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# Mindfulness-Based Treatment to Prevent Addictive Behavior Relapse: Theoretical Models and Hypothesized Mechanisms of Change

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## Abstract

Mindfulness-based treatments are growing in popularity among addiction treatment providers, and several studies suggest the efficacy of incorporating mindfulness practices into the treatment of addiction, including the treatment of substance use disorders and behavioral addictions (i.e., gambling). The current paper provides a review of theoretical models of mindfulness in the treatment of addiction and several hypothesized mechanisms of change. We provide an overview of mindfulness-based relapse prevention (MBRP), including session content, treatment targets, and client feedback from participants who have received MBRP in the context of empirical studies. Future research directions regarding operationalization and measurement, identifying factors that moderate treatment effects, and protocol adaptations for specific populations are discussed.

### Keywords

addiction; mindfulness meditation; mechanisms of behavior change; relapse prevention; theoretical model

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**Declaration of Interest**

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## INTRODUCTION

According to the 2010 National Survey of Drug Use and Health, approximately 20.3 million adults in the United States met criteria for a substance use disorder in the past year (Substance Abuse and Mental Health Services Administration, 2012). It has been estimated that approximately nine million adults (0.3%) in the United States meet criteria for past year pathological gambling (Kessler et al., 2008). In 2007, the total cost of illicit drug use in the United States, in terms of crime, loss of work, and health care costs, was estimated at 193 billion dollars (National Drug Intelligence Center, 2011), which includes 11 million dollars in health care costs and over three million dollars in specialty addiction treatment costs. Among those who do receive specialty addiction treatment, the rates of relapse across substances (i.e., return to problem substance use after a period of abstinence or moderate use) have been estimated at over 60% within the first year following treatment (McLellan, Lewis, O'Brien, & Kleber, 2000), and over 75% within the first year following treatment for gambling addiction (Hodgins, Currie, elGuebaly, & Diskin, 2007).

Numerous models of addictive behavior relapse have been developed that have attempted to identify the antecedents of relapse to problematic substance use and gambling behavior following treatment (Connors, Maisto, & Zwyiak, 1996; Ludwig & Wikler, 1974; Marlatt & Gordon, 1985; Tiffany, 1990). All of these models have incorporated biological, psychological, and/or social learning components to help understand addictive behavior relapse, which has led recent researchers to focus on biopsychosocial models of the relapse process (Garland, Boettiger, & Howard, 2011; Maisto & Connors, 2006; Witkiewitz & Marlatt, 2004).

Many of the biopsychosocial models are similar in that they generally propose that multiple interacting factors can influence relapse for a given individual, with a primary focus on biological predisposition and neurobiological dysfunction (including craving and stress responses), psychological health (including negative affect, positive affect, and perceived stress), social learning (e.g., self-efficacy), and social-situational influences (e.g., peer pressure, lack of social support, environmental cues). Conceptualizing these various factors as a complex, dynamic system, Witkiewitz and Marlatt (2004) proposed a model of relapse that focused on tonic and phasic processes as the factors that influenced the behavior of the system (i.e., the relapse process), within the broader context of high-risk situations for relapse. Tonic processes encompass various risk factors that represent underlying vulnerability for resumption of problematic behavior (e.g., drug use). These risk factors include distal risk (genetic influences, dependence severity, comorbid psychopathology), cognitive processes (self-efficacy, motivation or readiness to change), and social factors (social support). These factors often predict whether an individual will be more or less vulnerable and more or less likely to be in a high-risk situation (i.e., stopping by a bar because of feeling depressed or lonely). Phasic processes characterize the immediate precipitants of relapse within a high-risk situation, which increases a person's vulnerability in the moment, such as cognitions (e.g., self-efficacy), affective states, physical states, and use of coping skills. Several risk factors (e.g., craving, negative affect, self-efficacy) are considered either tonic or phasic processes, depending on the individual person and situational context.

Garland and colleagues (2011) also proposed a dynamic biopsychosocial model of alcohol dependence that incorporates many features of the Witkiewitz and Marlatt (2004) model, with an added focus on implicit and explicit cognitive processes (e.g., alcohol attentional bias, cognitive schemas). Both the Witkiewitz and Marlatt (2004) and Garland et al. (2011) models also proposed dynamic reciprocal interactions (i.e., feedback loops), in which various risk factors can be mutually influential (e.g., increases in negative affect predict alcohol use, and in turn, drinking predicts increases in negative affect (Witkiewitz & Villarroel, 2009)).

The primary reason for developing models of the relapse process is ultimately to prevent lapses or reduce the severity of lapses when do they occur. As noted above, the relapse process is influenced by both tonic (relatively fixed) and phasic (immediate) risk factors. By understanding these factors, we can develop treatment approaches that directly target the phasic processes, which we consider to be treatment modifiable factors. Specifically, we propose that various phasic processes (particularly craving, negative affect, momentary self-efficacy, and interpersonal factors) can be targeted in treatment. We also propose that it is critical for treatments to focus on the reciprocal interactions among risk factors, and between risk factors and substance use. Essentially, treatments need to break these feedback loops. Targeting risk factors independently (e.g., with a craving-reduction medication or antidepressant), without acknowledging the interaction between risk factors (e.g., negative affect may increase craving, which may elicit a lapse in abstinence), may be less effective in the long term given that factors such as craving, negative affect, stress, and distress are inevitable over the course of an individual's life. Rather, we propose that treatments will have greater long-term effectiveness if they target the responses to risk factors and situational demands that individuals experience well beyond treatment. Garland et al. (2011) and Witkiewitz and Marlatt (2004) each proposed that mindfulness-based interventions may be one method for targeting the interactions between risk factors and responses to risk factors in a dynamic model of relapse.

