

ORIGINAL ARTICLE

# Feasibility, Acceptability, and Preliminary Outcomes of a Mindfulness-Based Relapse Prevention Intervention for Culturally-Diverse, Low-Income Women in Substance Use Disorder Treatment

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We examined feasibility, acceptability, and benefits of a mindfulness-based relapse prevention (MBRP) intervention in a racially and ethnically diverse sample of 318 low-income women in substance use disorder treatment (2003–2006). The study used a single group, repeated measures design. Participant satisfaction was high ( $M = 3.4$ ,  $SD = .3$ ), but completion was modest (36%). Linear regressions examining change in addiction severity and psychological functioning by dosage showed that higher dosage was associated with reduced alcohol ( $\beta = -.07$ ,  $p < .05$ ), drug severity ( $\beta = -.04$ ,  $p < .05$ ), and perceived stress ( $\beta = -2.29$ ,  $p < .05$ ) at 12 months. Further research on MBRP efficacy for

this population is warranted. The study's limitations are noted.

**Keywords** mindfulness, relapse prevention, race/ethnicity, women, addiction, stress

## INTRODUCTION

Low-income and racial/ethnic minority women manifesting substance use disorders (SUD)<sup>1</sup> face many psychological and social stressors during the early phases of SUD treatment<sup>2</sup>. Most women in SUD treatment report high levels of psychological stress, depression, anxiety, and history of trauma (Amaro et al., 2007; Conway, Compton,

<sup>1</sup>The reader is reminded the diagnosis of a “substance use disorder” is a relatively new diagnosis which is based upon a consensus-based taxonomy which is not empirically informed (American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*, 4th Ed.; American Psychiatric Association: Washington, DC, 1994; 5th Edition, 2013). In order that any diagnosis be useful for treatment planning, it should “offer”, minimally, three critical, necessary types of information: etiology, process, and prognosis . . . which are not always known. Second, a diagnosis, when demystified, is simply the outcome of an information gathering process to be used for decision making. Third, the underpinnings for diagnostic criteria can be theory-driven, empirically-based, individual, and/or systemic stake holder-bound, based upon “principles of faith”, etc. All-too-often the needs or agendas of the classifier (individuals as well as systems) are not adequately considered or noted. Lastly, whereas all diagnoses are taxonomy categories or labels, all labels are not diagnoses. Editor’s note.

<sup>2</sup>Treatment can be briefly and usefully defined as a unique, planned, goal directed, temporally structured, multi-dimensional change process, of necessary quality, appropriateness, and conditions (endogenous and exogenous), which is *bounded* (culture, place, time, etc.) and can be categorized into professional-based, tradition-based, mutual-help-based (AA,NA, etc.) and self-help (“natural recovery”) models. There are no unique models or techniques used with substance users—of whatever types and heterogeneities—which aren’t also used with nonsubstance users. Whether or not a treatment technique is indicated or contraindicated, and its selection underpinnings (theory-based, empirically-based, principle of faith-based, tradition-based, etc. continues to be a generic and key treatment issue. In the West, with the relatively new ideology of “harm reduction” and the even newer Quality of Life (QOL) and well-being treatment-driven models, there are now new sets of goals in addition to those derived from/associated with the older tradition of abstinence-driven models. Conflict-resolution models may stimulate an additional option for intervention. Each ideological model has its own criteria for success as well as failure as well as iatrogenic-related harms. Treatment is implemented in a range of environments; ambulatory as well as within institutions which can include controlled environments. Treatment includes a spectrum of clinician–caregiver–patient relationships representing various forms of decision-making traditions/models: (1) the hierarchical model in which the clinician–treatment agent makes the decision(s) and the recipient is compliant and relatively passive, (2) shared decision-making which facilitates the collaboration between clinician and patient(s) in which both are active, and (3) the “informed model” in which the patient makes the decision(s). Editor’s note

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Stinson, & Grant, 2006; Greenfield et al., 2007; Najavits, Weiss, & Shaw, 1997; Tuchman, 2010). In a recent analysis of the clinical profiles of 1,444 offenders (43% women) in the publicly funded SUD treatment system in California, women reported significantly higher rates of depression (58% vs. 45% for men), lifetime physical abuse (70% vs. 32% for men), and lifetime sexual abuse (54% vs. 15% for men) (Du, Huang, Zhao, & Hser, 2013). Among women in SUD treatment, traumatic stress and perceived stress have been negatively associated with healthy coping responses such as seeking out emotional support and advice from others (Arévalo, Prado, & Amaro, 2008). Moreover, stress is one of the strongest predictors of drug craving, relapse, and continued drug use (Brewer, Catalano, Haggerty, Gaine, & Fleming, 1998; Kreek & Koob, 1998; Sinha, 2012).

Mindfulness training (MT) represents one potentially beneficial integrative program for patients in SUD treatment because it can help them develop positive coping skills for dealing with stress and preventing relapse (Katz & Toner, 2012; Witkiewitz, Bowen, Douglas, & Hsu, 2013). MT focuses on the development of awareness and acceptance of moment-to-moment experiences (Kabat-Zinn, 2003). Mindfulness-based relapse prevention (MBRP), for example, was designed as an aftercare intervention to help SUD patients cope with cravings<sup>3</sup> by increasing their awareness of thoughts, emotions, and environments that lead to using substances and developing coping skills to prevent relapse (Bowen et al., 2009; Witkiewitz, Marlatt, & Walker, 2005). Although the concepts underlying MBRP share elements of standard relapse prevention methods, MT interventions for SUDs focus on building skills to help patients identify, accept, and respond to thoughts, feelings, and bodily sensations which they associate with substance use (Bowen et al., 2009).

