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Minding the Body: Mind-Body Interventions for Substance Use Disorders

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MINDING THE BODY:
MIND-BODY INTERVENTIONS FOR SUBSTANCE USE DISORDERS

BY

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A handwritten signature in black ink that reads "Shelley Suter". The signature is written in a cursive, flowing style.

Date: 6/11/2020

Minding the Body:
Mind-Body Interventions for Substance Use Disorders
by

Shelby Smith, M.S.

Submitted to the Faculty of the Graduate School of
Eastern Kentucky University
in partial fulfillment of the requirements for the degree of

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Abstract

Substance use disorders (SUD) have a great impact on individual, social, and economic resources in the United States. In 2018, 19.3 million individuals – 7.8% of the population – aged 18 or older met criteria for SUD. There is a persistent gap in treatment needs for individuals with SUD and no single treatment approach is appropriate for everyone. Mindfulness-based interventions (MBIs) utilize the mind-body connection to attend to the various needs of individuals with SUD. Mindfulness practices promote emotional regulation and interoception by increasing awareness of private experiences in order to respond to those experiences in a reflective, rather than reflexive, manner. This paper presents a theoretical model and rationale for the use of MBIs for SUD and reviews several evidence-based MBIs for SUD. A discussion is offered on current limitations in the literature, barriers to implementation, and future directions for research in MBI for SUD.

Keywords: Mind-body interventions, mindfulness-based interventions, interoception, alexithymia, substance use disorders, body regard

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Section I: Introduction

Introduction to Topic

In the past several decades, substance use disorders (SUD) have taken a toll on individual, social, and economic resources in the United States (Substance Abuse and Mental Health Services Administration [SAMHSA], 2018). SAMHSA (2018) estimates that 2.1 million individuals aged 12 years or older met criteria for opioid use disorder in 2017 while 10.3 million individuals misused opioids. In 2018, 19.3 million individuals – 7.8% of the population – aged 18 or older met criteria for SUD. SUD is primarily characterized by continued use of substances despite a pattern of maladaptive cognitive, behavioral, and physiological symptoms and significant substance-related issues (American Psychiatric Association, 2013). Criteria for SUD in the Diagnostic and Statistical Manual of Psychiatric Disorders, Fifth Edition are grouped into categories of impaired control, social impairment, risky use, and pharmacological criteria. Treatment of SUD is required beyond detoxification due to the persistent cognitive effects of changes in brain circuitry resulting from substance use. Such changes are often evidenced by repeated behavioral and physiological symptoms including relapse and drug craving, which are primary targets for intervention.

While annual rates of opioid misuse are beginning to decline, SAMSHA (2018) findings suggest there is a persistent gap in treatment needs for individuals with SUD. The National Institute on Drug Abuse (2018) asserts that no single treatment approach is appropriate for everyone and that effective drug addiction treatment attends to the various needs of individuals including medical, psychological, social, vocational, and legal concerns. Mindfulness-based interventions (MBIs) utilize the mind-body connection to address the various needs of individuals with SUD.

MBIs encompass a variety of skills training, experiential activities, and treatment goals similar to what are referred to as mind-body interventions in the complementary and alternative medicine literature. Mind-body interventions include practices such as deep breathing, meditation, progressive muscle relaxation, yoga, and tai chi that are intended to bring awareness and intention to the interactions among the mind, body, and behavior to promote healthy functioning (Park, 2013). Common themes of mind-body interventions include use of breathing, training and repetition, noticing the body, discerning and differentiating changes in cognitions, emotions, and bodily sensations, and mind-body integration (Mehling et al., 2011). Although many of these practices have been integrated into psychological interventions, the terminology has shifted from mind-body interventions to mindfulness-based interventions. While MBI will be used most often in this paper for the sake of consistency, it is important to emphasize how MBIs promote integration of mind and body, especially in relation to treatment of SUD. In a meta-analysis of MBIs for psychiatric symptoms, Goldberg and colleagues (2018) found MBIs to have comparable effectiveness to evidence-based treatments (EBT) such as cognitive behavioral therapy and antidepressant medication. Specifically, evidence from the analysis supports MBIs for individuals with depression, chronic pain, smoking, and other addictive disorders (Goldberg et al., 2018).

Definition of the Problem and Statement of Significance

In 2018, of the estimated 21.2 million individuals aged 12 years or older who needed substance use treatment, only 3.7 million individuals received any treatment (SAMSHA, 2019). However, of the estimated 18.9 million individuals who needed substance use treatment but did not receive specialty SUD treatment, a majority (94.9 percent) did not think they needed treatment for their substance use (SAMSHA, 2019). The discrepancies in people who needed

substance use treatment, received treatment, and perceived a need for treatment speaks not only to the availability of services, but also to the need for education regarding problematic substance use. The need for psychoeducation, treatment, and recovery support services require an integrated, multidisciplinary approach for addressing SUD (National Institute on Drug Abuse [NIDA], 2018).

While SUDs can be conceptualized as emotional dysregulation that is enacted within the body, few treatment strategies incorporate the relationship individuals with SUDs have with their bodies into the theoretical model. Addressing these individuals' ability to sense what is going on in their body in addition to emotional dysregulation can provide a deeper understanding of the motivation behind urges to engage in substance use. MBIs promote more long-lasting treatment outcomes and empower individuals to choose healthy, alternative behaviors in the face of substance use triggers.

Purpose

The objective of this paper is to review the existing literature on mind-body or MBIs for SUD. The review begins with the presentation of a theoretical model and rationale for the use of MBIs for SUD as well as an examination of the effectiveness of current interventions. The discussion also includes barriers to implementing MBI, potential gaps in the literature, and future directions for MBI with SUD.

Section II: Literature Review

Methods of Literature Search

Articles were accessed by searching databases including Academic Search Complete, PsycINFO, and PsycARTICLES using the terms mind-body intervention, meditation, mindfulness, substance use, substance misuse, addiction, and drug use. Further articles were

accessed for information on addiction theory, alexithymia, interoception, and emotion regulation. Print sources including specific treatment manuals were also used.

Theoretical Model and Rationale for Mindfulness-Based Interventions for SUD

Addiction Theory

Many MBIs for SUD are intended for use as aftercare, following completion of an inpatient or outpatient treatment program, and thus, focus on relapse prevention (Bowen, Chawla, & Marlatt, 2011; Price, & Smith-DiJulio, 2016; Vallejo, & Amaro, 2009). Therefore, the theoretical model which will serve as a basis of support for using mindfulness-based or body-oriented interventions for SUD is also centered on relapse prevention. Baker and colleagues (2004) present an affective processing model of negative reinforcement in addiction. This model asserts that negative affect is the primary antecedent to drug use and relapse and that negative affect is a common symptom of withdrawal from all substances. Withdrawal symptoms occur early in the course of addictive substance use and increase in severity as substance use severity increases. For many substances, the avoidance of withdrawal symptoms is a key maintaining factor of substance use. When substance levels in the body fall, individuals with substance use difficulties learn to detect the interoceptive cues of negative affect related to withdrawal. The response to bodily sensations, or interoceptive cues, at this level is often substance seeking behavior and substance use. The detection of interoceptive cues is often preconscious and limits the response options available to the individual. While individuals may be aware of the urge to use substances, they are often unaware of the motivational factors underlying their craving (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004).