## THEORETICAL MODELS OF MINDFULNESS IN THE TREATMENT OF ADDICTION

Several contemporary mindfulness-based treatments have been developed that integrate current psychological treatment methods with Buddhist traditions and practices dating back thousands of years. These practices are traditionally conceptualized as a means of transforming suffering into peace, joy, and liberation (Hanh, 1998). The Buddhist understanding of suffering is clearly explicated in the first two of the four "Noble Truths" (Brazier, 1997): (1) Suffering is real and respectable, and worth understanding; (2) Craving for things to be otherwise causes suffering, and a deeper understanding of craving is warranted. As S. N. Goenka describes it, suffering exists because, "we are ignorant of the impermanent, impersonal nature of our existence," and "blinded by ignorance, we generate reactions of craving and aversion, which develop into attachment, leading to all types of unhappiness" (Hart, 1987, p. 47). If an experience is pleasant, an individual tends to seek amplification or continuation beyond its natural duration. If it is unpleasant, an individual tends to seek its minimization or cessation. Buddhist theory states that, if unchecked, the

strength of these reactions increases, leading to craving, or “the mental habit of insatiable longing for what is not, which implies an equal and irremediable dissatisfaction with what is” (Hart, 1987, p. 37).

The third and fourth Noble Truths identify the possibility of stepping out of this cycle of reactivity (Brazier, 1997; Hanh, 1998): (3) It is possible to find liberation from the path that leads to the cycle of suffering; (4) There is a path that leads to well-being. Traditional mindfulness practices are a reflection of the third noble truth (Brazier, 1997), and are intended to liberate the practitioner and allow him or her to shift away from cognitive and behavioral patterns that lead to suffering. According to Buddhist tradition, craving is a natural phenomenon that must be understood and accepted in order for the individual to make this shift.

In contemporary psychotherapeutic protocols, mindfulness is traditionally presented as secular (Kabat-Zinn, 1990). Mindfulness is thus conceptualized and practiced as a type of focused, purposeful, non-judgmental attention that people can access and practice outside of a religious context. Secularization functions to expand the access to these practices, thus making its benefits available to a broad range of people with varying spiritual and religious backgrounds.

While there are undoubtedly differences between mindfulness-based approaches and more traditional Western approaches such as cognitive behavioral therapy, behavior therapy, and 12-step programs, there are also several similarities. Similar to a cognitive-behavioral approach to addiction, mindfulness-based treatments include examination of thoughts related to triggers, cravings, and urges (Bowen et al., 2009). By observing substance-related thoughts, clients reframe these troubling experiences as expected and tolerable, similar to the intervention techniques of cognitive restructuring and reframing (Dowd, 2005). However, in mindfulness-based approaches, emphasis is typically placed on awareness of the process and nature of thought, rather than on challenging its content. For example, clients practice exercises in which they are instructed to notice when a thought has arisen in the mind, then allow it to naturally pass. They are further instructed to notice when they become involved or “caught up in” the thoughts, and regardless of content, to let go of the thought and return to observing the arising and passing of thoughts. This differs from the cognitive therapy approach of examining the content of the thoughts. Clients practice similar observation of emotion, wherein they focus on the somatic and cognitive constituents of the emotion, but do not “process” it on a content level.

Mindfulness-based approaches have some functional similarities with traditional behavior therapies, such as exposure and response prevention (Foa & Kozak, 1986). Traditional exposure therapy introduces triggering environmental “cues” to participants in gradually more intense degrees. Through this process, the process of habituation to cues occurs and more adaptive behavioral responses are generated (Marrisen, Granken, Blanken, van den Brink, & Hendricks, 2005; Rohsenow, 2001). Similarly, in mindfulness-based practices such as “urge surfing” (Bowen & Marlatt, 2009; Marlatt & Gordon, 1985), clients intentionally observe and remain in contact with experiences, although typically internal in nature versus environmental, such as craving and urges, without defaulting to their habitual, harmful

behaviors (Bowen et al., 2009). Finally, traditional 12-step treatment models come from a spiritual perspective that integrates elements of mindfulness. In Alcoholics and Narcotics Anonymous, participants work through 12 steps that involve various practices, including meditation (Alcoholics Anonymous World Services, 1952; Narcotics Anonymous World Services, 1988). In the 11th step of this program, participants often seek to further their spiritual progress through the development of a daily meditation practice (Gorski, 1989; Narcotics Anonymous World Services, 1993). However, in Alcoholics and Narcotics Anonymous, no specific form of meditation is taught. Mindfulness-based treatments for addiction may add to this tradition by appealing to a wider, more secular audience, while teaching mindfulness techniques specifically targeting relapse prevention. Recent reviews of the literature have provided support for the efficacy of mindfulness-based approaches for substance use disorders (Chiesa & Serretti, 2013; Zgierska et al., 2009).