In general, MT shows promising results in the improvement of stress and mental health-related problems (Baer, 2003; Black, Milam, & Sussman, 2009; Brown, Ryan, & Creswell, 2007; Grossman, Niemann, Schmidt, & Walach, 2004; Kabat-Zinn et al., 1992; Teasdale et al., 2000). The evidence in support of MT for SUDs is mixed; however, several randomized and nonrandomized controlled trials of MT interventions found that MT reduces alcohol and illicit drug use and craving, and increases patients' acceptance and awareness of their thoughts and feelings (Bowen et al., 2009; Brewer et al., 2009; Chiesa

& Serretti, 2013; Zgierska et al., 2009).<sup>4</sup> One randomized controlled study of MT with alcohol and cocaine users entering outpatient SUD treatment found improvements in stress levels beyond that of cognitive behavioral therapy (Brewer et al., 2009).

The generalizability of these findings to women and diverse racial/ethnic groups in SUD treatment is unknown. Most MT studies have been conducted with primarily male and/or non-Hispanic White samples and are limited by small sample sizes (Chiesa & Serretti, 2013). A few MT studies have included only women (de Dios et al., 2012; Dutton, Bermudez, Mats, Majid, & Myers, 2011; Linehan et al., 2002; Price, Wells, Donovan, & Rue, 2012) or a high proportion of women in their samples (Margolin, Beitel, Schuman-Olivier, & Avants, 2006), but are limited by small sample sizes. Despite limited evidence of the benefits of MT for women from diverse racial/ethnic backgrounds, pilot studies and case studies have suggested that MT is acceptable and useful for African American and Hispanic/Latina women with SUDs (Amaro et al., 2010; Dutton, Bermudez, Matás, Majid, & Myers, 2013; Meléndez, Cortés, & Amaro, 2012; Vallejo & Amaro, 2009).

To address this gap in research and clinical care, we adapted Jon Kabat-Zinn's (1992) mindfulness-based stress reduction (MBSR) intervention for use with culturally-diverse, low-income women in SUD treatment with a history of trauma exposure. The intervention was developed and tested with participation from staff and patients in publicly funded SUD treatment at five Boston clinics where many of the women were treated for co-occurring mental health disorders and trauma. The resulting intervention, *Moment-by-Moment in Women's Recovery: A Mindfulness-Based Approach to Relapse Prevention (MBRP-W)*, is the first adaptation of MBSR for culturally diverse, low-income women with complex histories of substance use and trauma exposure who had recently entered SUD treatment (Amaro & Vallejo, 2009).

The objective of the current study was to evaluate the feasibility, acceptability, and potential benefits of integrating MBRP-W into SUD treatment programs for this population of women, and to examine the effect of MBRP-W on substance use, perceived stress, and trauma symptoms (an area of particular importance due to elevated rates of trauma history among women with SUDs) (Lynch, Roth, & Carroll, 2002). Based on prior formative research, we hypothesized that MBRP-W would be feasible and acceptable to culturally-diverse, low-income women in treatment (Vallejo & Amaro, 2009). We also hypothesized that MBRP-W would be associated with decreases in addiction severity and improvements in psychological

<sup>3</sup>Craving, a bounded (culture, time, place, etc.) mystified and empowered concept, continues to be debated, being conceptualized as encompassing a broad range of phenomena including anticipation of a drug's reinforcing effects, intention to engage in drug use, and desire for the drug. Its dimensions and the critical necessary conditions which are necessary for it to operate (begin, continue, become anchored and integrate, change as de facto realities change, cease, etc.) or not to and whether its underpinnings are theory-driven, empirically-based, individual, and/or systemic stake holder-bound, historically-bound, based upon "principles of faith" need to be delineated. "Craving," which is pejorative in its socially constructed meanings and implications, is associated with selected populations and their behaviors. "desires", which is a positive, "normed" term, with other populations and their behaviors. Editor's note

<sup>4</sup>The reader is referred to Hills's criteria for causation which were developed in order to help assist researchers and clinicians determine if *risk factors* were causes of a particular disease or outcomes or merely associated. [Hill, A. B. (1965). The environment and disease: associations or causation? *Proceedings of the Royal Society of Medicine* 58: 295–300.]. Editor's note

functioning, particularly perceived stress and trauma symptoms.

## METHOD

### Design and Procedures

To assess feasibility and acceptability, a self-administered satisfaction questionnaire was collected by an independent research interviewer at the last MBRP-W session of each group. An outcome evaluation of MBRP-W was conducted using a single group, repeated measures design. Independent interviewers conducted structured baseline interviews at treatment entry in English or Spanish. Follow-up interviews, using the same closed-ended questionnaire, were conducted 6 and 12 months postbaseline. Participants received \$20 for the baseline interview and \$40 for each follow-up interview.