If substance use is interrupted or the individual is unable to obtain substances after the initial interoceptive cues, negative affect increases and enters conscious awareness (Baker et al.,

2004). This further motivates the individual to engage in substance use. Individuals are then biased toward behavioral responses that have lessened negative affect in the past so that when negative affect levels are high, they are more likely to respond reflexively. Reflexive responding prevents cognitive resources from being used to choose alternative responses and to delay immediate relief. Since low levels of negative affect influence behavior on a preconscious level and very high levels of negative affect result in reflexive reactions, emotion regulation skills are most likely to be utilized at moderate levels of negative affect. Therefore, treatments that lessen the affective elements of withdrawal may be most effective in reducing relapse (Baker et al., 2004).

Interoception

While substance use disorders can be conceptualized as emotional dysregulation that is enacted within the body, few treatment strategies incorporate the relationship individuals with substance use disorders have with their bodies into the theoretical model. Interoception refers to an individual's ability to sense what is going on in their body and can include many sensations such as temperature, itch, tickle, muscle tension, hunger, stomach pH, and intestinal tension (Paulus, Tapert, & Schulteis, 2009). While the focus of many psychotherapy interventions is on cognitive processes, the body maintains a sense of knowing that can affect a myriad of psychological concerns. Interoceptive deficits have been linked to several psychological disorders including depressive and anxiety disorders (Leweke, Leichsenring, Kruse, & Hermes, 2011). Interoceptive deficits are seen in patients across disciplines, with individuals diagnosed with fibromyalgia syndrome showing significantly lower scores in interoception than the general population (Duschek, Montoro, & Reyes del Paso, 2017). Bodily awareness has implications for physical wellness, as well as mental health, which makes it of particular interest to the treatment

of substance use disorders. Individuals with substance use disorders have been shown to have decreased interoceptive awareness compared to healthy controls (Sönmez, Kılıç, Ateş Çöl, Görgülü, & Çınar, 2017).

Responding effectively to inner experiences – thoughts, emotions, and sensations – requires being in touch with those experiences (Bishop et al., 2014). Individuals with poor interoceptive awareness exhibit more difficulty with identifying and describing feelings, suggesting that awareness of bodily states is related to awareness of emotions (Herbert, Herbert, & Pollatos, 2011). Indeed, bodily awareness has been found to support successful emotional regulation (Fustos, Gramann, Herbert, & Pollatos, 2013). In a study by Fustos and colleagues (2013), participants received instruction in cognitive reappraisal and then participated in an interoceptive awareness task before being shown a series of unpleasant or neutral pictures. During the picture presentation they were asked to rate the pictures as pleasant or unpleasant and to rate their level of arousal. Results suggest that more bodily awareness facilitated emotional regulation of negative affect when participants applied a reappraisal strategy (Fustos, Gramann, Herbert, & Pollatos, 2013).

Qualitative research also supports the finding that interoception improves emotional regulation (Zamariola, Frost, Van Oost, Corneille, & Luminet, 2019). Young adult females who scored high, average, and low in interoceptive ability were interviewed following participation in an interoception task which required them to count their heartbeat for a specific amount of time (Zamariola et al., 2019). Interoception was measured using the Body Awareness Questionnaire (BAQ; Shields, Mallory, & Simon, 1989) and the Multidimensional Assessment of Interoceptive Awareness (MAIA; Mehling et al., 2012). The interviews were focused on how participants perceive their level of bodily awareness and if and how that influences their emotional

awareness. Three themes emerged from the interview transcripts: interoceptive abilities, emotional regulation abilities, and influences on interoceptive and emotional abilities. Participants who scored high in interoception were more confident in their ability during the heartbeat counting task and linked their perception of bodily sensations with recognizing and regulating emotions. Participants who scored low in interoceptive ability reported difficulty labeling and describing their emotions. High scorers in interoception were also able to identify ineffective emotional regulation strategies while other participants did not mention any awareness of the efficacy of their emotion regulation strategies. The participants' discussion of the perception of emotions, bodily sensations, and emotion regulation in daily life demonstrates the fluid interplay of interoception, alexithymia, and emotion regulation (Zamariola et al., 2019).

Improving interoceptive awareness has been shown to directly affect neural processes (Haase et al., 2016). Haase et al. (2016) found that individuals who received mindfulness-based training demonstrate more effective neural modulation in response to aversive interoceptive stimulus than control participants. Specifically, participants in the treatment condition received mindfulness-based mental fitness training (MMFT; Stanley, 2014), which focuses on attentional control and tolerance for challenging external and internal experiences by using body-based skills for self-regulation of the stress response. During the Haase et al. (2016) study, all participants underwent an aversive interoceptive challenge using inspiratory breathing loads. Participants wore a nose clip and breathed through a mouthpiece that was attached to a tube. During successive trials, resistance loads of 10, 20, and 40 cm H₂O/l/s were applied to increase the aversiveness of the exercise and subjective experience of breathing. Participants who received MMFT showed significant attenuation in the right anterior insula and anterior cingulate

cortex which are important for interoceptive processing. This suggests that meditation training affects how the brain responds to aversive interoceptive stimuli (Haase et al., 2016).

Interoception not only affects how current body states are perceived, but it is also involved in the prediction of future body states (Berk et al., 2015). Adolescents with SUDs exhibit exaggerated responses when exposed to an aversive interoceptive challenge using inspiratory breathing loads similar to the method previously described (Berk et al., 2015). Berk et al.'s (2015) findings suggest that the insula of adolescents with substance use disorders is hypersensitive to aversive stimuli. Those participants also showed diminished anticipatory response compared to the control group which may indicate adolescents with SUD are unable to predict physiological bodily changes (Berk et al., 2015). Body prediction errors, or a discrepancy between what bodily states are expected to occur and actually occur, affect approach and avoidance behaviors related to substance use (Paulus, Stewart, & Haase, 2013). Meditation and exercise may alter the way individuals process stimuli that are predictive of a change in homeostasis and allow them to engage in alternative responses (Paulus, Stewart, & Haase, 2013).

Interoception is linked to substance use through the positive experiences of drug intoxication and the negative experience of substance withdrawal (Paulus, Tapert, & Schulteis, 2009). According to Paulus et al., as an individual's substance use progresses, approach behaviors are accompanied by avoidance behaviors; substance use is positively reinforced by the positive effects of intoxication and negatively reinforced by avoiding withdrawal symptoms. The way in which sensations are evaluated is dependent on the homeostatic state of the individual (Paulus et al., 2009). For substance users, the homeostatic set point is repeatedly affected by external stimuli so that the system relies on the substance for maintenance (Schmidt, Eulenbruch, Langer, & Banger, 2013). Interoceptive sensations following withdrawal represent

a deviation from homeostasis and contribute to the expectation that substance use will alleviate the aversive interoceptive experience. This type of expectation, referred to as tension reduction beliefs may result in exaggerated substance-related approach behavior (Schmidt et al., 2013). Specifically, in alcohol use disorder, research shows that participants with high tension reduction beliefs exhibit a negative relationship between interoceptive awareness and self-reported drinking behavior (Schmidt et al., 2013). This is one way in which alterations in interoceptive systems affect how drug-related cues are processed (Paulus, Stewart, & Haase, 2013).

