pain, sensory pain, mental and physical QOL. **Utility to PICOT:** Consistent findings; Significant

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			SG4 n= 251 SG5 n= 368 SG6: n=278 SG7: n= 193 SG8: n=230 SG9: n=215					supportive evidence for practice
Citation	**Theory/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Measurement/ Instrumentation**	**Data Analysis**	**Findings/ Results**	**Level of evidence/ Decision for Use/Application to Practice**
Cusens, B., et al., (2010). Eval of the Breathworks Mi pain management programme: Effects on well-being and multiple measures of Mi. **Country**: U.K. **Funding:** Unspecified **Conflicts/Bias:** None	MMT; Buddhist foundation 'loving kindness'	**Design:** Pilot program eval **Purpose**: Eval Breath-works programme	**N=** 53 IG: 33 CG: 20 **Demographics:** IG: *CR-95%* *F-93%* *M age-46.7* CG: *CR-89%* *F-55%* *M age-48.4* **Inclusion:** Students of Breathworks Pain Management	**DV:** Breathworks programme **Breathworks programme:** Weekly 2.5 hour meeting teaching on Mi; breath-awareness, body-scan, mindful movement, kindly awareness.	DAPOS, CPAQ, PSEQ, PCS, SF36	2x2 mixed factors design, parametric tests, Huberty and Morris, ANOVA	Improved pain acceptance, increased awareness pleasant affect.	**Level of Evidence**: IV **Strengths:** Application of program **Weaknesses:** Small number participants; LOE **Harm:** None **Conclusions:** Evidence to support immediate effects of MBSR **Utility to PICOT:** PCP setting implementation

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			Programme who signed consent forms; Outpatient pain clinic support group who opted in. **Exclusion:** Unspecified					feasible, prompt f/u results
Citation	**Theory/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Measurement/ Instrumentation**	**Data Analysis**	**Findings/ Results**	**Level of evidence/ Decision for Use/Application to Practice**
Garland, E. L., et al. (2014). Mi-oriented recovery enhancement for CP and prescription OpM: Results from an early-stage RCT. **Country**: U.S. **Funding:** The National Institute on Drug Abuse; Fahs-Beck Fund for	MMT	**Design:** RCT **Purpose**: Eval MORE effect on CP and OpM compared to UC	**N=** 115 **Demographics:** M age 48 f-68% **Inclusion:** Pain, treated with opioids **Excluded:** Comorbid psychiatric disorder	**IV:** Group with UC screened with instruments **DV:** MORE **MORE**: Int multi-modal training w/ Mi training, positive emotion regulation, reappraisal of thinking.	BPI, COMM, FFMQ, CSQ, CERQ, C-SOSI, ATT	ANCOVA, ITT, X^2 test, t tests, Cohen's d, G*Power software 3.1.	Good effect for CP and OpM reduction	**Level of Evidence**: II **Strengths:** RCT **Weaknesses:** Setting of opioid ongoing **Harm:** None **Conclusions:** Mi reduces CP **Utility to PICOT:** Evidence supporting Mi reducing CP,

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Research and Experimentation **Conflicts/Bias:** None								decreased opioid use
Citation	**Theory/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Measurement/ Instrumentation**	**Data Analysis**	**Findings/ Results**	**Level of evidence/ Decision for Use/Application to Practice**
Sharon, H., et al., (2016). MM modulates pain through endogenous opioids. **Country**: Israel **Funding:** I-CORE Program of the Budgeting Committee; The Israel Science Foundation **Conflicts/Bias:** None	MMT	**Design:** RCT **Purpose**: Eval pain caused by hand in ice water pre/post meditation session w/ and w/out naloxone	**N=** 15 **Demographics:** Unspecified; healthy mindfulness practitioners **Exclusion:** CP, neuro disease, psychiatric disorder **Attrition:** 1	**IV:** MM session **DV:** MM session with administered naloxone	VAS	3x2 repeated measures, post hoc, Tukey.	Pain reduced post MM; Naloxone reversed pain relief.	**Level of Evidence**: II **Strengths:** RCT **Weaknesses:** Unspecified demographics. Unnamed instrument for unpleasantness measurement. Small # of parts. **Harm:** None **Conclusions:**

