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The Efficacy of Meditation-Based Treatments in Relapse Prevention for Persons with Substance Use Disorders

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THE EFFICACY OF MEDITATION-BASED TREATMENTS IN RELAPSE
PREVENTION FOR PERSON'S WITH SUBSTANCE USE DISORDERS

by

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A thesis submitted in partial fulfillment of the requirements
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ABSTRACT

Substance abuse is a global problem that has contributed to a variety of societal, financial, health, and familial strains. An increasing prevalence of illicit drug, prescription opioids, and alcohol abuse has created a need for re-evaluation of recovery and relapse treatments. This literature review examines the efficacy of meditation-based treatments for relapse prevention in persons recovering from Substance Use Disorders (SUDs). A comparative analysis of Mindfulness Based Relapse Programs (MBRP), an adapted MBRP-W program, and a Transcendental Meditation (TM) intervention was used to examine the success of meditation-based interventions. Research supports improvements associated with the meditation-based interventions including significant reductions in substance use, craving, stress, and negative affect. Meditation-based therapy may provide the emotional self-regulation and decreased impulsivity required for long-term abstinence from substance use. Consistent meditative practice was associated with greater improvements. Altering current meditation-based therapy treatment programs to encourage adherence and participation may increase success. Additional research is needed to evaluate long-term relapse prevention potential. Research incorporating meditation-based supportive therapies that promote well-being, emotion regulation, and stress relief are important for the future of successful SUD treatment.

DEDICATION

This is dedicated to anyone whose life has been affected by addiction and trauma.

Also for Maggie, who passed away after relapsing in the spring of 2010. I hope you found peace in your next life.

ACKNOWLEDGEMENT

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INTRODUCTION

Substance abuse is prevalent globally and has contributed to a variety of societal, financial, health, and familial strains. An increasing prevalence of illicit drug, prescription opioid, and alcohol abuse has created a need for re-evaluation of recovery and relapse treatments. Research supports that meditation-based therapy can potentially offer a tool for self-regulation of emotions and impulsivity, and may provide an adjunctive therapy to promote recovery program adherence.

The American Drug Crisis

Substance abuse has ramifications that can affect work or school, promote financial hardship, contribute to domestic and child violence, initiate arrests and prison time, and create serious health problems including death (National Institute on Drug Abuse, n.d.). Illicit drug use statistics continue to rise. In 2017, more than 72,000 Americans died from drug overdose—a statistic that has doubled in the past decade. The most contributory substances were natural and synthetic opioids, and stimulants including cocaine and methamphetamine (National Institute on Drug Abuse, 2018). Statistics from 2015 indicate that 15.1 million adults, about 6.2 percent of the population, had Alcohol Use Disorder (AUD) with an estimated 88,000 dying annually from alcohol-related deaths. Based on this data, alcohol use is the third leading cause of death in the United States (US) (National Institute on Alcohol Abuse and Alcoholism, 2018).

The significant costs to society are evidenced by drug-related crime statistics. Approximately 18 percent of inmates state that they committed their current offense to

obtain money for drugs (Office of Justice Programs, 2018). According to the *2017 National Crime Victimization Survey*, 26 percent of victims aged 12 and older claimed that they believed the offender was under the influence of drugs or alcohol (Office of Justice Programs, 2018). About 72 percent of state prisoners with mental health issues and 56 percent of those without mental health issues reported that they were dependent on or abused alcohol and drugs.

Substance Use Disorders (SUD) can have a significant toll on familial and partner relationships. Each family member can be affected and at risk for having "unmet developmental needs, impaired attachment, economic hardship, legal problems, emotional distress and subjection to violence" (Lander, Howsare, & Byrne, 2013, p. 194). Maternal opioid use and Neonatal Abstinence Syndrome (NAS) incidences have risen "300 percent from 1.5 per 1,000 hospital births in 1999 to 6.0 per 1,000 hospital births in 2013" (Ko et al., 2016, p. 799). This syndrome is most often attributed to in utero opioid exposure and is manifested by central nervous system irritability, autonomic over-reactivity, and gastrointestinal tract dysfunction.The Centers for Disease Control and Prevention (CDC) found that 1 in 10 pregnant women had consumed alcohol and 1 in 33 reported binge drinking in the past month (Centers for Disease Control and Prevention [CDC], 2018). Alcohol consumption during pregnancy causes Fetal Alcohol Spectrum Disorders (FASDs) exhibited by physical deformities and underdevelopment. FASDs are often manifested by a small head size, short stature and low body weight, organ or bone problems, and cognitive impairments including hyperactivity, poor attention and memory, learning and language delays, intellectual disabilities, and possible fetal death (CDC, 2018).

Children who have a parent with a SUD are more likely to have a lower socioeconomic status and increased difficulties in academic and social settings, in addition to impaired family functioning (Peleg-Oren & Teichman, 2006). Based on data from 2009 to 2014 from The National Surveys on Drug Use and Health, 1 in 8 children aged 17 and under lived with at least one parent with a SUD, including 1 in 10 with AUD and 1 in 35 who had a parent that used illicit drugs (Lipari & Struther, 2017). These children are more likely to demonstrate higher rates of mental and behavioral disorders (Peleg-Oren & Teichman, 2006). In the absence of a positive extended support system, many of these children grow up to have SUDs themselves (Biederman, Faraone, Monuteaux, & Feighner, 2000; Peleg-Oren & Teichman, 2006).

Defining Substance Use Disorder

SUD is a general diagnosis that covers a range of disorders involving the abuse of at least one out of the 10 classes of potentially addictive drugs. These substances include alcohol, caffeine, cannabis, hallucinogens, inhalants, opioids, stimulants (including amphetamine derivatives and cocaine), tobacco, "other" substances, and sedatives, hypnotics, and anxiolytics (American Psychiatric Association, 2013). Diagnosis of a SUD requires that the clinician specifies the substance being used (e.g. alcohol use disorder, cocaine use disorder, heroin use disorder) or that all drugs are identified if the individual is a polysubstance abuser. Important symptomatic criteria for diagnosis includes impaired control and a persistent inability to cut down or regulate use, spending large amounts of time obtaining and using the drug, and experiencing craving, social impairment, and risky use that threatens health (American Psychiatric Association, 2013; Lipari & Struther, 2017). Although each drug class has a different

pharmacological approach, they each activate the same brain reward system that is usually involved in the reinforcement of behaviors and the production of memories. This intense activation and chase for a "high" often leads to neglect in normal activities and most often manifests in individuals with reduced self-control (American Psychiatric Association, 2013). This cluster of cognitive, behavioral, and physiological symptoms indicates that an individual will continue to use substances despite the ramifications of significant substance-related problems. The prevalence of polysubstance abuse has further contributed to higher rates of overdoses and mortalities (European Monitoring Centre for Drugs and Drug Addiction, 2002).

Trauma, Impulsivity, and Emotional Dysregulation as Personality Traits in Person's with SUDs

The use of illicit drugs, alcohol, or prescription medications with addictive properties does not definitively mediate the development of a SUD. Research has shown strong correlations between trauma, including adverse childhood experiences of neglect and abuse and adult acquired Post-Traumatic Stress Disorder (PTSD), in the development of psychiatric traits and SUDs (Mergler et al., 2018). Exposure to sexual and physical abuse in childhood significantly contributes to the development of mental and emotional disorders such as depression, anxiety disorders, conduct/antisocial personality disorder, substance dependence, and suicide attempts in adulthood (Fergusson, Boden, & Horwood, 2008). There is an especially strong relationship between the number of childhood adversities and consequential self-destructive behavior and substance abuse (Dube, Anda, Felitti, Edwards, & Croft, 2002; Maremmami et al., 2018). The self-medication hypothesis of addictive disorders states

that PTSD patients may use substances to relieve painful symptoms, contributing to the development of SUDs (Khantzian, 1985). Exposure to interpersonal trauma, especially during developmentally sensitive time periods, contributes to an altered response in emotional processing (Langevin, Hebert, & Cossette, 2015).

Emotional (affect) dysregulation is a personality trait that reflects problems with under-regulation of heightened affect states or maladaptive overregulation of affect leading to detachment. Having a limited ability for effective strategies to reduce intense affect states leads to problems with impulse control and goal-directed behavior (Pat-Horenczyk et al., 2015; Van Dijke, Hopman, & Ford, 2017). It is characterized by intense emotions, low distress tolerance, experiential avoidance, and a lack of control or strategies to effectively manage emotions (Eftekhar, Zoellner, & Vigil in 2009 and Moore, Zoellner, & Mollenholt in 2008 as cited in Price et al., 2018). Growing research is showing a link between emotion dysregulation and substance use (Kelly & Bardo, 2016). This is a trait that accompanies many mental health disorders and is a key feature of borderline personality types (Schulze, Schmahl, & Niedtfeld, 2016).

There is a significant relationship between mental health disorders and the presence of a SUD. Multiple studies have documented high but variable rates of DSM personality disorders (PD) in clinical samples of substance abusers (Rounsaville et al., 1998). A strong comorbidity has been found between alcohol abuse, drug-dependence, and depression that was supported by previous clinical observations (Swendsen & Merikangas, 2000). In an evaluation of alcoholic outpatients, 80 percent had either a coexistent axis I or II disorder (Nurnberg, Rifkin, & Doddi, 1993). Another study found that 57 percent of patients with substance use disorders met criteria for at least one comorbid axis II disorder with antisocial PD and borderline PD being the most

predominant (Rounsaville et al. 1998). Both conditions manifest in adolescence and reflect difficulties with emotional regulation and impulsivity.

Certain personality traits in SUDs have been measured and can be considered prevalent in this population. Research has shown that externalizing behaviors and sensation seeking, especially in later adolescence and young adulthood, may contribute to the pursuit of risky behaviors (McCabe, Louie, & King, 2015). One characteristic that is a frequent predictor of risk behavior is trait impulse control, also understood to be an inability for premeditation. Early studies have related poor impulse control to externalizing and conduct problems (Whiteside & Lynam, 2009). Other studies found links between impulsivity, alcohol problems and drug use (Coskunpinar et al., 2013; Stautz & Cooper, 2013; Verdejo-Garcia, Lawrence, & Clark, 2008). McCabe, Louie, and King's (2015) study concluded high sensation seeking along with increased impulsivity were characteristics that significantly contributed to the highest rates of drinking and drug consequences.

Conventional Treatments

Following detoxification, common treatments for SUDs include individual and group counseling, inpatient and residential treatment, partial hospital programs, medication, recovery support services, 12-Step fellowships, and peer support systems. Counseling treatments include cognitive behavioral therapy (CBT) to build skills that promote abstinence, contingency management to provide incentive and positive reinforcement, motivational enhancement therapy to build motivation and commitment, and 12-step facilitation therapy to promote cognitive restructuring (Desert

Hope, n.d.; McHugh, Hearon, & Otto, 2011; Substance Abuse and Mental Health Services Administration [SAMHSA], 2018).