Alexithymia

Alexithymia is a personality trait characterized by difficulty in identifying and describing emotions (Herbert, Herbert, & Pollatos, 2011). Individuals with SUDs score lower on measures of alexithymia than the general population and exhibit impaired emotional self-awareness and ability to attend to, identify, and label emotions in others (Carton et al., 2010). In general, the emotional dimensions of alexithymia – difficulty identifying and describing feelings – are positively correlated with substance use (Bonnet, Brejard, & Pedinielli, 2013). The presence of alexithymia has multiple implications for individuals with SUD. There is evidence that addiction severity is correlated with alexythimia; more severe addiction is related to difficulty identifying and describing feelings (Sönmez, Kılıç, Ateş Çöl, Görgülü, & Çınar, 2017).

When coupled with the positive correlation between substance use and negative emotionality, negative emotionality and difficulty identifying feelings explain 30% of the variance in substance use among individuals with SUD (Bonnet, Brejard, & Pedinielli, 2013). Alexithymia is also correlated with depression, anxiety, stress, and fatigue in individuals seeking treatment for addiction (Nezhad, Rad, Farrokhi, Viesy, & Ghahari, 2017). Specifically, for substance use treatment seeking individuals, difficulty identifying and describing feelings are

predictive of depression, anxiety, stress, and fatigue. Alexithymia is also negatively correlated with emotional intelligence (Nehra, Kumar, Sharma, and Nehra, 2014). In particular, individuals who are cannabis dependent exhibit lower emotional intelligence and higher alexithymia than healthy controls while individuals with alcohol use disorder have higher scores on alexithymia than cannabis or tobacco users (Bulai & Enea, 2016). Individuals with low emotional intelligence likely have difficulty identifying and describing feelings and are then at increased risk for experiencing myriad psychological concerns such as depression, anxiety, and stress.

Emotional Regulation

Improved emotional regulation in individuals who receive treatment for substance dependence is associated with decreased substance use frequency (Axelrod, Perepletchikova, Holtzman, & Sinha, 2011). Specifically, women who receive Dialectical Behavior Therapy experience improved confidence in ability to regulate emotions, ability to attend to, identify, and understand emotions, and ability to remain in control when they experience negative emotions. Adults receiving treatment for SUD experience more difficulty in emotional awareness and emotional regulation (Dingle, Neves, Alhadad, & Hides, 2018). Indeed, greater deficits in identifying and describing emotions is related to feeling less capable at regulating negative affect (Space & Courbasson, 2012). The ability to regulate negative emotions, in particular, is important for persistence in substance abuse treatment (Hopewood, Schade, Matusiewica, Daughters, & Lejuez, 2015).

Individuals with SUD have lower activation when highly aroused compared to the general public and emotional arousal shows a direct positive relationship to substance use (Bonnet, Brejard, & Pedinielli, 2013). Specifically, seeing a drug-related cue may elicit a large neural response and lead to an urge to use substances (Paulus, Stewart, & Haase, 2013).

Engaging in mindfulness may create a pause between sensing a drug-related cue and acting, which allows individuals to recognize feelings of craving without acting on them.

The use of interoceptive awareness skills to regulate emotions is associated with higher respiratory sinus arrhythmia (RSA; Price, Crowell, Pike, Cheng, Puzia, & Thompson, 2019). RSA is a measure of heart rate fluctuations across a respiratory cycle and can serve as an indicator of emotional dysregulation. Low resting RSA and excessive variability in RSA is associated with multiple forms of psychopathology (Beauchaine, 2015). Women in early SUD treatment who score low to moderate on interoceptive and mindfulness skills also exhibit low RSA, indicating poor ability to regulate emotions (Price et al., 2019). However, even brief interoceptive tasks may positively affect physiological response patterns and mood in individuals with SUD. Women receiving treatment for SUD completed a 5-minute interoceptive awareness task following exposure to a 5.5-minute film that had been validated to elicit sadness followed by a 2-minute rumination task (Crowell, Price, Puzia, Yaptangco, & Cheng, 2017). The participants' RSA decreased during the film and rumination tasks, indicating higher emotional dysregulation, and increased during the body awareness task. The participants evidenced improved physiological regulation and reduced arousal during the body awareness task (Crowell et al., 2017).

Mindfulness

Mindfulness, a therapeutic intervention in mindfulness meditation, is a practice of being aware, regulating attention, and adopting an orientation of curiosity, openness, and acceptance of present moment private experiences (Bishop et al., 2004; Harris, 2009). While mindfulness meditation is often described as a sitting meditation, the tenets of mindfulness practice can be applied in settings of daily life. Bishop et al., (2004) propose an operational definition of

mindfulness used in therapeutic contexts. Mindfulness begins with bringing attention to the present moment, often by using breathing as an anchor. Mindfulness creates space for one to observe private experiences – thoughts, feelings, and sensations – from moment to moment. Mindfulness as a practice requires the development and utilization of several skills including sustained attention, attention switching, and cognitive inhibition. In order to stay aware of the present moment, one must cultivate sustained attention. Inevitably, the mindfulness practitioner’s mind wanders from awareness of the present moment. When this occurs, one is to notice what thoughts, feelings, or sensations distracted the mind and to gently bring one’s awareness back to the breath. Bringing awareness back to the present moment requires the ability to flexibly switch one’s object of focus (Bishop et al., 2004).

Mindfulness teachings encourage practitioners to observe their private experiences with a nonjudgmental, non-elaborative stance of acceptance (Harris, 2009). When a thought, feeling, or sensation occurs, one is to observe the experience without judgment, explanation, or elaboration (Harris, 2009). This element of mindfulness practice requires cognitive inhibition – though this is not the same as thought suppression (Bishop et al., 2004). All private experiences are considered objects for observation. According to Bishop et al. (2004) individuals who practice mindfulness assume a specific orientation to experience; they are curious about where the mind wanders and the different aspects of one’s experience in the present moment. Curiosity of the present moment entails a willingness to experience the present with openness and a stance of acceptance. However, acceptance does not require liking or approval of all private experiences; rather, acceptance describes an openness to experiences (Harris, 2009).

The intent of mindfulness practice is not to produce relaxation or to change inner experiences; however, acceptance and curiosity may result in a reduction in reliance on cognitive

and behavioral strategies to avoid inner experiences (Harris, 2009). Bishop et al. (2004) propose that the valence of emotional distress may become less unpleasant as acceptance and curiosity changes the subjective meaning of private experiences. Additionally, investigative awareness in mindfulness practice, as described by Bishop et al. (2004), is an intentional effort to understand thoughts and feelings and to discriminate between different parts of inner experiences – emotions from physical sensations and cognitions from emotions. When individuals maintain contact with inner experiences, a space is created between thoughts, feelings, and sensations, allowing time for a reflective rather than reflexive behavioral response. While bringing awareness to the difference between cognitions, emotions, and behavior is similar to cognitive therapies, mindfulness differs in that the goal is not to restructure cognitions. Instead, practicing awareness of one's inner experiences enables individuals to cultivate acceptance of unpleasant or uncomfortable experiences and to engage in more life-enhancing behaviors.