## MANUALIZED MINDFULNESS-BASED TREATMENT FOR ADDICTION

In attempt to integrate mindfulness practices and perspectives into a deliverable, replicable treatment for addictive behaviors, mindfulness-based relapse prevention (MBRP; Bowen, Chawla, & Marlatt, 2010; Witkiewitz, Marlatt, & Walker, 2005) was designed as an 8-week-manualized outpatient aftercare program, incorporating cognitive-behavioral skills (i.e., effective coping skills, self-efficacy, and recognizing common antecedents of relapse) with mindfulness-based practices to decrease the probability of relapse by increasing awareness and flexible responding in the presence of substance use triggers.

To date, MBRP has demonstrated efficacy as a treatment for substance use disorders, in comparison to a treatment-as-usual control group in an outpatient treatment setting (Bowen et al., 2009), in comparison to relapse prevention in a residential women's treatment center (Witkiewitz et al., in press), and in comparison to the Freedom from Smoking intervention for smoking cessation (Brewer et al., 2011). We also recently tested the effectiveness of MBRP modified for problem gambling (MBRP-PG) in a small sample of individuals ($n$ = 10) who were receiving outpatient gambling treatment. From baseline to a posttreatment assessment, we found medium to large effect size decreases in gambling symptoms, gambling-related consequences, urges to gamble and depression symptoms following MBRP-PG treatment.

The practices and exercises throughout MBRP are designed to raise awareness and increase intentional responding by shifting out of "autopilot" and bringing attention to physical, emotional, and cognitive experiences, both in triggering situations and in typical daily routine activities. Several practices specifically target tolerance of negative physical, emotional, and cognitive states, thereby decreasing the need to alleviate discomfort by engaging in impulsive behavior. The content and activities of each MBRP session are summarized in Table 1.

The first two sessions introduce and offer a rationale for the relevance of mindfulness practice to relapse prevention, and maintain a specific focus on increasing awareness of external triggering stimuli and individual patterns of cognitive, emotional, and behavioral reactions. Clients learn to recognize urges to react impulsively, and practice alternative ways

of “staying with” discomfort, pausing before reacting, and choosing a more skillful response. Between weekly sessions, clients are given several options for practicing skills including audio-recorded mindfulness instructions, exercises for coping with acutely triggering stimuli, and worksheets to highlight individual patterns of reactivity, with a focus on recognizing cognitive, emotional, and behavioral antecedents of reactive or “automatic” responding.

Beginning in weeks 3 and 4, clients engage in practices and exercises designed to explore the functions of habitual reactive behaviors, specifically substance use. They identify underlying needs that may drive urges to react (e.g., affect regulation or stress reduction), and learn ways to expand their behavioral repertoires to include multiple alternatives for proactive rather than impulsive behavioral choices. One example of this is the “Stop Observe Breathe Expand Respond (SOBER) Breathing Space,” which is introduced in session 3, and a part of the activities and conversation in successive sessions as additional themes are considered. The practice is brief and simple (Stop or Slow down. Observe what is happening. Bring attention to Breathing. Expand awareness to the whole body. Respond mindfully, with awareness.), and incorporating it into each session may help practitioners develop a point of reference for their in-session experiences that is easy to remember, and accessible in a variety of situations and contexts. In session 5, practices and discussions center on the balance and interrelationship between acceptance of what is happening and skillful action that makes real changes. Conversation in session 6 focuses on the role of thoughts and the relationship of thought content to the relapse cycle, with exercises that may experientially demonstrate the nature of thoughts as simply thoughts and not necessarily truth. The final sessions center on sustainable implementation of these practices and skills into daily life, strengthening supportive social networks, and identifying or establishing access to supportive resources. In addition, structured practices of self-compassion and forgiveness are introduced as alternatives to aggressive and harmful behaviors.

All MBRP practices share the common intention of developing incremental systematic and sustainable practices to bring greater awareness to one’s experiences, with specific emphasis on the sequence of reactions that often follow a trigger and precede a lapse. Through both cognitive-behaviorally-based exercises and mindfulness practices, clients learn to recognize this succession earlier in its progression, and practice pausing before engaging in reactive behavior, or even in the midst of a reactive chain of behaviors. They learn to identify what might be “underneath” the craving or urge, and to attend to these needs more skillfully. The content and practices are presented in a non-judgmental, compassionate manner, encouraging clients to approach their observations and experiences with kindness rather than harshness or judgment, with the intention of reducing the shame and self-blaming that often precipitates further self-defeating behaviors (Marlatt & Gordon, 1985).