There are diverging opinions in literature about the effectiveness of Alcoholics Anonymous (AA) and Narcotics Anonymous (NA). Data on program adherence is difficult to quantify given the nature of anonymity and the lack of accurate data records collected by each program, however attrition is generally high with 91 percent of AA and 85 percent of NA members stopping attendance for a month or longer (Krentzman et al., 2010). Reasons for leaving include using drugs and alcohol and not feeling ready to stop or wanting to recover independently. These reasons reflect the inefficacy of both programs in enhancing motivation and confidence to continue with recovery.

Defining Meditation

In the past three decades there has been a growth in the interest and use of meditation by western therapeutic programs. Buddhist practices may be considered the standard for understanding the effects of meditation, which can easily be interpreted into secular thought and have been widely studied by neuroscientists and psychologists in the last few decades (Ekman, Davidson, Richard, & Wallace, 2005). Buddhists and psychologists similarly believe that emotions strongly influence people's thoughts, words, and actions. Buddhists maintain that happiness is attained through sustained training in attention, emotional balance, and mindfulness, to help one distinguish between how things appear to the senses and the self-projection of superimpositions on them. This training results in a shift in fleeting emotions, and eventually leads to a change in mood and temperament (Ekman et al., 2005). Certain mental states such as craving, hatred, and the delusion of an identity as concrete, are considered afflictive

regardless of degree or context. Craving is based on an unrealistic, reified distinction between the self and others or objects, creating an unbalance in the mind that gives rise to anxiety, misery, fear, and anger (Ekman et al., 2005).

Neuroscience is showing that dopamine release from the nucleus accumbens is common to states of craving regardless if it is pharmacologically or activity induced and is not associated with pleasure in the long run. In this sense, meditation practices offer a chance for individuals to reflect on their own internal experiences and can offer a therapy for anyone seeking to improve the quality of their lives (Ekman et al., 2005).

With the increasing western interest in meditative practice, research has attempted to classify the different types of meditation according to their foci. The two main types that can be distinguished are *focused attention* (FAM) and *open monitoring* (OMM). FAM involves maintaining a sustained selective attention on a chosen concept or object, such as breathing, physical sensation, or a visual image, whilst avoiding mind wandering (Lee, Kulubya, Goldin, Goodzari, & Girgis, 2018). FAM is associated with intentional activity within the attentional network and induces a narrow attentional focus due to its highly concentrative nature (Fujin, Ueda, Mizuhara, Saiki, & Normura, 2018; Lippelt, Hommel, & Colzato, 2014). OMM involves an acceptance of internal and external cues while maintaining a non-judgmental awareness (Fujin et al., 2018). This includes the increasingly well-known concept of mindfulness and its associated therapies, which are defined by leading researcher John Kabat-Zinn as "the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145). OMM also includes Vipassana, which influenced the core techniques of mindfulness-based stress reduction therapies (Samuel, 2015). In contrast to FAM, OMM

induces a broader attentional focus and allows practitioners to develop a more acute and less emotionally reactive awareness of their experiences (Fujin et al., 2018; Lippelt et al., 2014). There is some overlap between the two types, namely that in OMM there may initially be an object focus, often the breath, with the goal of gradually shifting focus into the broader monitoring of arising sensations and thoughts, and then further into the monitoring of awareness itself (Lee et al., 2018).

Structural and Functional Changes through Meditative Practice

Several methods that measure brain activity and function have been used in comparative studies to evaluate the effects of meditative practices for influencing structural and functional changes in neuroanatomy. In comparing scalp electroencephalography (EEG) wave readings of experienced Zazen meditators (OMM) during non-meditative and meditative states there were significant changes in the Default Mode Network (DMN) during meditation. Increased alpha activity was found primarily in the right hemisphere including areas associated with emotional processing, self-reference based on momentary experience, response inhibition, increased executive control, and increased momentary proprioception (Faber et al., 2014). Aftanas and Golosheykin (2005) compared the EEG response of experienced Sahaja Yoga mediators (OMM) against controls during rest periods, with alternating periods of the eyes opening and closing, and while watching an aversive movie clip to promote a negative emotional response. The meditators showed less tonic arousal and more internalized attention with less attentional involvement while viewing the neutral movie clips. Additionally, whilst both groups showed significant alpha desynchronization, reflecting an arousing nature of emotional induction, the control group showed significantly

higher levels and additional gamma synchronization, which reflects a "focused arousal" state, suggesting a heavier emotional workload on the control group compared to the meditators (Aftanas & Golosheykin, 2005; Sheer, 1989). Data from these studies supports that individuals who meditate regularly have capabilities for moderating the intensity of their negative emotional arousal.

Diffusion Tensor Imaging (DTI) is an imagery modality that can be used to quantify white matter bundles in the brain to compute the fractional anisotrophy (FA), indicating patterns of brain conductivity. A higher FA reflects enhanced connectivity. Luders, Clark, Narr, and Toga (2011) compared a variety of long term mediators against controls and found significantly higher FA levels in areas that may contribute to a meditator's ability to cultivate positive emotions, retain emotional stability, and engage in mindful behavior. Similarly, Newberg et al. (2010) used Single Photon Emission Computed Tomography (SPECT) imaging to measure baseline cerebral blood flow in a group of long-term meditators against controls, and found significantly higher ratios in areas that have roles in emotion regulation. These areas showed more permanent differences compared to controls.

Gray matter density provides another useful measurement, which is assumed to increase after repeated activation. Magnetic Resonance Imaging (MRI) data was taken from meditation-naïve participants suffering from chronic stress before and after completing an intensive 8-week mindfulness training. Researchers found significant increases in gray matter concentrations with significant group by time interactions in areas that suggest an improved function in regulating emotional responses and possibly signify an increased self-reflection by applying emotional context to self-reference (Hölzel et al., 2011). Research supports that meditators have an enhanced control over

emotional processing and responses, which has been quantitatively measured through a variety of modalities.

Meditation in Clinical Therapy

Meditative practice found scientific roots in the 20th century when researchers studied Buddhist practitioners in hopes of understanding a pervasive perception of improved mental wellbeing in this population. In the late 1970s social psychologist Dr. Ellen Langer began her strictly secular research on the illusion of control, mindful aging, stress, and decision-making, and established evidence-based therapies using everyday mindfulness without meditation through developing The Langer Mindfulness Institute (Langer, 2009). In 1979 Dr. Jon Kabat-Zinn opened the Center for Mindfulness in Medicine, Health Care, and Society at the University of Massachusetts Medical School, and created the Mindfulness-Based Stress Reduction (MBSR) program by adapting ancient traditions with clinical evidence to treat a wide variety of issues in western medicine (Tippet, 2012). Kabat-Zinn applied teachings of Vipassana meditators to create an OMM-incorporated therapy. The MBSR program has a patient-centered education approach and its primary goals are to teach people how to take better care of themselves and facilitate adaptation to life's stressors (Kabat-Zinn, 2014). The program includes 8-weekly classes that are 2.5-3.5 hours long; with formal mindfulness training in a body scan meditation, supine Gentle Hatha Yoga, mindfulness of breath, body, thoughts, and emotions, and an awareness walking meditation. It also includes instruction for everyday mindfulness, around an hour of daily home assignments for 6-days a week, individual and group reflection meetings, an all-day silent retreat, and introduction and exit interviews (Kabat-Zinn, 2014). Studies have found therapeutic

uses for MBSR in treating anxiety, depression, substance abuse, eating disorders, and fibromyalgia pain (Bowen et al., 2006; Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007; Hofmann, Sawyer, Witt, & Oh, 2010; O'Reilly, Cook, Spruijt-Metz, & Black, 2014).

In 1992, the Dalai Lama invited neuroscientist Dr. Richard Davidson to use modern tools in neuroscience to study how long-term meditation had changed the brains of Indian monks. Through his research, Davidson redefined the concept of neuroplasticity, which is the ability of the brain to produce measurable change. Davidson discovered differences in gamma oscillations of electrical brain activity between conventional persons and long-term meditators who showed continuous readings for several minutes at very high amplitudes (Tippet, 2012). Davidson reports in Tippet (2012) that the quality of clarity in the meditator was highly correlated with the presence of the gamma oscillations. In 2008, Davidson founded the Center for Investigating Healthy Minds for treating neurological disorders such as Attention-Deficit/Hyperactivity Disorder (ADHD), anxiety, affective disorders, PTSD, and autism (Tippet, 2012).

Mindfulness practices are increasingly being adapted into new therapeutic programs. Mindfulness-Based Cognitive Therapy (MBCT) combines mindfulness meditation with cognitive therapy to break the cycle of recurrent depression and has clinical support for symptom reduction (University of Massachusetts Medical School, 2017). This 8-week program helps participants become aware of how conditioned patterns of mind and mood can trigger depression relapse and sustain current depressive symptoms. Being aware of the signs of relapse allows for early intervention and continued practice can reduce the need for medication (University of Massachusetts Medical School, 2017).

Two therapies that are offered for relapse prevention are the Mindfulness-Based Relapse Prevention (MBRP) and the Mindfulness-Based Therapeutic Community programs (MBTC). MBRP is a 5-day course that incorporates interventions from Dr. Alan Marlatt's Relapse Prevention Therapy (RP), MBSR, and MBCT (UCSD Center for Mindfulness, n.d.). It is designed to prevent relapse for SUDs after undergoing inpatient treatment or intensive outpatient treatment. This program helps participants to recognize and stay with physical, emotional, and cognitive discomfort, and to "cultivate heightened awareness of internal and external triggers while promoting healthy lifestyle modifications that support recovery" (UCSD Center for Mindfulness, n.d., para. 2). Like 12-step programs, this program promotes acceptance, letting go of personal control, and the use of meditation (prayer) practices. Differences from AA and NA programs include the exclusion of labels like "addict", "alcoholic" or "diseased", an admission of powerlessness, and the use of a Higher Power for motivation (Stout, n.d.). Also important in the MBRP program is that it offers abstinence for individuals without insisting on it, which is beneficial in reducing harm from problem behaviors and emphasizing moderation approaches. Overall, this program emphasizes the internal power of individuals using CBT, without emphasis on the "failures" of relapse (Stout, n.d.).

Therapeutic communities (TC) have long been recognized as a method to treat SUDs by supporting social learning contributing to a change in worldview and self-image (De Leon, 2010). Attrition rates can be as high as 50 percent with the greatest dropout rates occurring in the first 30-60 days. Stress is considered a contributory factor to attrition, so MBTC programs have adapted MBSR for the TC aiming to reduce stress and increase retention (Marcus et al., 2009).

PURPOSE

Statistical trends indicate an increasing prevalence of drug and alcohol abuse, which can have several concurrent societal, financial, and health consequences. Traditional recovery programs have high rates of attrition and relapse, signifying a need for alternative or additional treatment methods. Meditation research demonstrates a potential for enhanced emotional processing and increased impulsivity and craving modulation. This literature review explored the feasibility and effectiveness of mediation-based treatments, which may provide an alternative or adjunctive therapy for relapse prevention.