Women (18 years of age and older) actively enrolled in one of five publicly funded SUD treatment programs (four residential and one outpatient) in Boston, Massachusetts, were invited to participate in the study. Program staff described the study to women at admission and referred interested women to research staff. Research staff explained the study and obtained informed consent according to study protocols approved by the institutional review boards at Northeastern University and Boston Medical Center. All women agreed to participate in the study.

A total of 118 women completed the satisfaction questionnaire. For the outcome evaluation, interviewers conducted 445 structured baseline interviews in English or Spanish between April 2003 and December 2006. The majority of women (81% or 360 women) participated in two or more survey interviews. Of the 360 women, five were excluded because they repeated the intervention, and 37 women were excluded because of missing data on significant covariates included in the analysis. Ultimately, 318 women with complete data were included in the final analytic sample.

### Sample

The sample was diverse in terms of race/ethnicity (45.3% Hispanic, 34.6% non-Hispanic Black, and 20.1% non-Hispanic White and other) and educational attainment. Participants ranged in age from 18 to 58 years ( $M = 33.9$ ). At baseline, 2.2% of participants were employed full- or part-time and 7.6% had been arrested during the previous 30 days. Many participants (45.6%) had been ordered by a court to obtain mental health or SUD treatment. The majority of women (73.9%) were recruited from residential treatment facilities; 26.1% of the sample was recruited from outpatient treatment.

### Intervention

*Moment-by-Moment in Women's Recovery: A Mindfulness-Based Approach to Relapse Prevention* (MBRP-W) is the product of a multiyear initiative to implement, evaluate, and refine the intervention with significant input from women in the SUD treatment (Vallejo & Amaro, 2009). MBRP-W was tailored to address

issues of substance use relapse faced by low-income women with a history of trauma exposure. MBRP-W is a nine-session (1.5–2 hours per session) manual-based intervention delivered by one or two trained facilitators to groups of 8 to 15 women (Amaro & Vallejo, 2009). The seventh session consists of a 4-hour silent retreat. Women meet weekly to learn meditation techniques, practice gentle yoga, and develop self-regulation strategies such as using mindfulness skills to manage stress and difficult emotions that may lead one to relapse.

MBRP-W evolved from practical experience using MBSR with women who were in treatment for their drug use (Vallejo & Amaro, 2009). Participant dissatisfaction with the original MBSR program was related, in part, to the apparent lack of direct relevance to issues of addiction and relapse, early recovery, trauma, mental illness, and literacy in the client population. The most fundamental change in creating MBRP-W was the reshaping and reorientation of MBSR into a MBRP program focused on the role of stress in relapse. Particular effort was made to account for a history of trauma and daily experiences of stress and then apply mindfulness-based skills to assist clients in relapse prevention and early recovery based on their real-life experiences. In addition to the focus on relapse prevention, the length, sequencing, and presentation style of MBSR had to be changed to fit the target population. For instance, the body scan, an MBSR exercise, had to be shortened to reduce potential interference from trauma experiences. A didactic approach was used to help women understand the role of stress in relapse prevention and recovery. Finally, literacy changes were made to increase the accessibility of the intervention to this population.

The goals of MBRP-W were to refine self-regulatory skills; increase relaxation and awareness skills; decrease symptoms of stress and stress reactivity; and increase an overall sense of well-being to prevent relapse. These skills would be learned in part by becoming aware of cravings and observing them with a certain spaciousness and affectionate curiosity instead of reacting in habitual ways. The program also aimed to foster the recognition of early warning signs of relapse, teaching skills to come back to the present, developing moment-by-moment awareness whenever the mind started to dwell in the past or future, and teaching clients how to access inner resources through the acquisition of mindfulness skills. Within this context, the role of stress in the curriculum was reoriented to relate specifically to its effect on substance use, cravings, and relapse among this population of women with a high rate of co-occurring disorders. Greater detail on the adaptation process can be found in Vallejo & Amaro (2009).

MBRP-W was offered as a compliment to gender-specific SUD treatment programs for women. As part of their standard treatment protocols, the participating programs provided assessments of co-occurring mental health disorders and trauma, incorporated needs related to trauma in their treatment plans, and facilitated the coordination of services across systems of care. In addition, the programs were sensitive to the cultural backgrounds



of Latina and African-American women as cultural norms and stigma can prevent women from acknowledging mental health problems and experiences of trauma (Amaro et al., 2005). MBRP-W was co-facilitated by a SUD treatment counselor and one of two masters' level facilitators. All were trained and certified in MBSR and participated in the development of MBRP-W. MBRP-W groups were offered four to six times per year from 2003 to 2006. MBRP-W was offered in English and Spanish.

### Measures

*Feasibility and Acceptability of MBRP-W* were measured by participation (number of sessions attended) and participant satisfaction. Participation was tracked via group attendance sheets. A 17-item satisfaction questionnaire, developed by the first author for this study, was used to assess overall satisfaction with MBRP-W, changes in individual attitudes toward stress, and improvements in well-being. Sample questions included "How much did you learn to change your attitude toward stress?" "How much did you learn to live in the present moment?" and "How important do you think this group is for women, to help them in their recovery process?" Thirteen of the questions used Likert-type responses (i.e. 0 = *not at all*, 1 = *some-what*, 2 = *OK*, 3 = *considerably*, and 4 = *extremely*; 0 = *poor*, 1 = *fair*, 2 = *good*, 3 = *very good*, 4 = *excellent*). The remaining four questions were open ended to elicit participants' reactions to MBRP-W in their own words in terms of what they liked best and least about the experience. In addition, participants were asked what they would tell other women in recovery about what can be learned from MBRP-W.