To study specific components of MBRP, from a client perspective, we examined client responses ($n$ = 100) on the mindfulness practice questionnaire. The mindfulness practice questionnaire is a 10-item unpublished assessment designed to measure the frequency (number of days in the past week) and duration (average number of minutes per day) of the specific mindfulness practices taught in MBRP and was collected immediately following the MBRP courses in three unpublished empirical trials of MBRP for addictive disorders. We

were particularly interested in how often the mindfulness skills were being used by clients, what skills the clients identified as "most helpful," and their ratings of how helpful those particular skills were. The descriptive data from these three studies are provided in Table 2. As seen in Table 2, across all three studies, individuals reported practicing awareness of breath/thoughts/sensations and the "SOBER breathing space," most frequently. Across all three studies, the "SOBER breathing space" was rated as the most helpful informal mindfulness exercise and was rated as fairly to extremely helpful by over 82% of clients.

## MECHANISMS OF BEHAVIOR CHANGE FOLLOWING MINDFULNESS-BASED TREATMENT

As noted above, there is growing evidence on the effectiveness of mindfulness-based treatments for addictive behaviors. Given the direct effect of treatment on addictive behavior outcomes, an important next step for research is to determine means by which the intervention influences outcomes. A theoretical model characterizing the mechanistic targets of mindfulness training is provided in Figure 1. Specifically, as illustrated with the solid black lines, we hypothesize that mindfulness training may directly prevent occurrence of a high-risk situation, directly reduce phasic risk, and directly prevent substance use by increasing awareness, decreasing automatic non-mindful responding and judgmental thinking, and increasing kindness and self-compassion. We also hypothesize that mindfulness training can impede the process of relapse, as shown by the "**X**" blocking the dashed lines that connect pre-high-risk situations with phasic risk with substance use, by increasing awareness, decreasing the tendency to behave on "auto-pilot," and decreasing reactivity.

From neurobiological perspectives of both addiction and mindfulness meditation, several plausible mechanisms emerge by which mindfulness-based interventions may affect substance use, substance craving, and the relation between negative affect and craving (Brewer, Bowen, Smith, Marlatt, & Potenza, 2010; Brewer, Elwafi, & Davis, 2013; Witkiewitz & Bowen, 2010; Witkiewitz, Lustyk, & Bowen, 2013). There is also evidence for neurobiological similarities between substance use disorders and disordered gambling (Potenza, 2001), which would suggest that many of these plausible mechanisms may be applicable to the treatment of pathological gambling with mindfulness-based approaches (Toneatto, Vettese, & Nguyen, 2007).

Based on recent neuroimaging studies of mindfulness as a brief intervention for craving in smokers (Kober, Kross, Mischel, Hart, & Ochsner, 2010; Westbrook et al., 2011), we hypothesize that mindfulness training will result in less dysfunction in the brain systems and pathways that have been implicated in addictive behaviors and addictive behavior relapse. Specifically, Goldstein and colleagues (2009) proposed that experiences of drug craving (involving the insula), poor decision-making (involving the anterior cingulate cortex), and the auto-pilot response of drug seeking in the presence of drug-cues or stimuli (involving the dorsal striatum) may explain the lack of insight and the habitual stimulus–response cycle that is often found among individuals who relapse to addictive behavior. We propose that mindfulness training may affect each of these systems, ultimately disrupting habitual

stimulus–response cycles by increasing self-awareness and acceptance of physical or affective discomfort. Additionally, mindfulness training has been associated with reduced reactivity to craving cues (Westbrook et al., 2011) and more adaptive responses to stressors (Brewer et al., 2009), as well as improvements in emotion regulation, cognitive control, and executive functioning (see review by Hölzel et al., 2011). These changes may help reduce both the interaction between risk factors and the immediate deleterious reactions to risk factors, as predicted by the dynamic model of relapse.

The mechanisms of behavior change following mindfulness-based treatment have recently been investigated in a few empirical studies. For example, in a recent study of mechanisms of change following mindfulness-meditation training, Bowen and colleagues (2006) found that incarcerated substance users who received a 10-day Vipassana meditation course reported significant decreases in attempts to avoid unwanted thoughts (as measured by the White Bear Suppression Inventory (WBSI); Wagner & Zanakos, 1994), which partially mediated the relationship between course participation and alcohol use and consequences 3-months post-release from jail.

Garland, Gaylord, Boettiger, and Howard (2010) found similar results in a randomized study comparing an alcohol dependence support group (ASG) to mindfulness-oriented recovery enhancement (MORE). Data from participants in the MORE condition showed significant decreases in thought suppression (as measured by the WBSI) over a 10-week period, while the ASG group showed an increase in thought suppression over the same period. Garland and colleagues also found a decrease in perceived stress (as measured by the Perceived Stress Scale; Cohen, Kamarck, & Mermelstein, 1983) in the MORE group along with higher heart rate variability (HRV), suggesting increased emotion regulation through engagement of cognitive energy, and a subsequent decrease in use of cognitive process when cues were withdrawn.

In addition to decreasing avoidance of unwanted thoughts, it is hypothesized that mindfulness-based treatments decrease reactivity toward triggers, thereby interrupting the “addictive loop.” Brewer et al. (2009) found that participants in a 9-week mindfulness training (MT) group for alcohol and/or cocaine dependence displayed a significantly decreased psychological and physiological response toward personalized and provoked stressful situations (using a stress-reactivity paradigm) when compared with participants in the 12-week cognitive-behavioral therapy group. These findings support the hypothesis that mindfulness-based treatments may decrease stress reactivity, and decreases in stress reactivity may explain the reductions in craving and substance use relapse following mindfulness-based treatment.