METHODOLOGY

Databases including CINAHL and CINAHL Plus with Full Text, Cochrane Central Register of Controlled Trials, MEDLINE, PsycARTICLES and psycINFO were searched using key words and limiters. Key words included "substance abuse", "addiction", "alcohol abuse", "narcotic abuse", "substance use disorder", or "drug dependence" and "relapse", "recurrence", or "regression", and "meditation", "mindfulness", "mindfulness based stress reduction", "mindfulness based relapse prevention", or "mindfulness based therapeutic community".

Studies measuring relapse prevention efficacy after a non-movement based meditation therapy that met inclusion criteria were evaluated. Scholarly, peer reviewed journals with publications from 2008 to 2018 were included. Exclusion criteria included movement-based meditation such as yoga and qigong, qualitative studies, non-English articles, secondary analyses, systemic reviews, short communications, study protocols, and editorials. Neurofeedback, pharmacological, and faith-based treatments were also excluded, to decrease the influence of external factors on meditative practice outcomes. Studies comprising of group sizes less than 20, with an absent control group, or employing a weak design were removed from the final analysis.

FINDINGS

Seven articles that met the inclusion criteria are included in this review. All of the studies used experimental designs. Five studies evaluated all SUDs including alcohol, illicit drugs, and polysubstance. One study addressed stimulant dependence and another examined AUDs. There were a variety of SUD interventions tested. Five studies evaluated the efficacy of MBRP, one study used an adapted program Moment-by-Moment in Women's Recovery: A Mindfulness-Based Approach to Relapse Prevention (MBRP-W), and another implemented a 14-week Transcendental Meditation (TM) intervention. All research was conducted in the United States and approved by an institutional review board (IRB). Financial incentives were used to recruit participants and reduce attrition.

The first randomized controlled trial (RCT) to evaluate an MBRP intervention was conducted by Bowen et al. (2009) with the purpose of discovering the feasibility and initial efficacy of an MBRP intervention compared to treatment as usual (TAU) by assessing substance use outcomes, craving, mindfulness, and acceptance. This trial assessed a sample with a range of SUDs: alcohol (45.2%), cocaine/crack (36.2%), methamphetamines (13.7%), heroin and other opiates (7.1%), marijuana (5.4%), others (1.9%), and polysubstance (19.1%). The intervention consisted of 2-hour weekly group meetings over 8-weeks facilitated by two therapists with intensive MBRP training. Sessions included 20-30 minutes of guided meditation with experiential exercises, discussion of the mindfulness role in relapse prevention, homework, daily exercises, and guided meditation CDs. The TAU group met once or twice weekly in 1.5-hour sessions for a 12-step supported process-oriented program that used relapse prevention skills

according to the disease model of addiction (Bowen et al., 2009). There were 168 participants in the sample between 18 and 70 years of age that were 63.7 percent male, 51.8 percent Caucasian, and 28.6 percent African American. Legally mandated and homeless participants were included. There were four assessment points over the 4-month study period. There was 61 percent retention post-intervention, 57 percent at 2-months, and 73 percent at 4-months.

Several self-report measures were used. The Timeline Followback (TLFB) addressed the previous 60 days of substance use, the Penn Alcohol Craving Scale (PACS) was adapted to include drug craving, the Short Inventory of Problems (SIP-AD) assessed impulse control, social responsibility, and substance use consequences, the Acceptance and Action Questionnaire (AAQ) which assessed acceptance versus avoidance and control of negative private experiences, and the Five Factor Mindfulness Questionnaire (FFMQ). Meditation practice was recorded weekly and a feedback questionnaire evaluated course satisfaction (Bowen et al., 2009).

Bowen et al. (2009) found that alcohol or drug (AOD) use decreased to greater extent among MBRP participants compared to TAU ($p <.001$). There was a curvilinear effect of MBRP treatment where treatment gains decayed by 4-months post-intervention and a "curvilinear decrease in the experience of substance use problems over time. Overall there were no significant treatment interactions or main effects of treatment on substance use problems ($p > .68$)" (Bowen et al., 2009, p. 301). Over time, craving decreased to a greater extent among MBRP participants ($p < .001$), however the magnitude of decreases in craving plateaued over the 4-month post-intervention period. The Acceptance (AAQ) model was statistically significant ($p = .02$) so that over time acceptance increased more among MBRP participants. These increases "plateaued over

4-months post intervention. The acting with awareness (FFMG-ACT) model was marginally significant (p = .07) suggesting that acting with awareness increased to greater extent in MBRP versus TAU participants for whom it decreased. At four months post-intervention increases in acting with awareness among MBRP participants plateaued" (Bowen et al., 2009, p. 302). Overall, participants rated MBRP course as highly important with a high likelihood of continuing formal and informal practices (p < .001).

A similar RCT by Bowen et al. (2014) assessed the relative efficacy of MBRP, RP, and TAU on 12-month SUD outcomes from October 2009 to July 2012. Two hundred and eighty six individuals between 18 to 70 years of age were recruited. The majority were male (71.5%), Caucasian (57.9%), and had completed initial intensive inpatient or outpatient care from a 2-site private, non-profit chemical dependency treatment agency. The type of drug and alcohol use among participants was not specified. There were 103 participants randomized to MBRP, 88 to RP, and 95 to TAU. The MBRP group comprised of 6-8 members per group and followed the same structure as the study by Bowen et al. in 2009 plus tracking sheets to monitor daily craving and mood. The RP group matched MBRP in time, format, group size, location at the agency site, and scope of assigned homework. Objectives for discussion included the assessment of high-risk situations, cognitive and behavioral coping skills, problem solving, goal setting, self-efficacy, and social support with daily monitoring of craving and mood. Both RP and MBRP participants were removed from the primary aftercare groups of the agency and returned following program completion. The TAU group maintained abstinence and was primarily process-oriented, based on the AA/NA 12-step programs. Group meetings were held once or twice weekly (n = 95) for 1.5-hours each (Bowen et al., 2014). Self-

report measures included the Addiction Severity Index (ASI) to track abstinence at the baseline and end of treatment, the Severity of Dependence Scale (SDS) for reporting symptoms of substance dependence, and the TLFB to account for the 30-day period before the baseline and subsequent periods between assessments. In addition, biophysical assessments using urinalysis drug and alcohol screening were obtained from a subset of participants (n = 199) who were court mandated or otherwise identified for testing by the agency.

Data was collected at four time points: baseline, 3-months post-intervention, 6-months post-intervention, and 12-months post-intervention (Bowen et al., 2014). Compared with TAU, MBRP and RP groups showed a 54 percent decreased risk of relapse to drug use and a 59 percent decreased risk of relapse to heavy drinking. Compared to RP, MBRP showed 21 percent increase in relapse risk to first drug use. The groups did not significantly differ on time to first heavy drinking day. At the 3-month follow-up there were no significant group differences on drug use days, any drug use, heavy drinking days (4+ drinks for women, 5+ for men), or any heavy drinking days between all groups (Bowen et al., 2014). At the 6-month follow-up the RP and MBRP groups reported 31 percent fewer days of drinking compared with the TAU groups and both MBRP and RP groups had significantly higher probabilities of abstaining from drug use and heavy drinking compared to TAU. There were no significant differences between MBRP and RP at this time point. The 12-month follow-up found that MBRP participants reported 31 percent fewer drug use days and a significantly higher probability of not engaging in heavy drinking (Bowen et al., 2014).

In a 2018 study by Davis et al. the effects of TAU plus MBRP were compared to TAU plus additional 12-step meetings to evaluate perceived stress, craving, and

substance use. Hypotheses stated that MBRP participants would have lower craving during the treatment and in the post treatment phase and would have lower levels of substance using days and perceived stress during post-treatment. Furthermore, it was hypothesized that reductions in treatment-phase stress would mediate the association between both MBRP assignment and post-treatment craving and between MBRP assignment and post-treatment substance using days (Davis et al., 2018). Participants were between 18-29 years old and were 65 percent male and 91 percent Caucasian who had one or more parents with a SUD and were primarily unemployed illicit drug users. Most had spent a large portion of time in jail or prison and 90 percent were polysubstance abusers. The sample was recruited from a residential, public, non-profit substance use treatment center that provided care to low-income patients with SUDs. Seventy-nine participants were randomized to MBRP (n = 44) or TAU (n = 35). A rolling group format was used to accommodate individuals as they entered the residential facility, which was in contrast to the conventional 8-week cohort-based protocol. The intervention was in addition to TAU. Sessions where led by two masters-degree level clinicians with 200-hours of clinical training in mindfulness-based interventions. A standardized "introduction" during each session covered the basics of mindfulness, definitions, discussion of the triangle of awareness and the SOBER (Stop, Observe the body, Breathe, Expand awareness, Respond mindfully) breathing space. A brief meditation took all participants through the SOBER steps. The MBRP group met twice weekly for 1.5-hour group sessions with 3-12 participants, which ensured course completion during the average one-month residential stay. Each class included specific themes, 20-30 minutes of homework daily using recorded guided meditation, and written exercises. The control group using TAU only received Cognitive Behavioral

Therapy (CBT) and 12-step approaches, with additional attendance to eight AA or NA

support groups to compensate for the "extra attention" received by the MBRP group

(Davis et al., 2018).

The follow-up post treatment phase was missing data from 17 percent ($n = 14$) of

participants. Ninety-five percent provided data at the 1-month follow-up, 81 percent

completed data collection at 3-months, and 75 percent completed assessments at 5-

months. Davis et al. (2018) found that at the end of treatment the MBRP participants

abstained from substance use immediately after treatment and maintained a flat

trajectory throughout the remainder of the study ($p = .76$). The TAU group tended to

show immediate increases in substance use ($p < .001$) that peaked & plateaued around

13 weeks after treatment. There were nearly statistically identical declines in levels of

craving during the treatment phase in both groups. These trajectories diverged

markedly upon leaving treatment ($p < .001$) with those in the MBRP group largely

maintaining low levels of craving throughout the remainder of the 28-week study period

($p = .29$). The TAU group showed rather immediate and substantial increases in craving

levels before plateauing approximately 14-weeks post-treatment ($p < .001$)(Davis et al.,

2018). Only the MBRP group showed statistically significant (linear) improvements in

their stress levels during treatment phase ($p = .18$). The MBRP group showed

statistically less positive rates in perceived stress compared to the TAU group ($p = .03$)

upon leaving treatment and tended to maintain their lower, treatment-acquired stress

levels at 28-weeks post-treatment. Those in TAU group showed rather immediate

increases in stress levels that gradually slowed ($p = .03$) before plateauing around 17

weeks post-treatment. The data indicated a non-significant indirect effect for stress

between treatment assignment and craving, and a significant indirect effect for stress

levels between treatment assignment and substance use. Post-treatment substance use is expected to decrease by 0.45 SD for individuals assigned to MBRP via decreases in perceived stress during treatment (Davis et al., 2018).