*Treatment dosage* was assessed with a categorical variable created to evaluate the effect of lower (1–4 sessions) and higher (5–9 sessions) doses of MBRP-W (vs. no MBRP-W) on addiction severity and psychological functioning. A dose of five or more sessions was hypothesized to be clinically meaningful based on outcomes from the MBRP study by Bowen et al. (2009).

*Alcohol and drug addiction severity* during the previous 30 days was assessed with alcohol and drug measures from the interview-based Addiction Severity Index [ASI; (McLellan, Luborsky, Woody, & O'Brien, 1980)]. The measures assess frequency of substance use in the past 30 days, alcohol use to intoxication, poly-drug use, frequency of problems related to substance use, extent to which one is troubled by problems related to substance use, and perceived importance of treatment. ASI composite or sum scores are based on six questions about alcohol use and 13 questions about drugs, which include the following nine drug categories: heroin, methadone, other opiates/analgesics, barbiturates, other sedatives/hypnotics/tranquilizers, cocaine, amphetamines, cannabis, and hallucinogens. Each composite score is adjusted for the answer range of each item and the total number of items in the composite (McGahan, Griffith, & McLellan, 1986). Items in the composite scores were coded according to the ASI manual creators with one minor exception: a constant (1) was added

to the dollar amount spent on alcohol during the previous 30 days to obtain log values of the item for participants who reported spending nothing on alcohol. ASI composite scores range from 0 (no symptoms) to 1.0 (highest severity). Internal consistency reliability in the baseline analytic sample was good ( $\alpha = .81$  for Alcohol and  $\alpha = .70$  for Drugs).

*Perceived stress* was measured by the Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983). The PSS version used in this study contains 14 Likert-type questions that assess one's response to stressors during the previous 30 days (e.g., unable to control the important things in your life) on a scale ranging from 0 = *never* to 4 = *very often*. A sum score was created with a possible range of 0 to 56, with higher scores indicating greater psychological stress. Internal consistency reliability in the baseline analytic sample was good ( $\alpha = .81$ ).

*Posttraumatic stress symptomatology* was measured using an adapted version of the Posttraumatic Diagnostic Symptom Scale (PDS) (Foa, 1995). The PDS includes 17 Likert-type questions that assess the frequency with which respondents were bothered by intrusive thoughts, numbing, avoidance, hyperarousal, vigilance, and other issues during the previous 30 days. All participants completed the PDS regardless of whether they had been exposed to a qualifying traumatic event, as defined by DSM-IV guidelines (American Psychiatric Association, 1994). Thus, the PDS was not used to measure posttraumatic stress disorder diagnosis but rather to assess symptoms often associated with trauma exposure. Responses were rated on a 4-point scale (0 = *not at all* to 3 = *almost always*) and summed to create a sum score (possible range = 0–51). A higher score indicated greater symptomatology. Internal consistency reliability in the baseline analytic sample was excellent ( $\alpha = .92$ ).

*Sociodemographic and treatment-related characteristics.* Self-reported race/ethnicity included the following categories: Latina, non-Hispanic Black, and non-Hispanic White/other. Non-Hispanic White/other combined White, Asian, and American Indian women because of the small number of women in these racial/ethnic groups. Women who reported part- or full-time employment were coded as employed (versus unemployed). Those who reported that they had been ordered by a court of law to receive SUD or mental health treatment (a single-item measure) were coded as court-ordered clients (versus not). Women who reported any arrests during the previous 30 days were coded as recently arrested (versus not). Trauma exposure was measured by the Life Stressor Checklist – Revised (LSC-R) (Wolfe & Kimerling, 1997). The LSC-R consists of 30 self-report items that assess lifetime and current (past 6 months) exposure to traumatic or stressful events such as natural disasters, physical or sexual assault, and death of a relative. Length of SUD treatment was calculated as the number of days between treatment admission and discharge or the date of the 12-month follow-up interview if they were still in treatment. An indicator for "in SUD treatment" at the time of survey completion was created.

## Analysis

Feasibility and acceptability of MBRP-W was assessed by examining mean scores on the satisfaction survey. Chi-square tests and analysis of variance (ANOVA) were used to compare the proportion differences for categorical variables and mean differences for continuous variables by MBRP-W dosage at baseline. Pairwise comparisons between the groups used Tukey adjustment for continuous variables and Bonferroni correction for categorical variables.

Changes in addiction severity and psychological functioning over time were examined for three levels of MBRP-W exposure: 0 sessions, 1 to 4 sessions, and 5 to 9 sessions. Linear regression models, appropriate for repeated measures data (Fitzmaurice, Laird, & Ware, 2004), were fitted separately for all outcomes. Differences in the rate of change in an outcome by MBRP-W dosage were evaluated in models that contained the main effects of time and MBRP-W, an interaction term for time and MBRP-W, and covariates that were statistically associated with MBRP-W dosage. These included time invariant covariates such as race/ethnicity, court-ordered treatment, treatment modality, and total duration of treatment, as well as time varying covariates such as employment status, arrested during the previous 30 days, and engagement in treatment at the follow-up assessment.