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								Mi reduces pain; Mi creates endogenous opioids **Utility to PICOT:** Evidence to support Mi reduces pain
Citation	**Theory/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Measurement/ Instrumentation**	**Data Analysis**	**Findings/ Results**	**Level of evidence/ Decision for Use/Application to Practice**
Omidi, A., & Zargar, F. (2014). Effect of MBSR on pain severity and mindful awareness in patients with tension headache: a randomized controlled clinical trial. **Country**: Iran **Funding:** Unspecified	MMT	**Design:** RCT **Purpose**: Eval MBSR effect on patients with tension headache pain severity, perceived stress, general mental health, and Mi skills	**N=** 66 **Demographics:** IG: M age 34.5 CG: M age 32	**IV:** Group with UC eval with instruments **DV:** MBSR	MAAS, Pain scale	Repeated measures analysis of variance, X^2 test	Reduced pain, improved MAAS scores post MBSR	**Level of Evidence**: II **Strengths:** RCT **Weaknesses:** Limited data on bias or funding. **Harm:** None **Conclusions:** MBSR reduces pain intensity **Utility to PICOT:** MBSR reduces pain

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Citation	**Theory/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Measurement/ Instrumentation**	**Data Analysis**	**Findings/ Results**	**Level of evidence/ Decision for Use/Application to Practice**
Zgierska, et al., (2016). MM and CBT Int reduces pain severity and sensitivity in opioid-treated CLBP: Pilot findings from a RCT. **Country**: U.S. **Funding:** Unspecified **Conflicts/Bias:** None	MMT	**Design:** RCT **Purpose**: Eval effect MM with CBT effect on pain severity, sensitivity for CLBP	**N=** 35 IG: 14 CG: 21 **Demographics:** Unspecified **Inclusion:** CLBP treated with opioid > 90 days **Exclusion**: Age under 21, non-English speaking, pregnancy, severe psych	**IV:** UC group eval with instruments **DV:** Meditation-CBT Int **Meditation CBT Int:** 8 weeks of 2 hour classes weekly conducted by psychologists	BPI, CPAQ, MAAS, ODI, PSS	Mann-Whitney – Wilcoxon Test, Cohen's d, Spearman correlations	Improved pain severity and sensitivity post MM with CBT	**Level of Evidence**: II **Strengths:** RCT **Weaknesses:** Study was not blinded **Harm:** None **Conclusions:** Effective to treat CLBP within two months **Utility to PICOT:** Feasible for PCP setting, prompt results.

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Citation	Theory/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Major Variables Studied and Their Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level of evidence/ Decision for Use/Application to Practice
Turner, J. A., et al., (2016). MBSR and CBT for CLBP. **Country**: U.S. **Funding:** National Center for Complementary & Integrative Health **Conflicts/Bias:** Royalties from PAR on CPCI & SOPA scale	MMT	**Design:** RCT **Purpose**: Eval MBSR vs CBT vs UC	**N=** 342 IG1: n=116 IG2: n=112 CG: n=113 **Demographics:** **IG1:** M age 50 %f 71 %CR 97 %Em 87 **IG2:** M age 49.1 %f 66 %CR 93 %Em 87 **CG:** M age 48.9 %f 87 %CR 88 %Em 89 **Setting: C**	**IV:** Group of pts eval **DV1:** MBSR **DV2:** CBT **MBSR:** psychosocial treatment approach increases awareness and acceptance of physical and psychological pain, and discomfort. **CBT:** instructions on sleep hygiene, changing thought patterns,	RDQ, FFMQ, PCS, CPAQ, PSEQ, PHQ	Spearman, linear regression models, ITT, t-test, X^2 test, SPSS,	Both MBSR and CBT improved instrument scores, minimal difference between DV1 and DV2	**Level of Evidence**: II **Strengths:** RCT **Weaknesses:** Pts with minimal symptoms **Harm:** None **Conclusions:** Both MBSR and CBT improve Mi; MBSR improves outcome compared to UC **Utility to PICOT:** Supports MBSR evidence to improve CP