The feasibility, acceptability, and potential benefits for integrating the MBRP-W program into SUD treatment for a culturally diverse, low income group of women was evaluated by Amaro, Spear, Vallejo, Conron, and Black in 2014. This non-randomized, non-controlled pilot trial examined the effects of substance use, perceived stress, and trauma symptoms for 318 females aged 18-58. It was hypothesized that "MBRP-W would be feasible and acceptable to culturally-diverse, low-income women in SUD treatment and that it would be associated with decreases in addiction severity with improvements in psychological functioning, particularly perceived stress and trauma symptoms" (Amaro et al., 2014, p. 548-549). It was further hypothesized that attendance in five or more sessions would provide meaningful outcomes. Multicultural participants- Hispanic 45.3 percent, non-Hispanic Black 34.6 percent, and non-Hispanic White 20.1 percent- with non-specified distributions of drug and alcohol use disorders were recruited between April 2003 and December 2006. Participants had high rates of unemployment (97.8%) and many were court mandated for treatment (45.6%).

The MBRP-W program was adapted from MBSR as a treatment for substance use relapse prevention in women with a history of trauma exposure. The 1.5- to 2-hour weekly sessions were delivered in groups of 8 to 12 participants in nine sessions. Groups learnt meditation techniques, practiced gentle yoga, developed self-regulation strategies such as using mindfulness to manage stress and difficult emotions, and participated in a 4-hour silent retreat during the seventh session. The program was reshaped from MBSR to focus on the role of stress in relapse with effort to address a history of trauma and

daily experiences of stress. The program's goals were to refine self-regulatory skills, increase relaxation and awareness, decrease stress and reactivity, become aware of cravings with nonjudgmental observation, recognize early signs of relapse, and teach skills to come back to the present moment. The program incorporated needs of participants with trauma and mental health disorders and was sensitive to cultural stigma that prevents Latina and African-American women from sharing experiences with trauma and mental health. Groups were offered four to six times a year in English and Spanish sequentially and closed to new participants after the second session. Self-report measures were used to assess feasibility and acceptability with attendance sheets to track the number of sessions participated in and a questionnaire to assess overall satisfaction, attitude changes towards stress, and improvements in wellbeing. These included four open-ended questions to address what participants liked best and least, and what they would tell other women in recovery about their experience. Treatment dosage was assessed using categorical variables to compare the effects of lower (1-4 sessions) and higher (5-9 sessions) doses of MBRP-W compared to those who attended no sessions (Amaro et al., 2014). The alcohol and drug measures from the ASI were used to evaluate the previous 30-days of substance use, including alcohol use to intoxication, poly-drug use, and the frequency of problems related to substance use, the extent to which the participant was troubled by substance-related problems, and the perceived importance of treatment. The Perceived Stress Scale (PSS) was administered to assess the response to stressors during the previous 30 days and an adapted version of the Post-traumatic Diagnostic Symptom Scale (PDS) was used to assess the frequency of intrusive thoughts, numbing, avoidances, hyper-arousal, vigilance, and other issues experienced during the previous 30-days. All participants completed the PDS regardless

of exposure to qualifying traumatic events as defined by the DSM-IV guide. Trauma exposure was measured using the Life Stressor Checklist to assess lifetime and current (past 6-months) exposure to traumatic or stressful events. Data collection occurred at three time points during baseline interviews, 6-month follow-up, and 12-month follow-up (Amaro et al., 2014).

Amaro et al. (2014) found that all participants reported a history of exposure to traumatic life events and 92 percent reported exposure in the previous 6 months prior to enrolling. A higher percent of women from the Caucasian or other racial/ethnic backgrounds group were found in the no MBRP-W and lower dosage groups. Women in the high dosage group were more likely to be in residential treatment and court-ordered treatment compared to the other groups. They were also more likely to be in SUD treatment at six and 12-month follow-ups compared to the other groups. Almost twenty percent attended one to four sessions, 35.8 percent attended five to nine sessions, and 44.3 percent did not attend any groups. Conflicts with commitments to treatment facilities and/or other providers resulted in treatment dropout. Among those who completed, satisfaction was reported as high. On average, women rated the change in their knowledge and skills as "considerable" with mean ratings on the quality and importance of MBRP-W between 3.4-3.5 where three is very good and four is excellent (Amaro et al., 2014). Participants reported satisfaction with learning how to manage feelings and meditating. There was a significant time-by-group interaction that was observed for alcohol ($p < .001$) and drug severity ($p < .05$) with an average rate of decline in addiction severity across dosages of MBRP-W. There was a greater rate of decline in ASI scores for participants between baseline and 12-months if they attended five to nine sessions ($p < .05$). Change in perceived stress over time varied significantly

by exposure to MBRP-W with scores declining by an average of 1.7 points per 6-month survey among all participants and high exposure groups experiencing an additional 2.3-point decline (p <.05). The change in trauma scores did not vary significantly after MBRP-W, however symptom scores among all participants declined by an average of 1.7 points at the 6-month survey interval (Amaro et al., 2014).

The pilot study by Witkiewitz, et al. (2014) compared the relative efficacy of MBRP and RP in the prevention of substance use relapse during intensive residential substance abuse treatment for women referred by the criminal justice system. Hypotheses included that MBRP participants would report less drug use and fewer drug-related consequences compared to those assigned to RP and that MBRP participants would report fewer medical, legal, psychiatric, and family/social problems compared to those assigned to RP. Recruitment of women referred to a nonprofit women's residential treatment center by the criminal justice system was conducted between July 2010 and December 2011. One hundred and five participants (n = 105) randomized into an MBRP (n = 55, mean age 35.8) and RP (n = 50, mean age 32.4). Of these, 86 participants had mental health histories including having at least one suicide attempt (46%), severe trauma (69.2%), chronic depression (70.7%), anxiety (73.5%), and a history of abuse (89.2%). Substance use included "methamphetamine (35.5%), heroin and other opiates (22.6%), cocaine (19.4%), alcohol (9.7%), marijuana (6.5%), nicotine (3.2%), and other drugs (3.2%)" (Witkiewitz, et al., 2014, p. 537-538).

The 8-week intervention of twice weekly 50-minute sessions was an adapted MBRP in rolling admission format. Primary objectives included teaching strategies to assess high-risk situations for relapse, building cognitive and behavioral skills to cope with craving and high-risk situations, and skills including goal-setting, drink refusal,

self-efficacy, social support, and a balanced lifestyle. Each MBRP session began with a brief guided meditation, experiential exercises, followed by a discussion. Assigned 30-minute exercises were practiced four days a week between sessions at scheduled times (Witkiewitz, et al., 2014). The control group intervention was manual-based RP plus portions of the Coping Skills Training Guide adapted to correspond with the MBRP content. These interventions had the same structure, time commitment, group format, and scheduling. Skill-building assignments were given to practice between sessions approximating the time and effort of the MBRP group. Self-report measures included the 30-day TLFB at baseline, 4-weeks, the end of the treatment program, and at the 15-week follow up. The Short Inventory of Problems (SIP-M) was abbreviated from the Inventory of Drug Use Consequences and collected at baseline and the 15-week follow-up. The subscales of the Addiction Severity Index (ASI) assessed the previous 30-days of family/social, medial, and legal problems and psychiatric symptoms and was collected at the baseline and 15-week follow-up. Focus was on individual subscales of the ASI rather than the total scores to compare each dimension. Additional weekly assessments were administered during the 8-weeks of treatment (Witkiewitz, et al., 2014). Throughout the study period, 23 MBRP participants and 15 RP participants did not receive or discontinued intervention and 27 (MBRP) and 24 (RP) were lost to follow-up. Attrition analysis in the results did not reveal that missing data was associated with demographic measures, primary or secondary outcomes, or treatment condition.

The data found that rates of drug use across the 15-week follow-up were low in the sample with one participant in the MBRP group reporting 1 day of drug use and five participants in RP reporting an average of 2.6 days (SD = 3.71) (Witkiewitz, et al., 2014). MBRP participants had 96 percent fewer drug use days compared to RP (p = .001). Drug

use consequences were found to be lower in the MBRP group (39%), although this result was not statistically significant (p = .16). Furthermore, MBRP participants had significantly lower scores on the legal status (p = .02) and medical status (p = .007) subscales of ASI, however there were no significant differences on the family/social (p = .87) or psychiatric status (p = .22) subscales. MBRP participants had lower scores on the ASI total score but this difference was not significant in linear regression analyses (p =.21). Data showed that the amount of mindfulness practice was not significantly associated with primary or secondary outcomes at follow-up. Of the MBRP sample, 50 percent of participants reported "formal and informal practice at the end of treatment and 30 percent reported continued practice at the 15-week follow-up. Of the 55 participants in the MBRP group, 27 reported an average of 2.7 days (SD = 1.8) of formal meditation practice for an average of 19.6 minutes (SD = 16.5) per day at the end of treatment" (Witkiewitz, et al., 2014, p. 540). In addition, 16 of those 55 women reported an average of 2.8 days (SD = 1.62) of meditation for an average of 15.8 minutes (SD = 12.9) per day. Most participants reported at post-treatment that the SOBER space was the most important skill learnt at post-treatment (Witkiewitz, et al., 2014).

A two-year study compared the "incremental efficacy and outcomes of MBRP to a health education (HE) control for stimulant-dependent adults receiving contingency management (CM)" (Glasner et al., 2017, p. 127). The hypotheses in this pilot trial were that MBRP wo stimulant drug use relative to HE. Participants aged 22-67 years had a DSM-IV diagnosis of stimulant dependence including some with diagnosed Generalized Anxiety Disorders (GAD; 24%) or Major Depressive Disorder (MDD; 43%). Homelessness was an exclusion factor unless recovery home placement arrangements were made. Drug use

consisted of cocaine (49%) or methamphetamine (51%). Compensation was $20 for weekly data collections visit and $30 for follow-up.