Time was modeled categorically and linearly, and the likelihood ratio test (Fitzmaurice et al., 2004) was used to compare nested models to select the best time parameterization for each outcome model. Analyses were conducted in SAS using the mixed procedure for repeated observations with an unstructured covariance structure. Model-based means for plots were generated with the lsmeans and estimate commands. Outcome sum scores were set as missing for participants who were missing item values (2%–4% of respondents per scale). A complete case analysis was conducted for 318 women (90% of 355 eligible clients) with complete data on covariates significantly associated with MBRP-W and who provided baseline data on at least one outcome (Allison, 2002). Statistical significance was determined by two-tailed tests with an alpha criterion of .05

## RESULTS

Baseline sociodemographics and treatment-related characteristics for the three MBRP-W dosage groups are included in Table 1. All women in the sample reported a history of exposure to traumatic life events and 92% reported exposure in the 6 months prior to enrolling in the study. No differences were found for baseline alcohol and drug severity, perceived stress, and posttraumatic stress symptomatology across dosage groups. Average length of SUD treatment was 157.3 days. About 40% of the sample was in treatment for their substance use at the 6-month follow-up and only 12.6% were in SUD treatment at the 12 month follow-up. Statistically significant variability was observed in race/ethnicity with a higher fraction of women from White or other racial/ethnic backgrounds in

the no MBRP-W and lower dosage groups. Women in the high dosage group were more likely to be in residential treatment and to be in court-ordered treatment compared with women in the no MBRP-W and lower dosage groups. In addition, women in the higher dosage group were more likely to be in SUD treatment at 6- and 12-months follow-up compared with women in the no MBRP-W and lower dosage groups.

## Feasibility and Acceptability of MBRP-W

Intervention dosages were as follows: 19.8% attended 1 to 4 sessions, 35.8% attended 5 to 9 sessions, and 44.3% did not attend any groups. The following reasons contributed to some women not participating or participating at a low level in MBRP-W. First, the intervention groups were run sequentially and closed to new participants after the second session, so women who entered SUD treatment after a group began had to wait to join the next MBRP-W group. Second, some patients' commitments at their treatment facilities and/or with other providers conflicted with the scheduled times for MBRP-W groups. Third, treatment dropout, typically high in SUD treatment, resulted in some women never receiving the intervention or not completing the intervention due to their discontinuation of SUD treatment.

Among those who completed MBRP-W, satisfaction with the intervention was high. As shown in Table 2, women reported learning new concepts and skills to help them live in the present moment, reduce their stress, and increase their sense of well-being. On average, women rated the change in their knowledge and skills as "considerable." The mean ratings for the overall utility of the information presented, the quality of the MBRP-W, and the importance of the MBRP-W for women in recovery ranged between 3.4 and 3.5 (3 = *very good* and 4 = *excellent*).

When asked what they liked most about MBRP-W, the most common responses related to learning how to better handle one's feelings (28 comments) and meditating (22 comments). As one participant related, "What I like the most about the group is that I learned how to work with my inner stress [and] also my attitude in life. Just for today I can sit, feel, deal, in a positive way." Another participant shared in Spanish, "Entender lo del momento fue lindo para mi," or "Learning to notice being in the present moment was beautiful for me." When asked how they would describe the benefits of MBRP-W to other women in recovery, 36 participants mentioned that mindfulness helped them "cope with their emotions," namely stress. Some of the strategies participants noted for dealing with stress and other feelings included "learning to be mindful and live in the present," "learning to acknowledge my feelings," "take control of my sensation and pay attention to my breath," and "get in touch with the feelings and how to deal with them and move on."

Participants provided fewer comments about what they disliked about MBRP-W. The majority of the negative comments related to certain exercises (12 comments). Although most participants were unspecific about which