While the previous discussion describes mindfulness as a skill that can be learned, the literature also includes investigations of how trait dispositional mindfulness is related to substance use. Dispositional mindfulness is the ability to nonjudgmentally observe the present moment without impulsively reacting (Elmquist, Shorey, Anderson, & Stuart, 2017). Research has shown a negative relationship between dispositional mindfulness and substance dependence severity in substance use treatment seeking adults (Bowen & Enkema, 2014). Specifically, the study of 281 individuals who were transitioning from inpatient or intensive outpatient treatment to aftercare for substance abuse found a significant negative relationship between substance dependence severity and the Five Facet Mindfulness Questionnaire (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) subscales of awareness, describing, and nonjudgment. The negative relationship between dispositional mindfulness and substance use disorder symptoms

has also been noted in men with comorbid eating disorder symptoms receiving residential substance use treatment (Elmqvist, Short, Anderson, & Stuart, 2017).

Investigations of dispositional mindfulness also shed light on potential skill deficits that could be addressed using mindfulness-based treatments. Individuals higher in avoidant coping had a stronger negative relationship between mindfulness and severity, suggesting that individuals with substance dependency use substances to avoid difficult experiences (Bowen & Enkema, 2014). Practicing awareness and acceptance, rather than avoidance, may benefit individuals with SUDs. Treatment-seeking individuals with cannabis, opioid, and/or cocaine use disorders have been shown to score lower than a nonclinical adult sample on the Mindful Attention Awareness Scale which assesses attention vigilance and moment-to-moment awareness (Dakwar, Mariani, & Levin, 2011). Mindfulness-related attentional impairments may be common in individuals seeking treatment for SUD and contribute to their difficulty in responding to unpleasant inner experiences in a reflective, rather than reflexive, manner. This assertion is supported by a study of 41 undergraduate students who consumed alcohol at least once per month over the past 3 months with an average 7.8 drinks consumed per occasion (Ostafin, Bauer, & Myxter, 2012). The participants' drinking behavior was measured using a calendar-based measure. Participants were randomly assigned to a mindfulness treatment group or a control group. The mindfulness treatment group participated in three sessions of listening to mindfulness audio instruction. Individuals in the treatment group exhibited a weaker relationship between automatic alcohol motivation and heavy drinking, suggesting that mindfulness practice weakens the relationship between impulse and action (Ostafin et al., 2012).

Evidence Based Mind-Body Interventions for Substance Use Disorders

Mindfulness Based Relapse Prevention

Mindfulness Based Relapse Prevention (MBRP; Bowen, Chawla, & Marlatt, 2011) is one of the most well-researched and validated mind-body treatments for substance use disorders. MBRP integrates mindfulness meditation with traditional relapse prevention (RP; Marlatt & Gordon, 1985), mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002), and mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990) to decrease the probability and severity of relapse for individuals receiving SUD treatment (Bowen et al., 2011; Bowen et al., 2014). It is designed as an aftercare program and recommended for individuals who have completed initial inpatient or outpatient treatment for SUDs (Bowen et al., 2011). MBRP is structured around a theory of relapse that focuses on how tonic and phasic processes influence behavior in high-risk situations (Witkiewitz, Brown, Harrop, Douglas, Enkema, & Sedgwick, 2014). Tonic processes are relatively fixed predispositions for vulnerability to relapse and likelihood of being in high-risk situations. Phasic processes, on the other hand, are immediate risk factors within a high-risk situation. Phasic processes can include thoughts, feelings, sensations, and use of coping skills and are the primary target for intervention. Through MBRP, individuals learn to recognize their responses to triggers that often lead to relapse and to create space between inner experiences and reactive behavior in order to choose alternative, adaptive ways of responding (Witkiewitz et al., 2014).

MBRP is delivered over the course of eight weekly, 2-hour sessions that focus on experiential learning (Bowen et al., 2011). While the group structure and format vary from week to week, every session includes an opening mindfulness practice, discussion of experiences, at least one formal meditation practice, and review of home practice for the week. Participants are

provided with handouts summarizing session concepts and are provided with CDs with guided meditations for home practice (Bowen et al., 2011). The first two sessions of MBRP explain the relevance of mindfulness practice for relapse prevention and focus on increasing awareness of external stimuli that trigger relapse (Witkiewitz et al., 2014). Participants also learn how to identify individual patterns of cognitive, emotional, and behavioral reactions to those triggers (Witkiewitz et al., 2014).

During the third and fourth sessions, clients identify the needs underlying their substance use and learn alternative ways of responding to those needs (Bowen et al., 2011). The Stop Observe Breathe Expand Respond (SOBER; Bowen et al., 2011) breathing space activity introduced in session three has been identified by participants as the most helpful and one of the most frequently practiced MBRP skills (Witkiewitz, 2014). Adapted from the 3-minute breathing space activity in MBCT, SOBER breathing space encourages clients to step out of their regular patterns of responding, bring awareness to their inner experience in triggering situations as well as every day activities (Bowen et al., 2011). Most individuals strive to amplify pleasant experiences while minimizing or stopping experiences perceived to be unpleasant. The mindfulness practices in MBRP encourage acceptance of all experiences. Practices like SOBER breathing space enable clients to cultivate tolerance of negative states and decrease reliance on impulsive behavior, such as substance use, to alleviate discomfort. Using mindfulness, individuals are able to bring awareness to their thoughts, emotions, and sensations before intentionally responding, rather than reacting reflexively, to the present moment (Bowen et al., 2011).

The fifth session focuses on balancing acceptance of what is and skillful action to make changes in life (Witkiewitz, 2014). Experiential practices in this session include practicing

SOBER breathing space in pairs and a discussion of using the SOBER breathing space in challenging situations (Bowen et al., 2011). This week also introduces mindful movement which incorporates basic yoga poses such as cat-cow, child's pose, and mountain pose. The purpose of mindful movement is to provide another avenue for participants to remain aware of the breath, physical sensations, and to notice the tendency of the mind to wander from the present moment. Week six of MBRP addresses the role thoughts play in relapse and how thoughts can be seen as simply thoughts. The focus is on awareness of thoughts rather than challenging their content (Bowen et al., 2011). Unlike traditional cognitive therapy, mindfulness-based therapies teach individuals that defusing from thoughts – rather than restructuring thoughts – allows for mindful responding. The seventh session discusses the importance of self-care, self-compassion, and integrating mindfulness into everyday life (Witkiewitz, 2014). Participants create a Reminder Card to carry with them that lists personal reasons to stay sober, contact number of supportive individuals, a list of MBRP mindfulness skills, and a list of alternative activities/plans. The final session discusses social support and continuing practice, focusing on how to strengthen support systems (Witkiewitz, 2014).

Bowen et al. (2014) researched the efficacy of MBRP compared to standard relapse prevention and treatment as usual for individuals with SUDs. Participants were recruited from a private, non-profit chemical dependency treatment agency that offers supervised detoxification, inpatient treatment, intensive outpatient treatment, and standard aftercare. The participant sample was 71.5% male, with an age range of 18-70 years, and 42.1% of participants identified as an ethnic/racial minority. All participants had completed either a 28-day inpatient or 90-day intensive outpatient treatment program. Participants randomly assigned to the treatment as usual (TAU) group participated in an abstinence-based, process-oriented group which was based on

12-step programs. The TAU group met one to two times weekly for 1.5 hours. The MBRP treatment group members participated in eight weekly, 2-hour sessions with 6 to 10 participants per group. The group format followed that previously outlined. The standard relapse prevention (RP) group was commensurate with the MBRP group in time, format, group size, location, and scope of homework. The sessions focused on assessment of high-risk situations, cognitive and behavioral coping skills, problem solving, goals setting, self-efficacy, and social support. Participants in the RP group also monitored their daily craving and mood (Bowen et al., 2014).