Another candidate mechanism is the ability to become aware of, tolerate, and choose a response to a triggering cue or stressful situation that may have previously led to relapse, rather than engage in “autopilot-driven” reactive behaviors. Elwafi, Witkiewitz, Mallik, and Brewer (2013) postulated that through non-judgmental observation of craving, a decoupling of the craving and substance use behavior would occur. In a secondary analyses of data from a randomized trial of mindfulness training for smoking cessation (Brewer et al., 2011), Elwafi and colleagues (2013) found an attenuation of the correlation between craving and

smoking after 4 weeks of mindfulness training. Specifically, there was a strong, significantly positive correlation between craving (as measured by the Questionnaire of Smoking Urges – Brief; Tiffany & Drobes, 1991) and cigarette use at baseline; however, at the end of treatment, the association between craving and cigarette use was nonsignificant. Days of informal mindfulness practice significantly moderated the craving-smoking correlation, indicating those who engaged in more days of informal practice were smoking less, regardless of levels of craving.

In a recent study, Witkiewitz, Bowen, Hsu, and Douglas (2013) found additional support for the correlation among mindfulness practice and craving reduction in secondary analyses of data from the Bowen et al. (2009) randomized trial on MBRP as a treatment for substance use disorders. Witkiewitz and colleagues found that participation in MBRP was associated with significant reductions in self-reported craving (as measured by the Penn Alcohol Craving Scale; Flannery et al., 2001) both during and following treatment. Furthermore, the association between MBRP and changes in craving was significantly mediated by changes in a latent mindfulness factor that was defined by acceptance, non-judgment, and awareness (as measured by the Five Facet Mindfulness Questionnaire; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). Notably, the individual components of the mindfulness latent factor (i.e., acceptance, non-judgment, awareness) did not independently correlate with decreased craving, suggesting that these targets of mindfulness training may be important mechanisms of change in combination. Acceptance or non-judgment without awareness, non-judgment or awareness without acceptance, and acceptance or awareness without non-judgment may not produce the same reductions in craving following treatment.

While these studies have generally found associations between mindfulness-based treatments and mediators of treatment outcomes, it is critical for more research to be conducted to fully examine whether each of the hypothesized mediators are the mechanism through which mindfulness-based treatments are effective. Testing for mechanisms of change goes far beyond tests of statistical mediation (Kazdin, 2007). Kazdin and Nock (2003) describe seven criteria necessary for establishing a mechanism of change: (1) strong association, (2) specificity, (3) gradient, (4) experiment, (5) temporal relation, (6) consistency, and (7) plausibility and coherence. The factors that statistically mediate the effects of mindfulness (e.g., craving, stress reactivity, awareness, acceptance) are excellent candidate mechanisms and, to date, the strong association, specificity, experiment, temporal relation, consistency, and plausibility/coherence criteria suggested by Kazdin and Nock (2003) have been supported by a handful of studies (i.e., Elwafi et al., 2013; Garland et al., 2010; Witkiewitz et al., 2013).

## FUTURE DIRECTIONS FOR RESEARCH ON MINDFULNESS-BASED INTERVENTIONS

As research on mindfulness-based treatments is progressing from the initial pilot and feasibility trials to more sophisticated studies (i.e., longitudinal randomized clinical trials with behavioral and neurobiological measures of change), several issues now warrant the attention of researchers. Among these are operationalization and measurement, identifying

populations for which these treatments are more and less effective, and beginning to navigate and adapt for barriers to implementing mindfulness-programs as currently designed.

In order to identify mindfulness as a construct, it has been necessary to develop valid and reliable tools of assessment. Several interventions adapting mindfulness-based practices as treatment have been developed over the last two decades. At the same time, assessment measures have been developed in an effort to quantify mindfulness and determine mechanisms of change. At present, there is a growing body of literature indicating that these measures are psychometrically sound (Eisenlohr-Moul, 2012), and the correlation of scores between assessments suggests a similar concept of mindfulness (Baer, 2011). However, some have expressed concern that our current operationalizations of mindfulness may only allow for a limited measurement of the full effects of mindfulness practice (Grossman & Van Dam, 2011). By assuming that the current understanding of mindfulness is complete, the complex phenomenology that is a component of a much larger tradition, meticulously developed over several thousand years, may be lost or compromised. It may be worthy of attention and caution as the field moves forward to, “preserve the integrity and richness of the Buddhist understanding of mindfulness” (Grossman & Van Dam, 2011, p. 234). As suggested by Grossman and Van Dam (2011), this could be accomplished in a variety of ways. For example, rather than using mindfulness as a catch-all description, precise labeling of the phenomena being described (as in the subscales of the five facet mindfulness questionnaire [FFMQ]) is important to help maintain a distinction between characteristics related to mindfulness, and the construct itself. Additionally, self-report of mindfulness may not differentiate between mastery and the desire for mastery that occurs in self-reports of skill. This concern could be addressed by reformulating self-report questionnaires from an assessment of skill toward an assessment of values, such as importance of silence, stillness, or noticing thoughts and emotions as they arise (Grossman & Van Dam, 2011).