TABLE 1. Participant baseline characteristics by MBRP-W dosage

Variable	Full sample (N = 318)		0 Sessions (n = 141)		1-4 Sessions (n = 63)		5-9 Sessions (n = 114)		p
	n	%	n	%	n	%	n	%	
Age, mean (SD)	316	33.9 (7.3)	140	33.7 (7.0)	63	33.2 (8.1)	113	34.6 (7.3)	.40
Race/ethnicity									
Hispanic	144	45.3	60	42.6	27	42.9	57	50.0	.45
Non-Hispanic Black	110	34.6	53	37.6	15	23.8	42	36.8	.13
Non-Hispanic White/other	64	20.1	28	19.9	21	33.3 <sup>c</sup>	15	13.2 <sup>c</sup>	.01
Education									
< High school/GED	48	15.2	22	15.7	7	11.3	19	16.8	.60
High school/GED	137	43.5	55	39.3	32	51.6	50	44.3	.29
> High school/GED	130	41.3	63	45.0	23	37.1	44	38.9	.45
Employed	7	2.2	4	2.8	1	1.6	2	1.8	.79
Court-ordered treatment	145	45.6	52	36.9 <sup>b</sup>	30	47.6	63	55.3 <sup>b</sup>	.01
Recently arrested	24	7.6	5	3.6	7	11.1	12	10.5	.05
Treatment modality									
Residential	235	73.9	77	54.6 <sup>a,b</sup>	52	82.5 <sup>a,c</sup>	106	93.0 <sup>b,c</sup>	<.01
Outpatient	83	26.1	64	45.4	11	17.5	8	7.0	n/a
Lifetime trauma exposure	318	100	141	100	63	100	114	100	
Past 6-mos trauma exposure	290	91.2	127	90.1	58	92.1	105	92.1	.82
Alcohol ASI, mean (SD)	311	.18 (.2)	138	.15 (.2)	61	.20 (.2)	112	.20 (.2)	.15
Drug ASI, mean (SD)	316	.16 (.1)	140	.15 (.1)	62	.17 (.1)	114	.17 (.1)	.06
Perceived Stress, mean (SD)	311	29.9 (9.0)	137	28.9 (9.3)	63	30.6 (8.6)	111	30.8 (8.8)	.21
Posttraumatic stress symptomatology, mean (SD)	309	18.1 (11.9)	134	18.0 (12.9)	63	19.4 (11.5)	112	17.4 (10.9)	.58
Days in treatment, mean (SD)	318	157.3 (121.8)	141	127.4 <sup>b</sup> (121.8)	63	121.6 <sup>c</sup> (117.0)	114	214.0 <sup>b,c</sup> (103.2)	<.01
In treatment at 6-month follow-up	119	40.2	35	26.9	15	26.8 <sup>c</sup>	69	62.7 <sup>c</sup>	<.01
In treatment at 12-month follow-up	31	12.6	9	8.3	3	6.8 <sup>c</sup>	19	20.4 <sup>c</sup>	.01

<sup>a</sup>0 sessions and 1-4 sessions' are significantly different.

<sup>b</sup>0 sessions and 5-9 sessions' are significantly different.

<sup>c</sup>1-4 sessions and 5-9 sessions' are significantly different.

TABLE 2. Client satisfaction with MBRP-W ( $N = 118$ )

Item	$M (SD)$	$n$
1. How much did you enjoy participating in the group?	3.2 (0.9)	116
2. How much did you learn to change your attitude toward stress?	3.2 (0.9)	116
3. How much did you learn to gain insight into personal patterns that led to addictive behaviors?	3.1 (0.9)	116
4. How much did you learn to improve your sense of well-being?	3.1 (0.9)	117
5. How much did you learn to obtain a sense of wellness?	3.0 (0.9)	114
6. How much did you learn to live in the present moment?	3.1 (0.9)	113
7. How much did the facilitator encourage participation?	3.6 (0.7)	116
8. How useful was the information presented to you?	3.4 (0.9)	115
9. How important do you think this group is for women, to help them in their recovery process?	3.5 (0.8)	114
10. Would you recommend this group to other women in recovery?	3.5 (0.8)	115
11. Please rate the group facilitator's knowledge	3.6 (0.8)	113
12. How would you rate the quality of this group?	3.5 (0.8)	113
13. Overall, how would you rate the group?	3.5 (0.8)	115
Overall level of satisfaction <sup>a</sup>	3.4 (0.3)	118

Note. Response options for questions 1–10 were 0 = *not at all*, 1 = *somewhat*, 2 = *OK*, 3 = *considerably*, 4 = *extremely*. Response options for questions 11–13 were 0 = *poor*, 1 = *fair*, 2 = *good*, 3 = *very good*, 4 = *excellent*.

<sup>a</sup>Overall mean based on the above 13 items.

exercises they didn't like, seven mentioned they least enjoyed sitting and not talking for a long time. These comments referred to the 4-hour silent retreat in week seven. Based on past experiences developing the intervention, we determined that some participants found the meditation activities boring and some had trouble staying awake, particularly those on psychotropic medications (Vallejo & Amaro, 2009). However, it is interesting to note that 14 participants cited exercises as the aspect of MBRP-W

that they liked the most. In addition, 10 stated they disliked group dynamics such as participant absences and group members not participating, talking at the same time, and not showing respect for others ("cuando faltaban el respeto").

### Clinical Outcomes

After controlling for covariates, change in addiction severity varied by MBRP-W dosage (Table 3); a statistically

TABLE 3. Linear regression coefficients (SE) for change in addiction severity and stress by time and MBRP-W Dosage ( $N = 318$ )

Model	ASI Alcohol	ASI Drug	Perceived Stress	Posttraumatic Stress
Nonlinear (saturated) models	$\beta (SE)$	$\beta (SE)$		
6-month follow-up	−0.03 (0.02)	−0.03 (0.01)*		
12-month follow-up	−0.04 (0.02)	−0.03 (0.01)*		
1–4 sessions	0.05 (0.03)	0.02 (0.02)		
5–9 sessions	0.05 (0.03)	0.03 (0.01)*		
6 months × 1–4 sessions	−0.07 (0.03)	−0.03 (0.02)		
6 months × 5–9 sessions	−0.05 (0.03)	−0.03 (0.01)**		
12 months × 1–4 sessions	0.01 (0.03)	−0.01 (0.02)		
12 months × 5–9 sessions	−0.07 (0.03)*	−0.04 (0.01)*		
# Observations	755	760		
Dosage × Time, $\chi^2 (df)$	20.0 (4)	10.0 (4)		
$p$ -value	<.001	<.05		
Linear models			$\beta (SE)$	$\beta (SE)$
Time (linear)			−1.66 (0.65)*	−1.71 (0.80)*
1–4 sessions			−0.08 (1.28)	−0.37 (1.78)
5–9 sessions			0.06 (1.22)	−1.90 (1.69)
Time × 1–4 sessions			−1.47 (0.92)	0.45 (1.12)
Time × 5–9 sessions			−2.28 (0.74)*	0.68 (0.90)
# Observations			754	749
Dosage × Time, $\chi^2 (df)$			9.8 (2)	0.6 (2)
$p$ -value			<.01	.75