MBRP group sessions held weekly for 8-weeks featured a guided meditation, homework review, and relapse prevention exercises guided by the MBRP manual. Session modification from 120 minutes to 75 minutes enhanced engagement. A MS therapist delivered the sessions after a 2-day manualized MBRP training seminar and the seminar trainer supervised during initial phases of the trial. This intervention was supplemented by a CM program that was delivered twice weekly featuring an initial urine sample collection and a fishbowl method of drawing chips with values ranging from motivational saying to cash vouchers between $5-$50. Compensation for chips was dependent on missed or positive urine samples (Glasner et al., 2017). The control group consisted of eight weekly Health Education (HE) sessions that incorporated a group health psycho-education time equivalent to MBRP sessions. A media educational program addressing various health and wellness topics plus CM was provided. Both groups featured a 4-week CM lead-in plus 8-weeks of MBRP plus CM or HE plus CM and 1-month follow up. (Glasner et al., 2017). The ASI was used to determine days of stimulant use in the past 30 days and psychiatric and drug severity composite scores at baseline, treatment-end, and follow-up. The Beck Depression Inventory (BDI-II) was administered at the baseline, weekly during treatment, and follow-up. The Beck Anxiety Inventory (BAI) was used to assess the severity of symptoms over the past week. Mindfulness practice was evaluated using a weekly log of time spent using the provided CD for at-home practice. The Difficulty in Emotion Regulation Scale (DERS) was used to assess awareness, understanding, and acceptance of emotions and the White Bear Suppression Inventory (WBSI) measured thought suppression or deliberate attempts to

avoid unwanted thoughts. Weekly urine toxicology assays were used to determine the presence of illicit stimulants; samples that were missing, refused, or invalid were considered positives (Glasner et al., 2017). Assessment frequency varied with general time points at the baseline, during treatment, and at the 1-month follow up. The 63 participants ($n = 63$) were divided into MBRP plus CM ($n = 31$) or HE plus CM ($n = 32$) conditions. There were 23 participants who were terminated for a 2-week absence from protocol participation, tampering with urine samples, or withdrawal. The MBRP group reported practicing mindfulness an average of 18.5 days over the 8-week intervention for a total of 145.3 minutes (Glasner et al., 2017).

The mean proportion of stimulant-free urine samples during the 8-week intervention phase did not differ between groups ($p > 0.05$ with no group effect). In mixed model analysis with stimulant use outcomes as a function of group, time, and psychiatric diagnosis for those with MDD (after controlling for GAD, alcohol dependence, and demographics) MBRP significantly decreased the likelihood of stimulant use relative to HE ($p = 0.03$). Among the subgroup for GAD (controlling for MDD, alcohol dependence, and demographics) MBRP effectively reduced the odds of stimulant use significantly over time ($p = 0.04$) relative to HE. The ASI-drug severity scores over time did not differ significantly as a function of group ($p > 0.05$). Depression severity decreased significantly during and after treatment for those in MBRP relative to HE with a significant group by time interaction ($p = 0.04$). Anxiety also decreased to a greater extent over time for the MBRP group but the group by time interaction failed to achieve significance, despite a larger effect size (Glasner et al., 2017, p. 131). Pairwise contrasts showed an advantage on MBRP on anxiety severity at the 1-month follow up ($p = 0.01$). The ASI psychiatric severity improved significantly over time in MBRP relative

to HE (p = 0.04), however pairwise contrasts were significant only at 1-month follow up (p = 0.01) but not at mid- or end-of-treatment. Analysis of changes in the FFMQ failed to reveal a significant group by time interaction effect, but pairwise contrasts revealed MBRP participants had significantly higher scores at mid-treatment (p = 0.01). A difference was observed at treatment end, but the effect did not achieve significance (p = 0.09). The MBRP group had significantly lower scores (indicating less difficulty in emotion regulation) at both treatment end (p = 0.02) and follow-up (p = 0.03). On the WBSI, MBRP scores changed in the predicted direction but neither the group by time interaction or any pairwise comparisons were significant (Glasner et al., 2017).

A non-randomized pilot study was conducted by Gryczynski et al. (2018) between 2015 and 2016 that used Transcendental Meditation (TM) to determine its success as a relapse prevention strategy for AUD, including the feasibility and outcomes of the intervention at 3-months post-discharge. Primary goals for the treatment intervention were to assess the feasibility, acceptability, and uptake of TM during AUD treatment, to compare of outcomes for patients who received TM training relative to TAU, and to investigate the relationship between TM practice/adherence and outcomes. Participants were male (65%) and female (35%) with a primary diagnosis of AUD and had plans to stay in treatment for at least 2 weeks.

In addition to TAU, training from the standard TM curriculum was delivered on the treatment site by certified instructors over four consecutive days in sessions lasting approximately 1-hour each. After initial introductory and preparatory lectures and a brief personal interview with the teacher, the instructor gave a personal mantra to each participant and taught them the TM technique of sitting for 20 minutes with eyes closed while repeating the mantra. It was recommended that participants continue practicing

this technique twice daily. The next three sessions were in group format to verify correctness and provide additional information including how to use TM daily. There was a "10-day check" after the core course where participants were asked to attend weekly "tune-up" trainings for 12-weeks post-discharge in local areas of the community. The control intervention consisted of TAU with 3-4 weeks of residential services including supervised withdrawal, structured activities, group and individual counseling using CBT and 12-step approaches, relapse prevention, and integrated SUD/mental health treatment. Follow up assessments were conducted 3-months after the treatment period. There were 66 participants with a mean age of 43 who were recruited into TM (*n* = 36) or TAU (*n* = 30) cohorts. Six participants in the TM group did not complete the program due to moved discharge dates (*n* = 2) or withdrawal prior to or during training (*n* = 4) (Gryczynski et al., 2018). Self-report data regarding alcohol use was gathered using the TLFB method indicating the quantity, frequency, and amount of heavy drinking (≥4 for females and ≥5 for males) and the amount of daily meditation was assessed using the retrospective TLFB at the follow-up only. A TM experience questionnaire evaluated perceived helpfulness for managing stress, craving, and alcohol use at follow-up only. Additional self-report measures included the ASI-lite, PSS, the Kessler-6 Psychological Distress Scale, the Alcohol Urge Questionnaire, and the Craving Experience Questionnaire. There was an additional observational measure via confidential face-to-face interviews with the participants (Gryczynski et al., 2018). Follow-up rates at the 3-month time point were 80 percent for TAU and 87 percent for TM.

Perceived helpfulness of TM was high throughout the 3-month follow-up with participants reporting meditating 25 of the previous 30 days on average and most for

more than 15 days. Perfect adherence, which involved twice daily meditation practice every day in the previous 30 days, was practiced by 38 percent of the TM cohort. Participants in both groups reported statistically significant reductions in stress on the PSS ($p < .001$) with no differential effect for TM versus TAU. There were significant reductions in craving reported on the Alcohol Urge ($p < .001$) and Craving Experience Questionnaires ($p < .001$) with no significant differences between group measures. TM (42 %) and TAU (54%) participants reported alcohol use in the 30 days preceding follow up with no significant differences between the cohorts in the reduction of alcohol use ($p = .63$) or days of heavy drinking ($p = .83$) from baseline to follow-up. Participants who were closely adherent to TM practice ($n = 16$) had lower rates of past 90-day alcohol use compared to the rest of the sample ($p = .02$). None of the closely adherent participants returned to heavy drinking post-discharge compared to nearly half at 90 days post-discharge ($p < .001$) (Gryczynski et al., 2018). There was a statistically significant advantage of TM adherence on return to heavy drinking ($p < .01$) and correlations between the frequency of TM signifying better outcomes of relapse and drinking behavior. These trends were not noted between twice daily meditation and changes in stress on the PSS.

DISCUSSION

Data analysis supports a wide range of improvements associated with meditation-based interventions. Significant reductions in cravings and substance use were demonstrated (Amaro et al., 2014; Bowen et al., 2009; Bowen et al., 2014; Davis et al., 2018; Witkiewitz et al., 2014). Improvements in significant negative affect and stress were also indicated (Amaro et al., 2014; Glasner et al., 2017). MBRP interventions had greater long-term effects when compared to standard treatments (Bowen et al., 2014). Consistency of meditative practice and continued support was found to be an important factor related to long-term success (Gryczynski et al., 2018). Participation and attrition were found to be limiting factors across the research presented.

The efficacy of MBRP as an alternative to 12-step or related aftercare programs was found by Bowen et al. (2009) with significant improvements in substance use, craving, awareness, and acceptance. A plateau at four months suggests diminished benefits and returns to TAU levels possibly attributed to study design. Participants returned to TAU groups and follow-up classes were not provided that could have reinforced the changes produced by MBRP therapy. Bowen et al. (2014) provided preliminary support for MBRP therapy in an ethnically diverse and challenging population with high rates of homelessness and legal problems. Results showed that RP, MBRP, and TAU may be equally effective at a 3-month follow up. Both RP and MBRP favorably compared with TAU to lower the probability and severity of relapses at 6-month follow up with RP delaying first time to drug use. MBRP may have a greater long-term effect. These findings appear conflicting despite both trials implementing the same MBRP treatment parameters in the same treatment facility and both groups returning to

TAU following the intervention (Bowen et al., 2009; Bowen et al., 2014). However, there were potential differences in participation as 67.6 percent of MBRP participants reported using skills taught in session at least once a week at the 12-month follow up in 2014 compared to 54 percent of MBRP participants continuing meditation practice at the 4-month follow up in 2009. It is unclear in the 2014 study whether mandated urinalysis testing was incorporated into 12-month follow-up assessments, which may have resulted in more incentive to maintain abstinence. Given that the 2009 study was limited by a 4-month follow-up it is uncertain whether the MBRP treatment affected substance use or craving over after an extended lapse of time. Additional longitudinal studies would be valuable in understanding this discrepancy.

Davis et al. (2018) found support for longevity of change related to treatment. Both groups experienced similar decreases in craving during the treatment phase, but MBRP scores remained lower in the post-treatment phase whereas the TAU group showed immediate and substantial increases in craving after leaving the treatment facility. Substance use following discharge increased relatively rapidly for the TAU participants compared to a sustained low endorsement of substance use over the 6-month follow-up period for those assigned to MBRP. MBRP participants had significantly lower stress scores during both the treatment and post-treatment phase.

The enduring effects of an MBRP program may be explained by an improved ability of MBRP participants to recognize and tolerate discomfort associated with craving or negative affects (Bowen et al., 2014). Secondary analyses of Davis et al. (2018) showed that MBRP assignment attenuated the associations between self-reported negative affect and craving, with craving significantly mediating AOD use at follow-up. Only the TAU group showed a relationship between negative affect and post-

treatment substance use that was mediated by craving (Witkiewitz & Bowen, 2010). This suggests that the MBRP group experienced reduced negative affect and craving resulting in low rates of substance use whereas increased AOD use in the TAU cohort was influenced by negative affect. A reduced severity of craving may be explained by increases in the awareness of thoughts, sensations, and emotions accompanying craving, and acceptance of non-reactivity to the craving response (Bowen et. al, 2009; Davis et al., 2018). Repeated exposure to triggering stimuli with non-reactivity may result in habituation to craving and decrease the intensity over time (Bowen et al., 2009).

Glasner et al. (2017) demonstrated the efficacy of mindfulness for improving symptoms of depression in MBRP participants relative to HE. There was an absence of overall significant between-group differences in stimulant use. However, the MBRP group demonstrated decreases in anxiety severity and those diagnosed with baseline GAD or MDD were less likely to use stimulants over the course of treatment relative to HE. This suggests that the use of mindfulness-based interventions for individuals with addictions may be greatest for those with clinically significant negative affect. The acquisition of coping skills emphasizing the acceptance of negative affect and discomfort in MBRP may replace maladaptive self-medication behaviors (Glasner at al., 2017, p. 133).