While no treatment differences were found at the 3-month follow-up, RP and MBRP participants exhibited reduced risk of relapse to substance use and heavy drinking compared with TAU participants at the 6-month follow-up (Bowen et al., 2014). Specifically, participants with alcohol use disorder reported significantly fewer days of heavy drinking in RP and MBRP groups compared with TAU. While participants in the RP group had longer time to first substance use compared with MBRP, findings from the 12-month follow-up showed that MBRP participants had fewer substance use days and a higher probability of not engaging in heavy drinking compared with the RP group. Results suggested that the three treatments may be equally effective at 3-month follow-up with MBRP having a more enduring effect at 12-months. The longer-term effects of MBRP may be explained by participants' improved ability to recognize and tolerate discomfort associated with craving or negative affect. Since MBRP aims to increase awareness of internal and environmental events that precipitate relapse, continued practice over time may strengthen ability to monitor triggers and alter responses to craving (Bowen et al., 2014).

Indeed, mindfulness practice has been shown to moderate the relationship between craving and substance use (Enkema & Bowen, 2017). A sample of 57 participants who had

completed inpatient or intensive outpatient treatment in the previous 2 weeks were randomly assigned to a MBRP treatment group following participation in treatment as usual or a standard aftercare program. Participants' substance use, craving, and amount of time spent in formal or informal mindfulness meditation practice was assessed. Formal practice included sitting meditation, body scan, or mountain meditation learned from MBRP while informal practice included activities such as urge surfing and SOBER breathing space. Results showed that craving after completion of MBRP predicted number of subsequent days of use. Days per week and minutes per week of formal practice moderated the relationship between craving and use, such that craving was less predictive of use for participants who spent more time in formal mindfulness practice. While informal practice was not a significant moderator of the relationship between craving and substance use, this study did not look at the role of negative affect regulation on substance use (Enkema & Bowen, 2017).

Aside from craving, another indicator of the efficacy of mindfulness-based interventions for substance use is quality of life (Yaghubi & Zargar, 2018). Yaghubi and Zargar (2018) found that men who received methadone maintenance treatment and MBRP for opioid use disorder showed a significant decrease in craving, as measured by a self-report scale. They also showed significant increases in quality of life at a two-month follow-up when compared to men who only received the methadone maintenance treatment.

Mindfulness-Oriented Recovery Enhancement (MORE)

Mindfulness-Oriented Recovery Enhancement (MORE; Garland, 2013) is an intervention designed to address chronic pain, craving, and opioid misuse behaviors. MORE integrates mindfulness training, third-wave Cognitive Behavior Therapies, and positive psychology to train clients in mindfulness, savoring natural rewards, and cognitive reappraisal (Garland, 2016;

Garland, Froeliger, & Howard, 2014). One goal of MORE is to restructure the reward process by reevaluating the meaning of conditioned stimuli and conditioned responses related to substance use. According to Garland (2016), humans can relearn the value of stimuli when reward-learning processes become dysregulated through addiction. The allostatic model of addiction states that prolonged exposure to drugs and stressful experiences leads to a reward deficit and dysphoric mood which then encourages increased drug consumption (Garland et al., 2014). Behavioral interventions designed to enhance the savoring of natural rewards may counteract these allostatic processes. Specifically, individuals with substance use disorders must relearn what is important in life by using pleasurable experience to regulate thoughts, feelings, and behavior. This concept is consistent with dual-process models of addiction which assert that addiction is due to dysregulated bottom-up neural circuits responsible for assigning value to reward-related stimuli and to dysfunctional top-down frontal-executive brain circuitry that carries on cognitive-control processes such as emotion and attention regulation (Garland et al., 2014).

MORE is a manualized group intervention designed to take place over eight weekly, 2-hour sessions (Garland et al., 2019). The mindfulness training in MORE aims to promote self-awareness, self-regulation, and self-transcendence. The mindfulness-to-meaning theory, which states that mindfulness allows separation from negative, automatic appraisals of painful experiences, is the foundation of mindfulness practices in MORE and supports the reappraisal training component of the intervention. Reappraisal training is intended to help clients develop meaning and psychological growth in the face of adversity. The third component of MORE, training in savoring pleasant events and emotions, is expected to enhance natural reward processing and positive affectivity. Session topics include discriminating between different

bodily signals of pain, danger, and suffering; gaining awareness of behavioral patterns and coping strategies for chronic pain; using reappraisal to break the connection between emotions, thoughts, and experienced pain; refocusing attention to savoring pleasant experiences, preventing opioid misuse by regulating emotions and behavior with mindfulness; and cultivating self-transcendence and meaning in life (Garland et al., 2019).

In addition to attending weekly group sessions, MORE participants are encouraged to practice mindfulness for 15 minutes every day using an audio recording (Garland et al., 2019). Mindfulness is further incorporated into daily routines through instruction for participants to engage in 3 minutes of mindful breathing before deciding to take their opioid medication. The mindful breathing exercise is intended to create a time and space for individuals to assess whether their opioid use is driven by urges or legitimate need for pain relief. This practice provides an alternative form of pain management and prevents unnecessary opioid use while also increasing the efficacy of the medication (Garland et al., 2019). Each session of MORE includes instruction of a mindfulness practice, debriefing of participant experiences, reiteration of concepts in the MORE therapeutic model, and positive reinforcement for participation. Every session ends with an experiential activity to practice new concepts and skills followed by assignment of homework (Garland et al., 2019).

MORE has been found to reduce general opioid craving and subjective opioid cue-reactivity in a sample of men and women who were prescribed opioid analgesics for chronic pain (Garland et al., 2014). Treatment group participants completed the MORE intervention described above while the control group attended a two-hour support group for eight weeks and journaled on chronic pain-related themes for 15 minutes each day. One week prior to and one week after participation in treatment, all participants in the study engaged in a dot probe task that

contained opioid-related, pain-related, and pleasure-related cues. Heart rate was measured to index reward responsiveness along with heart rate variability which is thought to record activity in the central and autonomic nervous systems involved in cognitive control over attention, emotion, and reward responses. During the task, participants rated the level of arousal elicited by the images on a 10-point scale. Results suggested that MORE is related to significantly greater reduction in subjective opioid cue-reactivity on the dot probe task. Additionally, the effect of MORE on opioid craving was mediated by increased reward responsiveness in the MORE group participants, indicating that MORE may enhance natural reward processing (Garland et al., 2014).