AA – African American, **Anx-** Anxiety, **API**–Attention to Positive Information Score, **APNIS**–Attention to Positive and Negative Information Score, **AS:** Asian, **ATT-** Attitudes Toward Treatment, **b/w** – between,– **BP-** back pain, **BPI**–Brief Pain Inventory, **C-SOSI-** Calgary Symptoms of Stress Inventory, **CBT**–Cognitive-behavioral therapy, **CERQ—**Cognitive Emotion Regulation Questionairre, **CG-** Control group, **CI** – Confidence interval, **CLBP**–Chronic low back pain, **Co:** coupled or married, **COMM**–Current Opioid Misuse Measure, **Commu** – Communication, **CP-** chronic pain, **CPAQ**–Chronic Pain Acceptance Questionnaire, **CR** – Caucasian race, **CSQ**–Coping Strategies Questionnaire, **DAPOS**— Depression Anxiety and Positive Outlook Scale, **Dep-** Depression, **DV1** – Dependent variable 1, **DV2** – Dependent variable 2, **Em:** Employed, **ES** – Educational session, **Eval** – Evaluation, **f** – female, **FA -** Functional ability, **FFMQ**–Five Facet Mindfulness Questionnaire, **FL -** Functional limitation, **FS** – Functional status, **F/U** – Follow Up, **GAD**–Generalized Anxiety Disorder scale, **GCPS**–Graded Chronic Pain Scale, **H** – Hispanic, **HADS**–Hospital Anxiety and Depression Scale, **IG-** Intervention group, **Int-** Intervention, **Inv-** Investigate, **ITT**–Intent to Treat, **IV** – Independent variable, **m** – Male, **M** –Mean, **MAAS—** Mindfulness Attention Awareness Scale, **MAP**–Mind-Body Approaches to Pain, **MBI**–Mindfulness-based interventions, **MBSR**–Mindfulness-based stress reduction, **Med-** Medication, **Mi-** Mindfulness, **MM-** Mindfulness meditation, **MMT**–Mindfulness-to-meaning theory, **MORE-** Mindfulness- Oriented Recovery Enhancement, **MRDQ**–Modified Roland Disability Questionnaire, **N** – Sample (population), **n** – Sample size (studies), **OCRS-R**– Obsessive-Compulsive Drug Use Scale, **ODI**—Oswestry Disability Index, **OpM-** Opioid Misuse, **OS** – Observational Study, **PCP**– Primary care provider, **PCS**–Pain Catastrophizing Scale, **PE -** Patient education**, PGIC**–The Patient Global Impression of Change Scale, **PHQ**–Patient Health Questionnaire, **PSEQ**–Pain Self-Efficacy Questionnaire, **PSS**— Perceived Stress Scale, **Pt** – Participant, **QOL** – Quality of life, **Quest** – Questionnaire, **RCT** – Randomized Controlled Trial,, **S1:** study group one, **S2:** study group two, **S3:** study group three, **SD** – Standard deviation, **SF12**–Short-Form Health Survey 12, **SF36**–Short-Form Health Survey 36, **SMD-** Standardized Mean Difference **SPSS -** Statistical Package for the Social Sciences, **UC-** usual care, **w/ -** with, X^2 – Chi square, **Yrs** – years, **# -** Number of

			Inclusion: Age 20-70, CBP, pain level >3. **Exclusion:** Pregnancy, non-English speaking, previous mind-body treatment	education on CP, coping skills **Variables**: catastrophizing, self-efficacy, acceptance				