Reductions in stress mediating the association between MBRP treatment assignment and decreased substance use suggests that reducing ones stress can act as an important mechanism in the recovery cycle (Amaro et al., 2014; Davis et al., 2018). This was a significant finding when evaluating the efficacy of the MBRP-W intervention by Amaro et al. (2014) which contributed to reductions in alcohol and drug addiction

severity in a sample of culturally-diverse, low-income women, regardless of the modality of SUD treatment in which women were enrolled, time in treatment, and engagement in treatment at follow-up. Women tend to show higher scores on behavioral measures of stress, indicating a gender difference in the stress response possibly due to higher rates of trauma (Amaro et al., 2014). It is notable that all women in this sample reported a history of exposure to traumatic events; understanding the prevalence of experiences with trauma is a crucial element to refining SUD treatments. The study did not assess history of a PTSD diagnosis, and changes in symptomatology may be more likely to occur in those with a history of PTSD (Amaro et al., 2014). The study by Witkiewitz et al. (2014) provided modest support for MBRP compared to RP in a sample of female criminal offenders. MBRP participants reported significantly fewer legal and medical problems at the 15-week follow-up, however relapse to any drug use was low in both MBRP and RP compared to existing literature. This further supports that an MBRP intervention may be effective in controlling the effects of substance use and improving functioning in a population of females.

Measures of stress, craving, or alcohol use after integrating TM into an inpatient AUD treatment showed no differences when compared to TAU (Gryczynski et al., 2018). The TM intervention did not address relapse prevention factors outside of TAU and can be considered less vigorous compared to the MBRP program. It is also possible that providing participants with a "personal" mantra instead of allowing them to choose for themselves may have resulted in difficulty connecting with the intimate experience usually associated with a TM practice.

The feasibility and acceptability of a meditation-based program was demonstrated across the studies. Good attendance and continued meditative practice

was demonstrated with over half of participants continuing practice for at least 4-months post-intervention, positive course ratings, and an absence of significant differences in attrition rates between MBRP and TAU participants (Bowen et al., 2009). Davis et al. (2018) successfully engaged participants in a traditionally challenging younger population who showed comparable attrition rates to other SUD treatment studies. There was evidence of skills acquisition in stimulant users who reported that they practiced mindfulness between sessions and experienced mindfulness-specific process changes in emotional regulation. This suggests that users had "the capacity to learn and apply mindfulness skills and benefit from the emphasis on coping with negative effect through acceptance, self-observation, and mindful awareness" (Glasner et al., 2017, p. 133). The feasibility of integrating TM into an inpatient AUD treatment experience was demonstrated in Gryczynski et al. (2018) as patients were willing to enroll in the program and a large majority finished the core curriculum and follow-up sessions. Most participants reported at 3-month follow-up that they were still meditating regularly. The program completion rate in Amaro et al. (2014) was lower than those found in previous MBRP studies (61% in Bowen et al., 2009 and 58% in Price et al., 2012) as well as other intervention trials for SUD and mental health treatments, however the study is unique in that most participants were engaged in residential treatment programs with highly demanding schedules. The study by Witkiewitz et al., 2014 supported that MBRP can be used during active treatment versus as an aftercare program and participants may still use techniques after the treatment ends.

Studies that measured the relationship between participation and improvements in substance use found that more involvement with meditative practice was correlated with higher benefits. Better outcomes associated with MBRP-W was partially supported

by greater reductions in alcohol and drug severity and perceived stress among those women receiving the highest dosage of treatment. (Amaro et al., 2014). Greater consistency of TM practice was associated with better outcomes as no participants that had strong adherence returning to heavy drinking post-treatment. A potential theory is that the practice of meditation produces better benefits for participants who are more engaged. Alternatively, these participants may have been more motivated and would have perhaps engaged in any additional intervention and were therefore possibly predisposed to doing well (Gryczynski et al., 2018).

These outcomes support that adding mindfulness to a typical residential program may better prepare participants for the relapse risks they face upon exiting (Davis et al., 2018). The data suggests that continued mindfulness practice over time may strengthen the ability to monitor and address factors contributing to well-being, thus supporting long-term outcomes. Continued support following MBRP treatment may be necessary to ensure to long-term success (Bowen et al, 2009; Bowen et al., 2014; Davis et al., 2018).

Mindfulness practice adapted into relapse prevention programs have shown to be most efficacious for decreasing craving and stress and promoting longevity of abstinence from substance use when compared to standard treatment programs. As a non abstinence-based therapy that has shown to decrease rates of substance related problems, MBRP and similar programs may provide an alternative treatment for difficult SUD patients and/or those who lack a strong religious belief system. A potential strength of the MBRP program when compared to other aftercare programs is that by not insisting on abstinence it may provide benefits for people who are abusing substances but are not ready to accept total abstinence.

Program adherence and regular practice has been shown to be especially important in abstinence success. Future programs could potentially benefit from alterations that provide more regularly scheduled meditation classes after completion of the initial therapy to promote regular practice and support in the community. Longer and/or more intensive treatment programs may benefit particularly difficult persons who frequently lapse to substance use. Additionally, programs could benefit from a redesign to accommodate demanding schedules and facilitate participation including follow-ups with those who miss treatments, provision of child-care services, transportation if needed, and a focus on engagement strategies. Participation may be improved by offering continuous groups or make up sessions for missed classes. Larger studies with longer follow up periods are needed to determine accuracy in the longevity of results and to further refine program designs as needed. With the pervasive occurrence of SUDs and related health problems, it is imperative that nurses take an active role in understanding successful treatments.

LIMITATIONS

Several limitations were noted throughout the research. Brief follow-up periods in some studies restricted the ability to examine effects of MBRP on long-term outcomes (Amaro et al., 2014; Bowen et al, 2009; Glasner et al., 2017; Gryczynski et al., 2018; Witkiewtiz et al., 2014). The retrospective self-report of substance use is potential limitation, however TLFB is considered a reliable assessment of substance use and was used in most of the studies (Bowen et al, 2009; Bowen et al, 2014; Davis et al., 2018; Gryczynski et al., 2018; Witkiewitz et al, 2014). Additional biophysical measures such as urine toxicology testing would strength the validity of substance use data (Amaro et al., 2014; Bowen et al., 2009; Gryczynski et al., 2018; Witkiewitz et al, 2014). Attrition and participation were significant limitations resulting in incomplete data during the follow up period (Amaro et al., 2014; Bowen et al, 2009; Glasner et al., 2017; Witkiewitz et al., 2014). Attrition may have confounded interpretation of drug use and other outcomes as lost participants may have created a more homogenous, motivated, treatment-compliant group for comparisons. Small sample sizes may have influenced the power to detect the effects of interest and make statements regarding null growth (Davis et al., 2018; Glasner et al., 2017; Gryczynski et al, 2018; Witkiewitz et al., 2014).

Study designs within treatment facilities provided ample opportunity for participants to share feedback across conditions and completion of the training may have been higher than it would be in an outpatient setting where intermittent attendance and drop out may be more common (Davis et al, 2018; Gryczynski et al., 2018; Witkiewitz et al., 2014). One facility allowed for control and intervention groups to participate in separately scheduled mindfulness meditation sessions, which may have

confounded results (Witkiewitz et al., 2014). The setting within a well-functioning

program and care continuum could be considered both a strength and weakness as this

may limit generalizability. Compensation was provided across all studies which may

have influenced attendance and motivation; however, studies that recorded independent

meditation practices showed high participant adherence (Bowen et al., 2009; Glasner et

al., 2017; Gryczynski et al., 2018; Witkiewitz et al., 2014). Other potential differences

between dosage groups were not measured in this study (such as motivation) which may

account for some findings (Amaro et al., 2014)

Additional limitations include participant exposure to other treatments

preventing detection of between-group differences (Gryczynski et al., 2018; Witkiewitz

et al., 2014). There were significant differences in the number of treatment hours

between MBRP and TAU (p <.001) in Bowen et al. (2009) which poses a potential study

limitation, and low rates of substance use in both groups limited variability and an

ability to find significant between-group differences. Davis et al. (2018) used a rolling

format with shorter MBRP sessions to include all aspects of the curriculum and several

modules which were abbreviated when compared to the original workbook. A potential

limitation was that one rater conducted the supervision of adherence and competence;

having multiple raters is beneficial to avoid bias in rater scoring and for validity checks.

Treatment status was concealed from research assistants conducting assessments and

procedures were established to maintain separation between staff delivering and

assessing the intervention, reflecting a strength of the study design (Davis et al., 2018).

In Glasner et al. (2017) no distinction was made between substance-induced depression

and/or anxiety versus substance-independent symptoms due to limitations of the

diagnostic instrument. Future studies should assess diagnoses more thoroughly to

elucidate the features of drug users who could benefit most from these interventions. Due to the court mandated programs in Witkiewitz et al. (2014) it was unethical to include a no-treatment control group so it can only be concluded that both MBRP & RP interventions caused lower relapse rates, with MBRP being slightly lower. The study design by Amaro et al. (2014) did not include randomization or a control group creating multiple threats to internal validity. Integrating satisfaction ratings and feedback through the course of the intervention versus during the last session would have been helpful by including data from people who did not attend. The small sample sizes of White, Asian, and American Indian women prevented the inclusion of separate groups in analysis, which is not ideal because is masks any unique characteristics and precludes the identification of important racial disparities (Amaro et al., 2014).

IMPLICATIONS

Nursing Practice

Nurses are exposed to the effects of substance abuse across a variety of healthcare settings. Staying informed on the most current and effective treatments is necessary to help patients organize a successful plan of care. In locations where they can accept more responsibility, interested nurses can seek out the appropriate training to teach meditation to people with SUDs to help manage their substance use and relapse risks. Understanding the issues of abuse and effective treatments can provide confidence for healthcare workers to approach a situation where someone is struggling with an SUD.

Education

Research supports the use of meditation for improving psychological and physical symptoms related to negative affect and people with SUDs. Nursing education on available treatment programs, meditation styles, and associated benefits is important for providing community interventions. This may encourage greater user participation through the nurse's understanding of the importance of support and self-management.

Research

More research is needed to address additional factors related to substance use such as trauma and social disconnection and how this influences negative coping strategies in the community. This understanding can be incorporated into future meditation and RP training research. Future longitudinal studies would be beneficial to

determine the strength of enduring effects. Program refinements based on additional research may address issues of adherence and community support to promote regular practice. Nurses have important psychosocial roles in establishing therapeutic relationships with patients. Taking an active role in meditation research can help nurses provide better care by understanding how incorporating these treatments can reduce negative affect and improve the quality of life in people with SUDs.