MORE has also been found to decrease momentary pain experience over time, supporting its use as an alternative form of pain management (Garland et al., 2017). In the same sample of men and women from Garland et al. (2014), MORE was associated with a 7% reduction in pain and significant increases in momentary positive affect over time when compared to the control group (Garland et al., 2017). In addition to the reduction in momentary pain and increase in momentary positive affect over time, individuals in the MORE treatment group also exhibited significant reductions in medication misuse (Garland et al., 2017). The above findings are taken from a sample of individuals enrolled in a larger randomized controlled trial (RCT) which evidenced a significant direct effect of the MORE intervention group on change in positive affect, meaning in life, savoring, and self-transcendence (Garland et al., 2019). Results suggest MORE significantly increased positive psychological health over the course of treatment and significantly reduced opioid misuse risk three months after treatment. Of note, the positive preliminary results of this first RCT suggest that the mindfulness training component of MORE,

with a focus on self-transcendence, can increase experiences of oneness in novice meditations and may be especially therapeutic for this population (Garland et al., 2019).

Mindful Awareness in Body-Oriented Therapy (MABT)

Proposed solutions to overcoming barriers to SUD treatment include collaborations between mental health counselors and medical healthcare professionals to provide care to patients with SUD within a primary care setting (Jacobson & Hatchett, 2014; Urada, Teruya, Gelberg, & Rawson, 2014). While professionals in the fields of medicine, psychiatry, psychology, counseling, and social work regularly work with individuals with SUD, further integration of complementary and alternative medicine may be advantageous. Preliminary research found promising feasibility estimates of implementing complementary therapies such as Swedish massage, Healing Touch, and Reiki as adjuncts to psychotherapy in a community mental health center (Collinge, Wentworth, & Sabo, 2005). Other approaches to mental health care found in the complementary and alternative medicine literature include mind-body interventions such as meditation, relaxation techniques, biofeedback, and massage therapy (Mamtani & Cimino, 2002).

Mindful Awareness in Body-Oriented Therapy (MABT; Price & Hooven, 2018) is a manual, mind-body therapy that addresses the need for mind-body integration (Price, Wells, Donovan, & Brooks, 2012). MABT is facilitated by licensed massage therapists who have specific training in massage therapy for mental wellness and is used as an adjunct to psychotherapy (Price et al., 2012). MABT addresses awareness, interoception, and regulation with the intent of building self-care tools based in body awareness to facilitate emotion regulation. The components of MABT are massage with attention to developing body literacy (ability to identify and articulate bodily and sensory experiences), interoceptive skills training to

reduce avoidant and dissociative coping, and mindful body awareness practice. The overarching focus of MABT is on embodiment (Price et al., 2012). Emotional regulation is often focused on cognitive appraisal and restructuring, without acknowledging bodily sensation; dealing effectively with thoughts, feelings, and sensations requires being in touch with those experiences (Burkitt, 2018). Focusing on embodiment is one avenue to cultivate such connectedness.

MABT is a manualized intervention constructed to include eight weekly 90-minute sessions (Price et al., 2018). The sessions are divided into three stages, consistent with the three components of MABT. Stage 1 focuses on identifying bodily sensations and increasing body literacy. The goals of stage 2 are for clients to learn and develop strategies for interoceptive awareness and stage 3 aims to assist clients in developing the capacity to sustain awareness for appraisal of interoceptive experiences. Each session, regardless of stage, begins with a 30-minute check-in regarding current emotional and physical well-being, followed by a 45-minute massage. The last 15-minutes of session are spent reviewing the client's experience during the massage and discussing homework for the week. The verbal review at the end of session is meant to promote integration of session practices into daily living. Clients receive instruction in four inner body awareness exercises including feeling sensation of the breath, accessing inner body through conscious attention to specific body areas, using mental intention to release physical tension, and deepening attention to and presence with physical and psychological discomfort. Throughout the intervention, attention is given to body awareness in the context of clients' experiences with substance use and treatment. Additional mindful body awareness practices are used to facilitate embodied self-awareness instead of dissociation or avoidance as means of coping (Price et al., 2018).

When combined with TAU, MABT has been shown to have significant additive effects to treatment outcomes (Price, Wells, Donovan, & Brooks, 2012). Women in the MABT plus TAU group completed the 8-week MABT protocol described above in addition to an inpatient or outpatient 12-step, abstinence-based treatment program. The TAU only group participated in the same inpatient or outpatient programs. At the three-month posttest, individuals in the MABT plus TAU group were abstinent for substance use for significantly more days than the TAU only group. The MABT plus TAU group also showed a significant reduction in dissociation, perceived stress, and emotion regulation difficulties when compared to the TAU only group. At the six-month follow up, 73% of the MABT group participants had a regular practice for body connection and used skills learned in MABT. At nine-months posttreatment, 82% of MABT participants continued with regular body connection practice at an average of 5.4 times/week (Price et al., 2012).

MABT has also been shown to increase interoceptive awareness ability and emotion regulation (Price et al., 2018). In a study by Price et al. (2018) participation in MABT plus TAU was compared with TAU only, and a Women's Health Education (WHE) group in addition to TAU. The MABT group showed significant improvements over the two comparison groups in several areas of interoceptive awareness including noticing, attention regulation, emotional awareness, self-regulation, body listening, and trust. The MABT group also evidenced significant improvement in emotion regulation when compared to the TAU and WHE groups (Price et al., 2018). Longitudinal data of 12-month posttreatment follow-up show a significant reduction in days abstinent from substance use for participants in the MABT plus TAU group compared to TAU (Price, Thompson, Crowell, & Pike, 2019). These results show the positive effect of interoceptive awareness training on reducing risk of relapse. Additionally, RSA

significantly improved for the MABT group compared to TAU only and WHE plus TAU groups at three, six, and 12-month posttest, providing support for the relationship between interoceptive awareness training and emotion regulation capability (Price et al., 2019).

Importantly, Price and Smith-DiJulio (2016) conducted focus group interviews with five women who had completed an MABT intervention regarding their continued use of interoceptive awareness skills, perspective of the intervention, and thoughts on MABT delivery in the future. Themes that emerged from the participants' responses to a set of semi-structured interview questions include barriers to using skills, how skills were used in daily life, MABT impact, and directions for the future. Participants reflected that they individualized the strategies learned in MABT based on their needs, personality, environment, and nature of stressors. They reported that stressful events and not having a regular practice impeded use of interoceptive awareness skills. Participants believed MABT, compared with other treatments, allowed them to develop a more secure sense of self and to connect to their bodily self. They expressed that MABT should occur early in treatment and that long-term support options to encourage continued practice would be beneficial (Price & Smith-DiJulio, 2016).

Acceptance and Commitment Therapy for Substance Use Disorders

Also represented in the literature of mind-body or mindfulness-based interventions for SUD are individual studies describing adaptations of widely-used interventions. Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) has been implemented in multiple approaches to treating SUD. The general goals of ACT are to attenuate the effect thoughts have on behavior and to create a context in which alternative behavior that is aligned with one's values can occur (Lanza, Garcia, Lamelas, & Gonzalez, 2014). This is achieved through didactic learning and experiential exercises (Hayes, Strosahl, & Wilson, 1999).