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Appendix B

Table 3

Synthesis Table

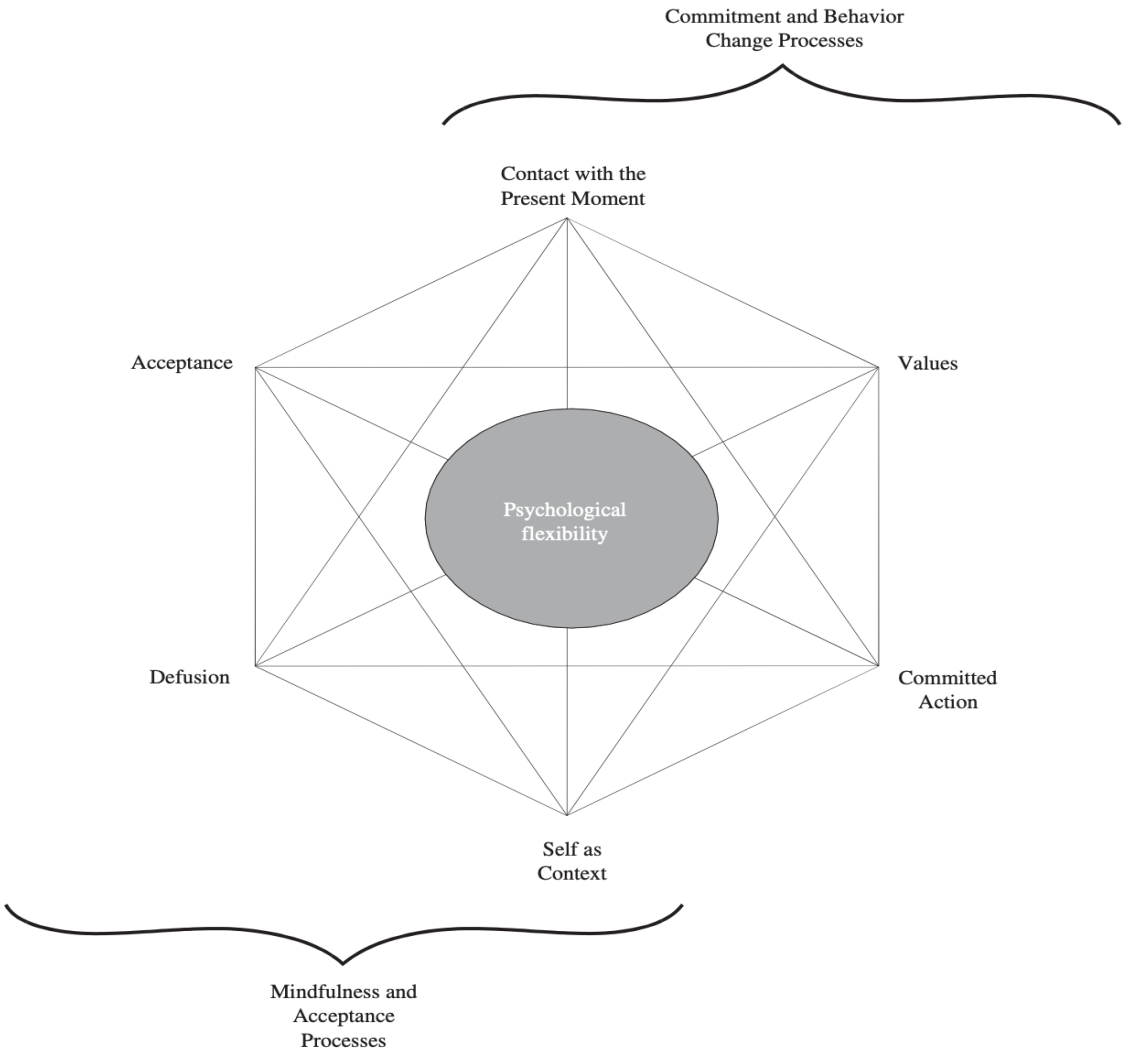
	Studies	*Ball, et al.*	*Cherkin, et al.*	*Cusens, et al.*	*Garland, et al.*	*La Cour, et al.*	*Omidi, et al.*	*Priddy, et al.*	*Sharon, et al.*	*Turner, et al.*	*Zgierska, et al.*
Basics	Year	2017	2016	2010	2014	2015	2014	2018	2016	2016	2016
	Design/LOE	SR	RCT	RCT	RCT	RCT	RCT	SR	RCT	RCT	RCT
	# Pts/ Studies	862/13	342	53	115	109	66	300/3	15	342	35
Measurements/ Instrumentation	BPI/PS			x	x	x	x	x	x		x
	SF/ODI/ MRDQ/RDQ		x	x		x				x	
	HADS/PHQ/GAD/ DAPOS		x	x		x				x	
	CSQ				x	x					
	PGIC		x								
	FFMQ/APNIS/API/ MAAS/CERQ			x	x		x	x		x	x
	PSEQ/PCS/ GCPS/CPAQ		x	x	x	x				x	x
	C-SOSI/ PSS				x						x
Interventions	MBSR		**x**			**x**	**x**	**x**		**x**	
	Breathworks			**x**							
	MORE				**x**						
	MM								**x**		**x**
	MBM	**x**									
Major findings	Pain Intensity	↓	↓		↓	↓	↓		↓		↓
	Pain Control/ Acceptance			↑		↑				↑	
	QOL	↑				↑					
	Functional Ability		↑		↑	↑					
	Anxiety	↓				↓					
	Depression	↓	↓	↓		↓					
	Applicability	x	x	x	x	x	x	x	x	x	x

API–Attention to Positive Information Score, **APNIS**–Attention to Positive and Negative Information Score, **ATT-** Attitudes Toward Treatment, **BPI**–Brief Pain Inventory, **CERQ—**Cognitive Emotion Regulation Questionairre, **C-SOSI-** Calgary Symptoms of Stress Inventory, **CPAQ**–Chronic Pain Acceptance Questionnaire, **CSQ**–Coping Strategies Questionnaire, **DAPOS**— Depression Anxiety and Positive Outlook Scale, **FFMQ**–Five Facet Mindfulness Questionnaire, **GAD**–Generalized Anxiety Disorder scale, **GCPS**–Graded Chronic Pain Scale, **HADS**–Hospital Anxiety and Depression Scale, **MAAS—**Mindfulness Attention Awareness Scale, **MBSR**–Mindfulness-based stress reduction, **MM**- Mindfulness meditation, **MMT**–Mindfulness-to-meaning theory, **MORE-** Mindfulness-Oriented Recovery Enhancement, **MRDQ**–Modified Roland Disability Questionnaire, **ODI**—Oswestry Disability Index, **Part-** Participants, **PCS**–Pain Catastrophizing Scale, **PGIC**–The Patient Global Impression of Change Scale, **PHQ**–Patient Health Questionnaire, **PSEQ**–Pain Self-Efficacy Questionnaire, **PSS**—Perceived Stress Scale, **QOL** – Quality of life, **RCT** – Randomized Controlled Trial, **SF**–Short-Form Health Survey ↓ - Reduced, ↑ - Increased