Policy

Currently, there is no universal standard of treatment for people with SUDs. As research that explores the root of addiction progresses and effective treatment approaches becomes refined it is important that a standard protocol is created and implemented for people across a range of socioeconomic backgrounds. Currently, there is little attention and funding given issues of mental health and substance abuse in America despite the impacts seen across many facets of society. Knowledge of SUD research addressing meditation-based interventions can help advance policy changes by legislation providing greater availability and more research in treatment centers across the country.

APPENDIX A: Review of Methodology

Review of EBSCOhost database including CINAHL, CINAHL Plus with Full Text, Cochrane Central Register of Controlled Trials, MEDLINE, PsycARTICLES, and psycINFO with publications between 2008-2019 using special limiters (MH "Substance Abuse") OR (MH "Substance Abusers") OR addict* OR "drug abuse*" or "substance abuse*" or "alcohol abuse*" or "narcotic abuse*" or "narcotic use*" or "drug use*" or "alcohol use*" or "drug addict*" or "substance addict*" or "substance use disorder*" or SUD* or "substance use*" or "drug dependence" or "alcohol dependence" or "narcotic dependence" or "substance dependence" or "alcohol*" or "dipsomania*" or "chemical abuse*" or "solvent abuse*" AND relapse or recur* or regress* AND meditat* or mindful* or "mindfulness based stress reduction" or MBSR or "mindfulness based relapse prevention" or MBRP or "mindfulness based therapeutic communit*" or MBTC.

n = 234

INITIAL REVIEW: ↓

Removal of irrelevant articles = 144

n = 90

↓

Removal of non-English articles = 5

n = 85

↓

Removal for use of spiritual practice, pharmacological intervention, or movement-based therapy = 4

n = 81

↓

Removal of repeat articles = 8

n = 73

↓

Removal of systemic reviews and editorials = 33

n = 40

↓

Removal of qualitative research = 2
n = **38**

↓

Removal for inclusion of comorbid disorders (other than affective disorders) = 2
n = **36**

DETAILED REVIEW:

↓

Removal for not addressing relapse prevention = 11
n = **25**

↓

Removal for use of massage therapy = 1
n = **24**

↓

Removal of secondary analyses, short communications, and study protocols = 10
n = **14**

↓

Removal of weak articles (group size <20, no control group, weak design) = 4
n = **10**

↓

Removal of articles addressing nicotine smokers = 3
n = **7**

TOTAL NUMBER OF ARTICLES IN FINAL EDITS
n = **7**

APPENDIX B: Table of Outcomes

Authors, Year, Country	Purpose	Study Design	Intervention	Measures	Sample	Outcomes

Amaro, Spear, Vallejo, Conron, & Black. (2014). USA.	To assess the feasibility and acceptability for integrating an MBRP-W program into SUD treatment for culturally diverse, low-income women.	Single group repeated measures design
		
		Length: April 2003-December 2006 plus 12-month follow-up.
		
		IRB: YES
			Independent Variable: MBRP-W adapted from MBRP to address women with a history of trauma exposure.
			
			Control: NONE
			
			Length: 9 weeks plus 12-month follow-up.
				Self Report: FEASIBILITY & ACCEPTABILITY: Attendance sheets & satisfaction questionnaires
				
				TREATMENT DOSAGE: To compare the effects of lower (1-4) and higher (5-9) sessions doses compared to none.
				
				ALCOHOL & DRUG ADDICTION SEVERITY: The alcohol and drug measures from the ASI evaluating the previous 30 days of use.
				
				PERCEIVED STRESS: The PSS to assess response to stressors during the previous 30 days.
				
				POST-TRAUMATIC STRESS SYMTPOMALOGY: An adapted version of the Posttraumatic Diagnostic Symptom Scale (PDS).
				
				TRAUMA EXPOSURE: Life Stressor Checklist to assess lifetime and current exposure to traumatic or stressful events.
				
				Frequency:
				1. Baseline interviews
				2. 6-month follow-up
				3. 12-month follow up
					Amount:
					  N = 318
					
					Age: 18-58
					  (34 M)
					
					Gender: Female
					
					Characteristics:
					-45.3% Hispanic, 34.6% non-Hispanic Black, 20.1% Non-Hispanic White and other.
					-2.2% employed
					-7.6% had been arrested in the previous 30 days.
					-45.6% were court-mandated for treatment.
					-From residential (73.9%) and outpatient (26.1%) facilities.
					
					Compensation: $20 at baseline & $40/ follow-up interviews.
						1. There was a 100% history of trauma exposure and 92% with recent exposure.
						
						2. Session Dosage:
						5-9 sessions: 35.8%
						1-4 sessions: 19.8%
						No sessions: 44.3%
						
						3. Scheduling conflicts with treatment facilities and/or other providers prevented consistent participation.
						
						4. Satisfaction was reported high.
						
						5. There was an average decline in addiction severity across all dosages of MBRP-W.
						
						6. Alcohol and drug severity and perceived stress decreased across all groups with greater reductions in the highest dosage groups.

						7. Change in trauma scores did not vary significantly with MBRP-W as symptom scores among all participants declined.
Bowen, Chawla, Collins, Witkiewitz, Hsu, Grow, Clifasefi, Garner, Douglass, Larimer, & Marlatt, (2009). USA.	To evaluate MBRP in comparison to TAU on SUDs.	Pilot RCT *Length:* 8 weeks of treatment plus 4-month follow up period. *IRB Approval:* YES	*Independent Variable*: MBRP *Control*: TAU per standard outpatient aftercare of treatment agency. *Length*: 8 weeks plus 4-month follow up period.	*Self Report:* SUBSTANCE USE: The Timeline Followback (TLFB) assessing daily use 60 days prior to treatment admission/assessment. ALCOHOL & DRUG CRAVING: Penn Alcohol Craving Scale (PACS) adapted to include drug craving. ALCOHOL & DRUG USE CONSEQUENCES: Short Inventory of Problems (SIP-AD) assessing impulse control, social responsibility, & physical, interpersonal, & intrapersonal consequences. MINDFULNESS: The Five Factor Mindfulness Questionnaire (FFMQ) ACCEPTANCE: The Acceptance and Action Questionare (AAQ) assessing acceptance vs avoidance &	*Amount:* *N* = 168 4-months post intervention: *n* = 43 *Age:* 18-70 (40.5 M) *Gender:* M: 63.7% F: 36.3% *Characteristics:* -Caucasian (51.8%), African American (28.6%), Multiracial (15.3%), Native American (7.7%) -Legally mandated (57%+2%) -Homeless (75% + 19%) *Compensation:* $45 gift card at	*% Participation:* MBRP: -Attended 65% of sessions -86% practiced meditation post-intervention -54% continued at 4-months post-intervention 1. AOD use decreased to greater extent compared to TAU: -MBRP had 86% (M) decrease in AOD use x 2 months -MBRP: 2.1 (M) days of use -TAU: 5.4 (M) days of use 2. No significant effects of MBRP on substance use problems.

| | | | | control of negative experiences.

MEDITATION PRACTICE:
Weekly recording of type & # minutes of practice.

Frequency:
1. Baseline
2. Immediately post-intervention
3. 2-months post-intervention
4. 4-months post-intervention. | baseline & post-assessments, $50 gift card/additional assessment | 3. PACS craving model was significant (*p*<.001): Craving decreased more in MBRP possibly from an increase in awareness of craving & acceptance of/non-reactivity to the craving response.

4. Acceptance & acting with awareness increased in MBRP; decreased in TAU.

5. Plateaus of all treatment effects at 4-months post-intervention suggests gains were returning to TAU levels (possibly due to study design).

6. MBRP course was rated highly important with high likelihood of continuing practices. |
| Bowen, Witkiewitz, Clifasefi, Grow, | To assess the relative efficacy of MBRP, RP, | RCT.

Length:
October | *Independent Variable:*
Weekly MBRP in 2H small group sessions | *Self Report:*
ABSTINENCE: The Addiction Severity Index at baseline and end of treatment. | *Amount*:
N = 286
MBRP: 103
RP: 88 | % Participation (use of skills at 12-month follow up):
  MBRP: 67.6% |

| Chawla, Hsu, Carroll, Harrop, Collins, Lustyk, & Larimer (2014). USA. | and TAU on 12-month SUD outcomes | 2009 – July 2012

IRB Approval: YES | (*n*=6-8) per MBRP treatment manual.

RP: Matched MBRP in time, format, size, location and scope of assigned homework.

*Both RP & MBRP groups were removed from primary aftercare groups & returned after program completion.

Control: Abstinence-based TAU primarily processed oriented based on Alcoholics/Narcotics Anonymous in groups (*n*=95) for 1.5 H weekly.

Length: 8 weeks of MBRP or RP with 12-month follow up period. | DEPENDENCE: The Severity of Dependence Scale (SDS).

SUBSTANCE USE: The Timeline Follow-back accounting for 30 days before baseline and periods between assessments.

Biophysical:
1. URINALYSIS DRUG & ALCOHOL SCREENING: From subset of participants (*n*=199) court mandated or otherwise indicated for testing.

Frequency:
1. Baseline
2. 3-months post-intervention
3. 6-months post-intervention
4. 12-months post-intervention | TAU: 95
At 12-months:
  MBRP: *n* = 83
  RP: *n* = 72
  TAU: *n* = 76

*Participants with missing data at 12-month follow up were significantly older.

Age: 18-70

Gender:
Male (71.5%)
Female (28.5%)

Characteristics:
-White (57.9%), ethnic/racial minority (42.1%)
-Completed initial intensive inpatient or outpatient care.

Compensation:
$40 gift cards/completed assessment + $40 bonus for completion of all assessments + $20-$30 attendance bonuses. | RP: 100%

1. In all groups the rates of substance use and heavy drinking were much lower than other SUD studies.

2. MBRP & RP groups vs. TAU:
-54% decreased risk of relapse to drug use
-59% decreased risk of relapse to heavy drinking.

3. MBRP had a 21% increase in relapse risk to first drug use vs. RP; groups did not significantly differ on time to first heavy drinking day.

4. 3-month follow-up:
  -No significant group differences on drug or alcohol use days between all groups.