Note. All models included race/ethnicity, employment status, court-ordered treatment, arrested during the previous 30 days, treatment modality, length of treatment, and in treatment at time of survey. ASI = Addiction Severity Index;  $\beta$  = unstandardized beta.

\* $p < .05$ , \*\* $p < .01$

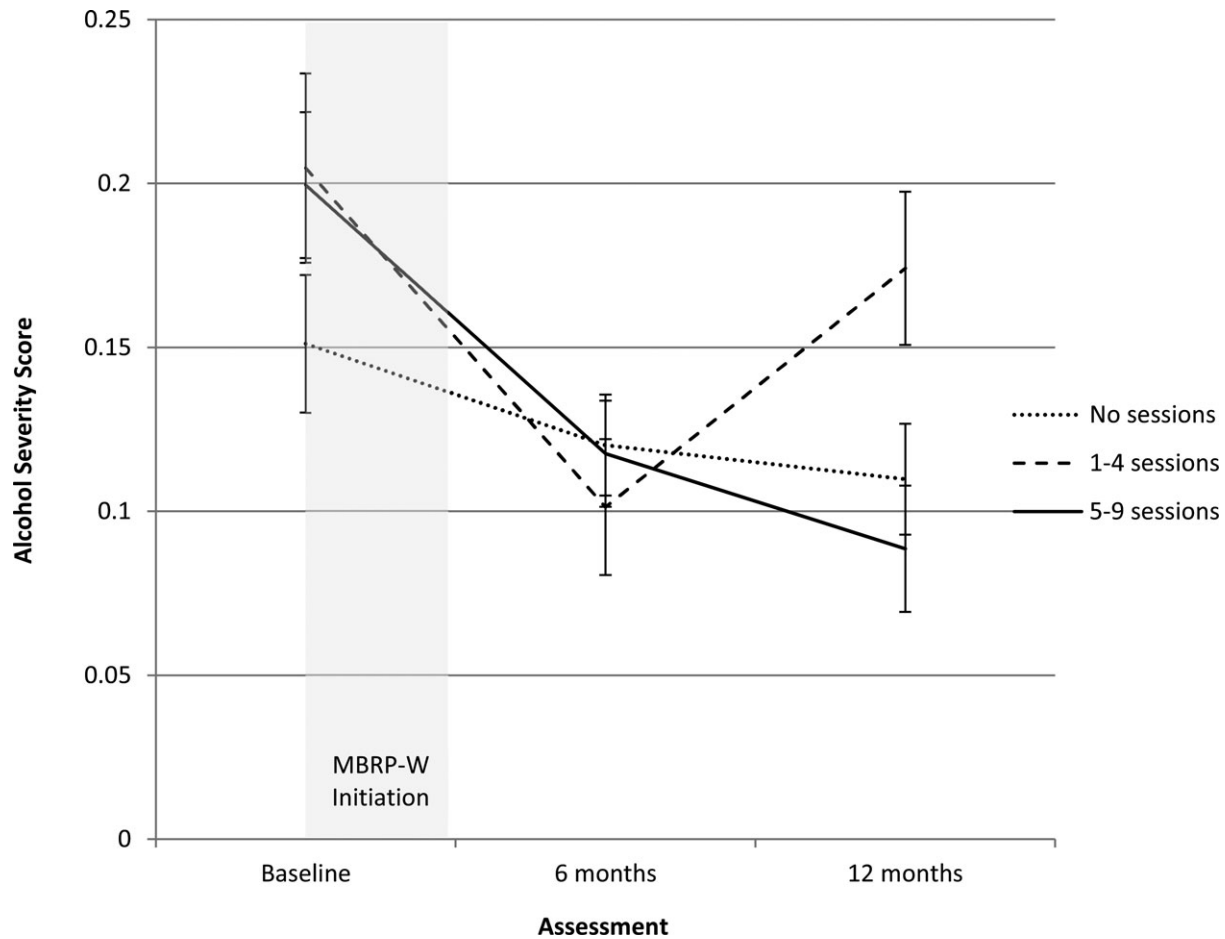


FIGURE 1. Estimated means ( $\pm$ SE) for ASI alcohol severity scores at baseline and 6- and 12-month follow-up by MBRP-W dosage ( $N = 318$ ).

significant time-by-group interaction was observed for both alcohol severity ( $\chi^2 = 19.0$ ,  $DF = 4$ ,  $p < .001$ ) and drug severity ( $\chi^2 = 10.0$ ,  $DF = 4$ ,  $p < .05$ ). A general pattern of diminished addiction severity (for alcohol and drugs) was observed across dosages of MBRP-W (see Figures 1 and 2). The average rate of decline in ASI alcohol scores between baseline and 12 months among participants who received 5 to 9 sessions was greater ( $\beta = -.07$  points,  $SE = .03$ ,  $p < .05$ ) than that of those who received zero sessions. As shown in Figure 2, participants who received a high dose of MBRP-W (5–9 sessions) reported significantly greater declines in ASI drug scores at both 6 months ( $\beta = -.03$ ,  $SE = .01$ ,  $p < .01$ ) and 12 months ( $\beta = -.04$ ,  $SE = .01$ ,  $p < .05$ ).