With the increased interest in mindfulness-based treatment approaches, there is a growing attention to moderators of mindfulness-based treatments (i.e., identifying individuals who may most benefit from mindfulness training). Given the gender differences in substance use disorder prevalence and progression (i.e., males having higher rates of disorder; Douglas, Shilling, Reaves, & Lustyk, 2013), one might expect to see gender differences in substance abuse treatment outcomes. Indeed, in one study of incarcerated adults, women, as compared to men, showed greater improvements in self-esteem, mood states, and hostility following mindfulness-based stress reduction courses offered in drug units in the correctional facilities (Samuelson, Carmody, Kabat-Zinn, & Bratt, 2007). Additionally, research on reasons for drug use suggests that women are more likely to report drug use due to negative emotions (Zywiak, Connors, Maisto, & Westerberg, 1996). Specifically, Otto, Powers, and Fischmann (2005) argue that the proclivity for women to self-medicate negative emotions with drug use indicates that women are more likely to benefit more from treatments that focus on negative emotional cues as triggers for drug use such as distress tolerance or other mindfulness practices. As such, examining differential effects by gender is a crucial area of study in mindfulness-based treatments for addiction in both incarcerated and non-correctional settings.

Research on mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002), a mindfulness-based treatment developed to prevent depression relapse, has found that MBCT is most effective for those who have had three or more depressive episodes (Teasdale et al., 2000). Similarly, individuals with substance use disorders may respond differently to mindfulness-based treatments for addiction based on their history with substance use, number of previous quit attempts, drug of choice, or length of the current period of abstinence. Given that many mindfulness-based treatments for addiction include mindfulness practices in addition to traditional treatment approaches (e.g., cognitive-behavioral therapy, relapse prevention); perhaps mindfulness-based treatments are more effective for those with multiple prior quit attempts due to their introduction of new strategies. At this point in the progression of this research, it is prudent to include systematic investigation of factors that may moderate treatment outcomes, allowing for treatment modification as needed for the most optimal treatment outcomes for a diverse range of participants.

As designed, many of the mindfulness-based treatments for addiction are closed-group interventions, with content of each session building upon the skills and practices from the previous sessions. Substance abuse treatment programs, however, demonstrate high turnover and significant attrition, with nearly 55% of those seeking substance use treatment dropping out (Baekland & Lundwell, 1975; Stark, Campell, & Brinkerhoff, 1990). Given these realities, closed-cohort groups often do not meet the needs of clients, some of whom might have to wait almost 2 months to begin a group, or the financial needs of the institution or treatment centers who, in order to maintain high group attendance, compensate for attrition by admitting new clients into an existing group. Due to these realities, researchers have begun to test the feasibility of more flexible structures, such as allowing clients to enter a “block” at session 1 or session 5, with an introductory meeting prior to entry (Brewer et al., 2009), or with rolling admission, so that clients may enter at any week in the course (Witkiewitz et al., in press). Further research with these new formats is needed to determine the relative efficacy of flexible structures and rolling versus closed-cohort groups.

Similarly, it remains unclear whether the group format is necessary for successful outcomes. Therapists in private practice commonly meet with clients in individual versus group therapy formats. Thus, practitioners in the community have adapted the material for individual 50-min sessions. To date, however, there are no published studies on outcomes of this format. Together, these issues highlight the need for further research on adaptation, dissemination, and implementation of mindfulness-based treatments in community settings.

As mindfulness-based treatments are implemented in increasingly diverse populations and settings, the need arises for further adaptations to better suit these contexts. The high rates in substance use populations of cooccurring psychiatric diagnoses carry important implications for treatment. Indeed, mindfulness practices are currently integrated into treatments for a wide range of psychiatric disorders that commonly cooccur with substance use, ranging from eating disorders and depression to psychosis (Brewer et al., 2010; Chadwick, Newman Taylor, & Abba, 2005; Davis, Strasburger, & Brown, 2007; Kristeller, Baer, & Quillian-Woever, 2006). Brewer and colleagues (2010) suggested that since mindfulness training improves symptoms of both substance use and other psychiatric disorders, it may be

targeting behavioral (e.g., attention training, acceptance) and neural processes (e.g., ventromedial- and dorsolateral-pre-frontal cortex) common to substance use and psychiatric disorders.

In addition to consideration of adaptations of MBRP to better treat individuals with cooccurring disorders, there are contextual factors to consider. For example, individuals with substance use disorders also have a higher likelihood of being incarcerated during their lifetime (Karberg & James, 2005), and research involving incarcerated adult populations indicates that mindfulness training may decrease substance use upon release (Bowen, Witkiewitz, Dillworth, & Marlatt, 2007). Thus, adaptations may be required for MBRP to more adequately fit the needs and strictures of incarcerated populations, such as alternatives to recorded meditation instructions typically given to clients for home practice, and adjustments to some of the mindfulness practices to better address the lack of privacy and high volume of ambient noise, are also warranted.