5. 6-month follow-up:
  -RP and MBRP groups had 31% fewer days of |

						drinking vs. TAU. -No significant differences between MBRP and RP. 6. 12-month follow-up: MBRP participants reported 31% fewer drug use days 7. Continued mindfulness practice may strengthen the ability to address factors in well-being, supporting long-term outcomes.
Davis, Berry, Dumas, Ritter, Smith, Menard, & Roberts (2018). USA.	To compare TAU plus MBRP against TAU plus additional 12-step meetings on perceived stress, craving, and substance use.	RCT in rolling group format. *Length:* September 2015- November 2016 *IRB Approval:* YES	*Independent Variable:* 8 x 1.5H group sessions (*n* = 3-12) of MBRP x 2 weekly d/t average residential stay of one month to ensure course completion. Groups were held in rolling format. *Control:* TAU provided by the residential facility including cognitive behavioral treatments and 12-step approaches	*Self Report:* SUBSTANCE USE: The TLFB for the previous 2 weeks PLUS the Substance Frequency Scale (SFS) to measure the days of problems associated with substance use. CRAVING: The GAIN assessment instrument corresponding to the new DSM-IV criteria for craving. STRESS: The Perceived Stress Scale. *Biophysical:*	*Amount:* *N* = 79 MBRP: 44 TAU: 35 At 5-months: *n* = 38 *Age:* 18-29 (25.3 M) *Gender:* Male (65%) Female (35%) *Characteristics:* -White (91%) -Majority had 1+ parent with a	*% Participation:* Between 93.3-100% (95.6% M) attendance in all 8 MBRP sessions. 1. At the end of treatment TAU showed immediate increases in substance use (*p*<.001) that peaked & plateaued around 13 weeks after treatment. 2. MBRP abstained from substance use

| | | | | plus attendance in up to 8 extra support groups.

Length: 8 weeks with 6-month follow up period. | 1. URINALYSIS: Utilized during treatment phase; 85% of participants lived outside the study area so urinalysis was not possible during post-treatment phase.

Frequency:
1. Treatment phase:
   -Baseline
   -2 weeks
   -1 month
2. Post treatment phase: Biweekly for 6-months (12 occasions) | SUD and were unemployed.
-Most spent significant time in jail/prison
-90% were polysubstance abusers.

Compensation: $10 /assessment completed ($150 maximum) + 2 $150 bonus drawings during follow up period. | immediately after treatment and maintained a flat trajectory through the study ($p=.76$).

3. Nearly identical declines in craving during the treatment phase which diverged after leaving ($p<.001$) with MBRP maintaining low levels ($p=.29$) & TAU showing immediate increases with plateaus 14 weeks post-treatment ($p<.001$).

4. Only MBRP showed significant improvements in stress levels during treatment phase ($p=.18$) and tended to maintain lower, treatment-acquired stress levels through the study (28 weeks post-treatment).

5. TAU showed immediate rises in stress levels which gradually slowed ($p=.03$) & plateaued 17 weeks |
|---|---|---|---|---|---|---|---|

						post-treatment.
						6. Post-treatment substance use decreased for individuals assigned to MBRP via decreases in perceived stress.
						7. Adding mindfulness to residential treatment programs may help better prepare young adults for environmental relapse risks they face after exiting
						8. Reducing ones stress is an important mechanism in the recovery cycle.
Glasner, Mooney, Ang, Garneau, Hartwell, Brecht, & Rawson (2017). USA.	To compare efficacy and outcomes of MBRP to a HE control for stimulant-dependent adults receiving CM.	A pilot RCT *Length:* 2 years. *IRB:* YES	*Independent Variable:* Group MBRP sessions weekly over 8 weeks with modifications of sessions from 120 to 75 minutes in addition to CM delivered twice weekly.	*Self Report:* STIMULANT USE: The Addiction Severity Index (ASI) to determine past 30 days of stimulant use and psychiatric & drug severity composite scores at baseline, treatment-end, and follow-up. DEPRESSION: The Beck Depression Inventory (BDI)-II at baseline, weekly during treatment, and follow-up.	*Amount:* $N = 63$ MBRP+CM: 31 HE+CM: 32 $n = 40$ *Age:* 22-67 (45.3 M) *Characteristics:* -Some GAD (24%) or MDD (43%).	*% Participation:* MBRP: practiced mindfulness ~18.5 days during intervention (145.3 mins). 1. Both groups had the same amount of stimulant-free samples ($p>0.05$ with no group effect) and ASI-

		Control: 8 weekly HE sessions of manualized, group health psychoeducation of equivalent duration to MBRP plus CM. *Length:* 4-week CM lead-in plus 8-weeks of MBRP+CM or HE+CM and 1-month follow up.	ANXIETY: The Beck Anxiety Inventory (BAI) to assess severity over past week. MINDFULNESS PRACTICE: Weekly log of minutes. EMOTION REGULATION: The Difficulty in Emotion Regulation Scale (DERS) to assess awareness, understanding, and acceptance of emotions. THOUGHT SUPPRESSION: The White Bear Suppression Inventory (WBSI) to measure thought suppression or deliberate attempts to avoid unwanted thoughts. *Biophysical:* 1. URINE TOXICOLOGY ASSAYS: Weekly to determine the presence of stimulant metabolites.	*Compensation:* $20/weekly data collections visit + $30 for follow-up.	drug severity scores (*p*>0.05). 2. In mixed model analysis MBRP significantly decreased the likelihood of stimulant use relative to HE (*p*=0.03). 3. Among those with GAD MBRP reduced the odds of stimulant use significantly over time (*p*=0.04). 4. Depression severity decreased during/after treatment in MBRP with a significant group x time interaction (*p*=0.04). 5. Pairwise contrasts showed an advantage on MBRP on anxiety severity at 1-month follow up (*p*=0.01). 6 The ASI psychiatric severity improved significantly over time in MBRP (*p*=0.04). Pairwise

						contrasts were significant only at 1-month follow up (p=0.01). 7. MBRP indicated less difficulty in emotion regulation at treatment end (p=0.02) and follow-up (p=0.03). 8. Evidence of skills acquisition as participants practiced mindfulness between sessions and showed mindfulness-specific process changes.
Gryczynski, Schwartz, Fishman, Nordeck, Grant, Nidich, Rothenberg, & O'Grady. (2018). USA.	To determine if TM holds promise as a relapse prevention strategy for AUD.	Non-randomized pilot study. *Length:* 2015-2016 *IRB:* YES	*Independent Variable:* Training from the TM training curriculum at the treatment site over 4 consecutive 1H sessions + "10-day check" after the core course & weekly "tune-up" trainings for 12-weeks post-discharge in the community. This was in addition to TAU.	*Self Report:* ALCOHOL USE: TLFB TM PRACTICE QUESTIONNAIRE: Amount of daily meditation via retrospective TLFB at follow-up only. TM EXPERIENCE QUESTIONNAIRE: Evaluating perceived helpfulness for managing stress, craving, and alcohol use at follow-up only.	*Amount:* N = 66 TM: 36 TAU: 30 At 3-months: TM: n = 26 TAU: n = 24 *Age:* 43 (M) *Gender:* 65% male 35% female *Characteristics:* -Completed	1. Perceived helpfulness was high over 3-month follow-up with participants reporting meditating regularly: -38% had perfect adherence of 2x daily meditation in past 30 days. 2. Both groups reported statistically

| | | | Control:
TAU as provided by the facility including 3-4 weeks of residential treatment (group and individual counseling using cognitive-behavioral and 12-step approaches).

Length: 4 days of core treatment plus 10-day check and weekly tune-ups 12-weeks post discharge and 3-month follow up. | ADDICTION SEVERITY INDEX-LITE

PERCIEVED STRESS SCALE

KESSLER-6 PSYCHOLOGICAL DISTRESS SCALE

ALCOHOL URGE QUESTIONNAIRE

CRAVING EXPERIENCE QUESTIONNAIRE

Observational: Confidential face-to-face interview

Frequency:
1. Baseline
2. 3-months post-discharge | medically assisted withdrawal with plans to stay in treatment for at least 2 weeks.

Compensation: $30/baseline + $40/follow-up assessments. | significant reductions in stress ($p<.001$) with no differential effect for TM versus TAU.

3. Participants reported significant reductions in craving ($p<.001$) and Craving Experience ($p<.001$) with no significant differences between groups.

4. 42% of TM and 54% TAU reported alcohol use in the 30 days before follow-up with no significant differences between groups in alcohol use ($p=.63$) or days of heavy drinking ($p=.83$) from baseline to follow-up.

5. Participants who were closely adherent to practice ($n=16$) had lower rates of alcohol use compared to the rest of the sample ($p=.02$). None of the closely |

						adherent participants returned to heavy drinking post-discharge. 6. There were correlations between the frequency of TM practice correlating with better outcomes of relapse and drinking behavior.

Witkiewitz, Warner, Sully, Barricks, Stauffer, Thompson, & Luoma. (2014). USA.	To compare MBRP and RP in the prevention of substance use relapse for women referred by the criminal justice system.	A pilot RCT.
		
		Length: Recruitment between July 2010-December 2011 plus 15-week follow up period.
		
		IRB: YES
			Independent Variable: Adapted MBRP in rolling admission so participants began treatment when they were ready with 2x weekly 50-minute sessions over 8 weeks.
			
			Control: RP plus portions of the CST Guide adapted to correspond with MBRP content, structure, group format, and scheduling.
			
			Length: 8-week intervention + 15-week follow-up.
				Self Report: ALCOHOL/DRUG USE: 30-day TLFB.
				
				SUBSTANCE USE CONSEQUENCES: The Short Inventory of Problems (SIP-M) abbreviated from the Inventory of Drug Use Consequences at baseline and 15-week follow-up.
				
				FAMILY/SOCIAL, MEDICAL, & LEGAL PROBLEMS, PSYCHIATRIC SYMPTOMS: Subscales of the ASI assessing the previous 30 days at baseline and 15-week follow-up.
				
				WEEKLY ASSESSMENTS: During 8-weeks of treatment.
					Amount:
					  $N = 105$
					  MBRP: 55
					  RP: 50
					At 15-weeks:
					  MBRP: $n = 5$
					  RP: $n = 11$
					
					Age:
					  MBRP: 35.8 M
					  RP: 32.4 M
					
					Gender: Female
					
					Characteristics:
					-Referred to women's residential treatment by the criminal justice system (e.g. for drug use/possession, burglary,
						1. Formal and informal practice:
						  50% at end of treatment
						  30% at 15-week follow-up.
						
						2. The majority of participants report that the SOBER space was the most important skill learnt.
						
						3. Amount of mindfulness practice was not significantly associated with primary or secondary outcomes.
						
						4. Rates of drug use

				Frequency:
				1. Baseline: In last week of stabilization & detoxification.
				2. Mid-treatment: 4-weeks follow start.
				3. Post-treatment: At the end of the treatment program.
				4. 15-week follow-up
					prostitution)
					-n = 86 had mental health histories: 1+ suicide attempt (46%), severe trauma (69.2%), chronic depression (70.7%), anxiety (73.5%), and history of abuse (89.2%).
					
					Compensation:
					Gift cards:
					  Baseline: $10
					  Mid-: $5
					  Post-: $10
					  Follow up: $30.
						were low with 1 MBRP reporting 1 day of drug use & 5 RP reporting ~2.6 days (SD=3.71) of drug use.
						
						5. MBRP participants had 96% fewer drug use days compared to RP (p=.001).
						
						6. Drug use consequences were 39% lower in the MBRP group; this result was not statistically significant (p=.16).
						
						7. MBRP had significantly lower scores on the legal (p=.02) and medical status (p=.007) subscales of ASI.

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