In contrast to MBRP, ACT has shown efficacy in implementation during early stages of SUD treatment, rather than as an aftercare program (Lee, An, Levin, & Twohig, 2015). Results from a meta-analysis of 10 RCTs provide support for ACT as an efficacious treatment for SUD (Lee et al., 2015). Analysis from the same study show that abstinence from substance use is better maintained when treated with ACT compared to other active treatments. Specifically, results from a study of 50 incarcerated women in a state prison in Spain show the percentage of participants who maintained abstinence from substances at posttreatment and six-month follow-up was higher in the ACT treatment group than the CBT and control group conditions (Lanza, Garcia, Lamelas, & Gonzalez, 2014). While Lanza and colleagues (2014) recognize that access to drugs in prison is limited, they assert that the individuals in the two treatment groups shared a living space and had similar ease of access to drugs. The positive treatment effects of ACT for SUD also increase over time or lessen at a slower rate than other active treatments (Lee et al., 2015). ACT also has support in being used specifically to treat opioid use disorder (Hayes et al., 2004). When used in conjunction with methadone maintenance treatment, ACT is associated with higher abstinence rates posttreatment compared to methadone maintenance alone (Hayes et al., 2004).

In addition to being used as a primary treatment for SUD, ACT has been adapted to specifically target shame related to SUD (Luoma, Kohlenberg, Hayes, & Fletcher, 2012). Many individuals with SUD experience shame due to the stigma associated with substance use, failure to control substance use, and role functioning failures (Luoma et al., 2012). Although avoiding experiencing shame may provide temporary relief of discomfort, avoidance will likely exacerbate the emotion over time and contribute to problematic outcomes (Luoma et al., 2012). The ACT perspective asserts that problematic outcomes in substance use are related to over-

identifying with self-critical thoughts which leads to substance use and avoidance of painful private experiences such as shame (Luoma et al., 2012). Individuals with SUD often use substances as a way to avoid painful private experiences. However, vast reductions in shame during treatment have been shown to predict higher levels of substance use at follow-up (Luoma et al., 2012).

The shame in SUD adaptation of ACT is comprised of three, 2-hour group sessions which occurred in a single week within the context of a 28-day inpatient treatment program for SUD (Luoma et al., 2012). The first session focuses on discussing how suppression and avoidance of unpleasant experiences has worked for participants in the past and provide a rationale for practicing acceptance skills related to substance use. The second session introduces defusion and acceptance skills through experiential exercises and mindful practice. Session three integrates mindfulness exercises and identification of life goals and values with a focus on building social support and values related to treatment. Individuals who participated in the ACT group exhibited more gradual reductions in shame and higher levels of attendance in outpatient treatment at follow-up compared to the TAU group. Higher levels of outpatient treatment were then associated with lower levels of substance use. ACT participants exhibited continuous treatment gains over time rather than the quick reductions in shame subsequent to relapse seen in the TAU group. These results suggest that acceptance and mindfulness-based interventions may break the cycle of shame and avoidance, allowing individuals to have gradual reductions in shame and to encourage use of life-enhancing behaviors (Luoma et al., 2012).

Support and Limitations of Mindfulness-Based Interventions for SUD

A systematic review of MBIs suggests that they can lead to a reduction in misuse of substances – alcohol, cocaine, methamphetamines, marijuana, nicotine, and opiates – that is

significantly larger than non-specific educational support groups, some specific control groups, and nontreatment groups (Chiesa & Serretti, 2014). In addition to reducing substance misuse, MBIs are effective in increasing abstinence at posttreatment as well as follow-ups from 2 weeks to 12-months posttreatment (Li, Howard, Garland, & Lazar, 2017). MBIs can reduce craving, urges, and stress (Chiesa, & Serretti, 2014; Li et al., 2017). MBIs have been shown to have moderate-to-high treatment adherence although completion rates do not differ significantly from other specific treatments or TAU (Li et al., 2017). Mindfulness meditation as a specific intervention for SUD shows promising preliminary efficacy (Zgierska, Rabago, Chawla, Kushner, Koehler, & Marlatt, 2009).

Along with the positive findings of support for MBIs with SUD come a myriad of limitations including lack of randomization, nonprobability sampling, small sample sizes, insufficient information about treatment delivery adherence, reliance on self-report measures, and insufficiently detailed statistical information (Chiesa & Serretti, 2014; Li, Howard, Garland, & Lazar, 2018). Additionally, many studies only assessed outcomes at posttreatment or 3-month follow-up, limiting the generalizability of findings. It is also unclear from meta-analytic findings whether the many MBIs in the literature represent unique treatment approaches. Goldberg and Tucker (2019) implore readers to use caution when interpreting trials and meta-analyses of MBIs due to the potential bias of researcher allegiance.

In addition to establishing the efficacy of interventions, it is important to address potential barriers to implementation. In a sample of professionals from psychology, psychiatry, social work, and psychiatric nursing, two thirds of practitioners surveyed indicated they were at least familiar with mindfulness in the treatment of substance misuse and one third reported they incorporate mindfulness into treatment (Edwards, Cohen, & Wupperman, 2016). Findings from

Edward et al. (2016) found familiarity with mindfulness is significantly associated with likelihood of using mindfulness in practice. However, only 7% of the sample who were incorporating mindfulness into their practice were using research-supported, formalized manuals. The need for further training was rated as the greatest barrier to incorporating mindfulness into treatment (Edward et al., 2016). These results suggest that while use of MBI may be supported by the literature, there are still gaps when it comes to treatment accessibility and delivery.

Additionally, special considerations should be made when adapting evidence-based practices for use with SUD. For example, Vallegjo and Amaro (2009) faced several challenges when adapting MBSR for use with women receiving community-based addiction treatment. The participants were African American and Latina women from low socioeconomic status backgrounds with a history of trauma, homelessness, and incarceration. Some of the providers of the treatment program expressed concerns with using meditation and yoga with individuals in early stages of recovery. For example, remaining still may be difficult due to the hyperactivity of the body in early stages of recovery; drugs prescribed to treat withdrawal symptoms induce drowsiness and may result in difficulty staying awake during meditative practices; individuals with a history of trauma may be triggered by having sustained attention brought to specific areas of the body; attention to bodily sensations may amplify cravings and urges if practiced directly after detoxification (Vallegjo & Amaro, 2009).

Vallejo and Amaro (2009) made several adaptations to MBSR. They still used the four basic formal meditation practices of MBSR including body scan, seated meditation, mindful hatha yoga, and walking meditation. However, the length, sequence, and presentation of practices varied to accommodate individual needs and states of group members. Group members were allowed to keep their eyes open during meditation to promote a sense of safety. During

walking meditations, the speed and quality of movement was allowed to match the level of agitation participants experienced. Seated meditation began with awareness of environmental sounds rather than the breath or bodily sensations and yoga practice excluded pelvic-rocking exercises (Vallegjo & Amaro, 2009). While treatment delivery fidelity is important when facilitating manualized treatments, it is important to assess the individual and varying needs of clients to promote recovery.

Future Directions

Patient-Treatment Fit

As with other forms of mental health treatment, MBIs may provide more benefit to specific individuals. While future research on patient-treatment fit for MBIs used for SUD treatment is needed, cues can be taken from the existing literature. Results of a study examining the effect of MBSR on distress tolerance, perceived stress, and mood states suggest that individuals with low levels of distress tolerance pre-treatment may receive the most benefits from mindfulness training (Gawrysiak, Leong, Grasseti, Wai, Shorey, & Baime, 2016). Additionally, older age has been shown to predict better outcomes in MBSR mindfulness training for chronic pain patients (Petersen & la Cour, 2016). A meta-analysis of 39 studies examining the relationship between trait mindfulness and substance use behaviors found a stronger negative relationship between the two variables for tobacco and alcohol use behaviors compared to other substances (Karyadi, VanderVeen, & Cyders, 2014). This finding suggest that treatments aimed at increasing mindfulness may be more beneficial for individuals who use specific substances. Karyadi and colleagues (2014) also found a stronger relationship between trait mindfulness and substance use behaviors for inpatient clinical samples compared to non-clinical and outpatient samples. The specific facets of mindfulness related to substance use

behavior included acting with awareness, non-judgment, and non-reactivity (Karyadi, VanderVeen, & Cyders, 2014).