Finally, because substance use is typically initiated during adolescent years, study of potential benefits of mindfulness in younger populations also deserves further attention. Research with adolescent incarcerated populations has found that mindfulness is a promising approach for improving substance use symptoms in addition to other problematic behaviors (Himelstein, Hastings, Shapiro, & Heery, 2012). In non-incarcerated adolescent populations, similar benefits have been observed (Biegel, Brown, Shapiro, & Shubert, 2009; Black, Milam, & Sussman, 2009; Sibinga et al., 2011). Furthermore, several studies have also indicated several potential mechanisms by which trait mindfulness contributes to a reduction in adolescent substance use, such as increased self-efficacy and improved affect regulation (Black, Sussman, Johnson, & Milam, 2012a, 2012b). Though these findings are promising, further research is necessary to effectively adapt the MBRP program to these diverse populations.

## SUMMARY AND CONCLUSIONS

Despite the growing body of evidence in support of mindfulness-based treatment for addictive disorders, there are considerable unanswered questions, in addition to those we have posed above. For example, does the “dose” of mindfulness matter? There is some preliminary evidence that additional informal practices are associated with significantly better substance-related outcomes (Brewer et al., 2011; Elwafi et al., 2013); however, examination of whether certain practices are more or less useful is needed. Similarly, what is the role and effect of the therapist’s personal mindfulness practice on substance use treatment outcomes? It is suggested by several treatment progenitors (Kabat-Zinn, 1990; Segal et al., 2002) that the clinician’s practice is essential to clinical outcomes, yet only one locatable study (Grepmair et al., 2007) provides an empirical evidence for this, and to date, no published studies have assessed effects of therapists’ mindfulness practice in the field of addictive behaviors. Finally, adaptations of the treatment for specific populations and settings should continue to be studied and ongoing efficacy, effectiveness, and dissemination trials (see Flay et al., 2005 for standards) are needed to successfully offer these treatments to a broader range of communities and settings.

## Biographies

**Katie Witkiewitz**, PhD, is an associate professor in the Department of Psychology and a Scientist at the Center on Alcoholism, Substance Abuse, and Addictions at the University of New Mexico. Her research has largely centered on studying the process of addictive behavior relapse and empirically supported treatments for addiction. These efforts have led to several empirical investigations on the mechanisms of successful addiction treatment outcomes, as well as the development of interventions to prevent addictive behavior relapse, including mindfulness-based relapse prevention and group-based relapse prevention interventions.

**Sarah Bowen**, PhD, is an acting assistant professor at the University of Washington, where she received her PhD in clinical psychology in 2008 under the mentorship of Dr. Alan Marlatt. Her research work has focused primarily on mindfulness-based therapies for addictive behaviors, with a specific focus on mechanisms of change. In addition to numerous papers and book chapters in this area, Dr. Bowen is lead author of *Mindfulness-Based Relapse Prevention for Addictive Behaviors: A Clinician's Guide*. Dr. Bowen has facilitated MBRP groups in private and government treatment agencies, and has offered trainings to researchers and clinicians in the United States and internationally. She has a particular interest in adapting and disseminating mindfulness-based treatment for dual-diagnosis and underserved populations.

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**Haley Douglas**, BS, is currently working on her doctoral degree in clinical psychology from the University of Washington in hopes of pursuing a career in research academia. Her research interests include alcohol use and psychophysiological and psychological stress processes in women, and the use of mindfulness strategies for substance use.

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**Carly Sedgwick**, MS, EdS, is a licensed professional clinical counselor in Albuquerque, NM, USA. Her therapeutic practice and research interests center on the application of mindfulness- and acceptance-based approaches with underserved populations.

## GLOSSARY

| | |
|---|---|
| **Addiction** | Engaging in a behavior that leads to physiological and/or psychological dependence on the behavior as well as a significant impairment in an individual's ability to function in important areas of their life. |

| | |
|---|---|
| **Mindfulness** | Intentionally bringing awareness to experience as it arises, with an open receptivity toward and curiosity about phenomena. |
| **Relapse prevention** | Intervention applied with an individual in the recovery/maintenance phase of addiction that focuses on skill building to prevent the reoccurrence of the addictive behavior. |
| **Theoretical model** | A theory constructed to explain a particular behavior. |