Appendix C

Figure 1

Conceptual Model

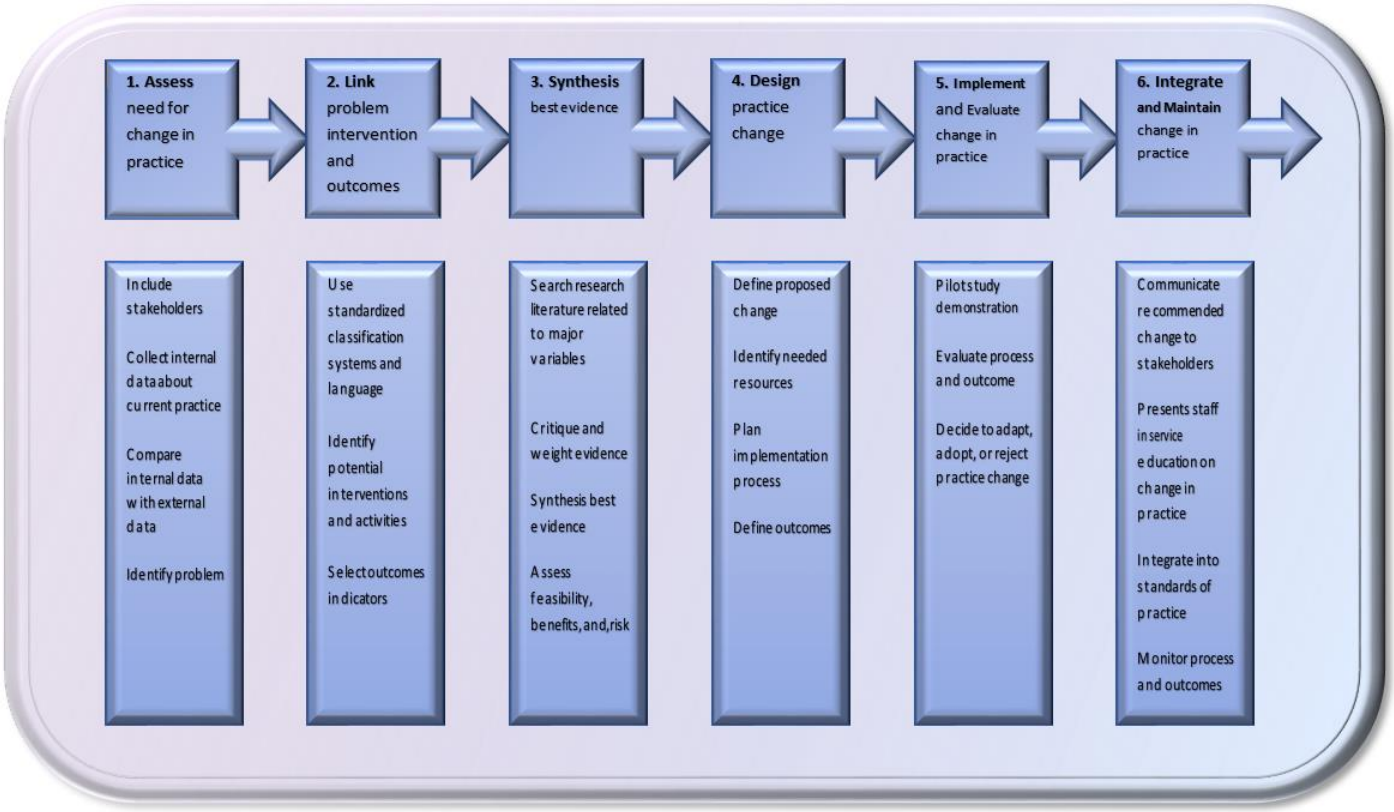


Note: Acceptance and Commitment Therapy (ACT) Relational Frame Theory (RFT), (Hayes et al., 2015).

Appendix D

Figure 2

Evidence Based Model



Note: Rosswurm and Larrabbee Model (1999).