The current review of MBIs provides several suggestions for ways MBIs can add to an integrative SUD treatment plan. Mindfulness training increases bodily awareness which facilitates identification of craving and ability to tolerate associated discomfort thus reducing substance use (Bowen et al., 2014; Enkema & Bowen, 2017). This suggests that individuals with deficits in interoceptive awareness would likely benefit from MBI for SUD. In addition to relapse prevention, MBIs may also be useful in the prevention of SUD for at-risk populations. Specifically, MBIs teach skills that can be used in pain management, effectively reducing the use of opiate pain medication (Garland et al., 2017).

Addressing the Body

Disordered eating and nonsuicidal self-injury (NSSI) have been described as emotional dysregulation that is enacted through the body (Muehlenkamp, Peat, Claes, & Smits, 2012). Even though SUDs are also associated with emotional dysregulation and are inherently connected to bodily experiences, assessment of how feelings toward the body influence substance use behavior is scant in the literature. A study on basic-body knowledge of women who actively use substances found that 44% of participants incorrectly responded to a question on whether women had sex and urinated from the same place and 62% of participants incorrectly identified whether tampons could get lost in the abdominal cavity (Gollub, Cyrus-Cameron, Armstrong, Boney, & Chhatre, 2013). These findings suggest that in addition to the interoceptive deficits common among individuals with SUD, low basic body knowledge may also impact individuals' relationship to their bodies. The relationship between substance use and the physical body is further complicated by how substance use is influenced by body image

concerns. In a sample of 297 women recruited from seven substance abuse treatment facilities, 70% reported concern about weight gain during recovery and 43% worried that weight gain could lead to relapse (Warren, Lindsay, White, Claudat, & Velasquez, 2013). About one-third of participants reported weight loss was a reason they began using substances and 37% reported they often, usually, or always used substances to lose weight (Warren et al., 2013).

In support of how MBIs may address the body image component of SUD, a brief mindfulness intervention was shown to influence female smokers' response to a body image challenge (Adams et al., 2013). Female undergraduate students, between the ages of 18-26, who self-identified as smokers and who did not meet criteria for an eating disorder were invited to participate in the study. Participants were assigned to a silent body image condition, mindfulness body image condition, or a neutral stimulus condition. In the mindfulness body image condition, participants listened to a 10-minute instructional tape on mindfulness including instructions on breath awareness, nonjudgmentally paying attention to present moment experiences, and noticing thoughts and feelings while letting them pass. After the initial instructions, participants then listened to another 10-minute recording encouraging them to apply the mindfulness techniques while participating in a body image challenge (i.e., trying on a bathing suit and looking in a floor length mirror). Participants in the silent body image condition completed the same body image challenge in silence. The mindfulness group exhibited increased self-reported state mindfulness and stable body dissatisfaction and negative affect related to the body image challenge. Results suggest the mindfulness treatment weakened the relationship between negative affect and smoking urges (Adams et al., 2013).

While basic body knowledge, body image, and interoceptive awareness are all related to substance use behavior, there exists a paucity in the literature of how current interventions target

deficits in these areas. Muehlenkamp (2012) proposed a construct that plays a critical role in nonsuicidal self-injury that may also relate to individuals with substance use disorders. Body regard is composed of body esteem, body competence, interoceptive awareness, and body integrity (Muehlenkamp, 2012). Body regard encompasses satisfaction with appearance, perceived physical ability and health, one's sense of connection to, ownership of, and understanding of the body, and includes an innate desire to protect the body. Body disregard, then, is characterized by negative attitudes, perceptions, and experiences of the body including less connection and caring for the body (Muehlenkamp, 2012). Body regard, as measured with the Body Attitudes Scale (BAS) has been found to mediate the relationship between emotion dysregulation and NSSI (Muehlenkamp, Bagge, Tull, & Gratz, 2013). In fact, low levels of body regard are a prerequisite for NSSI.

Given the similarities in emotional dysregulation between NSSI and SUD, and the increasing use of mind-body interventions for SUD, research is needed to assess the relationship between body regard and SUD. Such inquiries may also provide insight into chosen methods of drug use. Des Jarlais and colleagues found that, contrary to previous professional opinion, the transition from injection to non-injection drug use is a relatively stable behavior change. In the study of 104 individuals who had a history of intravenous heroin or cocaine use, one of the most common reasons for discontinuing injection drug use was health concerns (Des Jarlais et al., 2007). This finding suggests that concerns about health, a component of body regard, can contribute to decisions about substance use.

Exploring the dimensions of body regard and increasing individuals' sense of understanding and caring of the body may be an additional target of MBIs. While some interventions previously described (e.g., MBRP and MABT) include a self-care component, few

interventions operationally define what is meant by self-care. Cook-Cottone (2015) asserts that taking care of the body – including basic physical needs, exercise, and adaptive stress relief – is an essential part of self-care. Since many MBIs encourage mindfulness practice within the context of everyday situations, health promoting self-care activities could easily be incorporated (Bowen et al., 2001). For example, mindful awareness, nonjudgment, and acceptance could be practiced when performing self-care activities such as personal hygiene, cooking, or exercising. Research is needed to examine the effects of self-care activities on body regard in individuals with SUD.

Key Points and Recommendations

- Negative affect is the primary antecedent to drug use and relapse (Baker et al., 2014)
- Interoception, an individual's ability to sense what is going on in their body, is related to awareness of emotions and is often impaired in individuals with SUD (Herbert, Herbert, & Pollatos, 2011; Sönmez, Kılıç, Ateş Çöl, Görgülü, & Çınar, 2017)
- Mindfulness practices promote emotional regulation and interoception by increasing awareness of private experiences in order to respond to those experiences in a reflective, rather than reflexive, manner
- Several MBIs including MBRP, MORE, MABT, and ACT have empirical support for use with SUD. Mechanisms of change include increasing interoceptive awareness and emotional regulation ability, and decreasing craving and drug cue-reactivity (Price et al., 2018; Garland et al., 2019; Enkema & Bowen, 2017)
- MBIs can lead to a reduction in misuse of various substances including alcohol, cocaine, methamphetamines, marijuana, nicotine, and opiates (Chiesa & Serretti, 2014)
- Barriers to implementing MBIs for SUD include lack of practitioners using research-supported, formalized manuals and need for further training (Edward et al., 2016)
- Limitations to the current literature on MBIs for SUD include lack of randomization, nonprobability sampling, small sample sizes, insufficient information about treatment delivery adherence, reliance on self-report measures, and insufficiently detailed statistical information (Chiesa & Serreti, 2014; Li, Howard, Garland, & Lazar, 2018).
- Future studies should examine the relationship between body regard and SUD and the effect of health promoting self-care activities on body regard in individuals with SUD.

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