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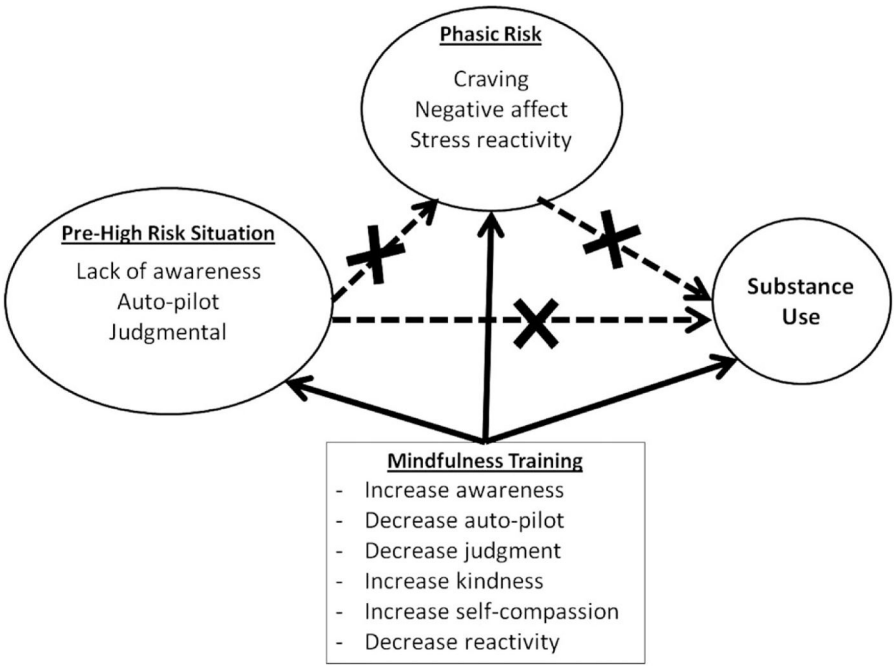


**FIGURE 1.**

Hypothesized mechanisms of mindfulness training in reducing risk of high-risk situations and interrupting the dynamic process of relapse. Solid black arrows indicate the hypothesized direct effects of mindfulness on situational factors, phasic risk factors, and substance use. Dashed arrows indicate the dynamic process of relapse from high-risk situation to substance use, with "**X**" indicating the connections that can be blocked by mindfulness training.

## TABLE 1

Session-by-session overview of mindfulness-based relapse prevention

| Session # | Session theme | Within session activities | |
|---|---|---|---|
| 1 | Automatic pilot and relapse | **a.** | Raisin exercise |
| | | **b.** | Body scan meditation |
| 2 | Awareness of triggers and craving | **a.** | Body scan meditation |
| | | **b.** | Home practice review and common challenges |
| | | **c.** | Walking down the street exercise |
| | | **d.** | Urge surfing exercise and discussion of craving |
| | | **e.** | Mountain meditation |
| 3 | Mindfulness in daily life | **a.** | Awareness of hearing |
| | | **b.** | Home practice review |
| | | **c.** | Breath meditation and review |
| | | **d.** | SOBER breathing space |
| 4 | Mindfulness in high-risk situations | **a.** | Awareness of seeing |
| | | **b.** | Sitting meditation: Sound, breath, sensation, thought |
| | | **c.** | Individual and common relapse risks |
| | | **d.** | SOBER breathing space in a challenging situation |
| | | **e.** | Walking meditation |
| 5 | Acceptance and skillful action | **a.** | Sitting meditation: Sound, breath, sensation, thought, emotion |
| | | **b.** | SOBER breathing space (in pairs) |
| | | **c.** | Using SOBER breathing space in challenging situations |
| | | **d.** | Discussion of theme |
| | | **e.** | Mindful movement |
| 6 | Seeing thoughts as thoughts | **a.** | Sitting meditation: Thoughts |
| | | **b.** | Thoughts and relapse discussion |
| | | **c.** | SOBER breathing space |
| | | **d.** | Preparation for end of the course and home practice |
| 7 | Self-care and lifestyle balance | **a.** | Sitting meditation: Loving-kindness |
| | | **b.** | Where does relapse begin? |
| | | **c.** | SOBER breathing space |
| 8 | Social support and continuing practice | **a.** | Body scan |
| | | **b.** | The importance of support networks |
| | | **c.** | Intentions for the future |
| | | **d.** | Concluding meditation |
| | | **e.** | Closing circle |

## TABLE 2

Client reports on mindfulness practice questionnaire (MPQ) following MBRP in three empirical studies (unpublished data)

| | Study 1 | Study 2 | Study 3 |
|---|---|---|---|
| *Sample characteristics* | | | |
| MBRP assigned n | 101 | 55 | 11 |
| Completed MPQ n (% of total) | 78 (77.2%) | 16 (29.1%) | 6 (54.5%) |
| Age: Mean (SD) | 37.2 (10.8) | 34.0 (9.3) | 53.1 (9.9%) |
| Gender: % Female | 23.0% | 100% | 36.4% |
| Race: % | 56.4% | 34.5% | 100% |
| Non-Hispanic white | | | |
| *Days of practice past week* | | | |
| Body scan | 2.7 (3.5) | 2.6 (1.8) | 1.5 (0.5) |
| Mountain meditation | 1.2 (2.2) | 1.3 (1.9) | 1.5 (1.8) |
| Awareness of breath/thoughts | 4.2 (4.5) | 4.5 (2.6) | 5.3 (2.1) |
| Mindful walking | 3.2 (5.1) | 2.9 (2.6) | 0.8 (0.8) |
| Mindfulness of daily activity | 3.9 (5.1) | 2.8 (2.9) | 2.2 (2.8) |
| SOBER/Hourglass | 4.0 (5.3) | 5.0 (2.4) | 5.2 (2.2) |
| Urge surfing | 1.1 (2.3) | 2.1 (2.8) | – |

*Note*. MPQ = mindfulness practice questionnaire.