Change in perceived stress over time varied significantly by exposure to MBRP-W after controlling for covariates. Perceived stress scores declined by an average of 1.7 points per 6-month survey interval among all participants (see Figure 3). The rate of decline among those with high exposure to MBRP-W was accelerated by an additional 2.3 points ( $SE = .74$ ,  $p < .05$ ). Change in trauma symptom scores did not vary significantly by exposure to MBRP-W; however, trauma symptom scores among all participants declined by an average of 1.7 points per 6-month survey interval.

## DISCUSSION

To the best of our knowledge, this is the first study of a tailored MBRP intervention designed for culturally-diverse low-income women in SUD treatment. The study tested the feasibility, acceptability, and preliminary outcomes of MBRP-W, an adapted model of MBSR for women recently enrolled in SUD treatment who have histories of trauma exposure and come from low-income, low-literacy backgrounds. This pilot study adds to the scant literature on the utility of mindfulness training (MT) for diverse women in SUD treatment. Previous studies have lacked racial/ethnic diversity in samples and have not investigated outcomes by sex (Katz & Toner, 2012).

Approximately 36% of women in the sample attended five of the nine sessions, the cut-off point deemed clinically significant. The completion rate found in the present study is lower than those found in other MBRP studies (e.g., 61% completion rate in Bowen et al., 2009 and 58% completion rate in Price et al., 2012), as well as other behavioral intervention trials with women who have co-occurring substance use and mental health disorders and who are in outpatient SUD treatment (Hien et al., 2009; Ruglass et al., 2012). However, the present study is unique in that the majority of participants were engaged in residential treatment programs that had



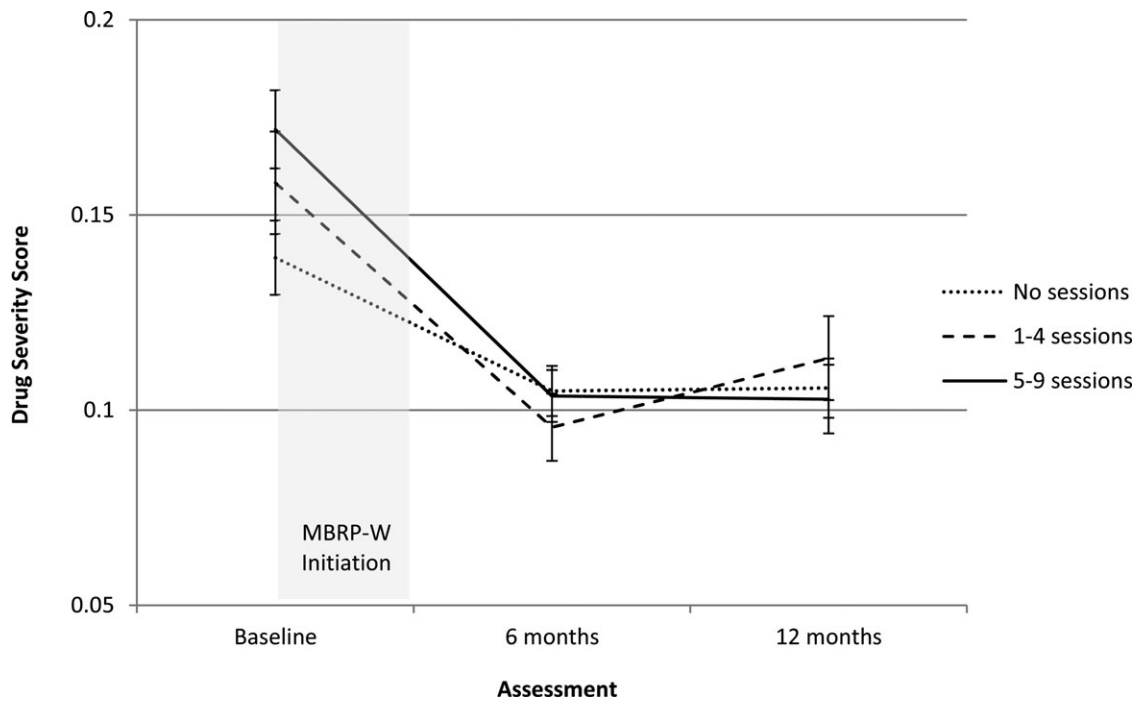


FIGURE 2. Estimated means ( $\pm$ SE) for ASI drug severity scores at baseline and 6- and 12-month follow-up by MBRP-W dosage ( $N = 318$ ).

highly demanding schedules directly related to their SUD treatment and external providers of care during the day as well as mandated community tasks. Scheduling conflicts with external agencies such as courts, medical providers, child protective services; and treatment dropout prevented many women from consistently participating in

the MBRP-W sessions. Further, retention of minority patients in SUD treatment (Guerrero et al., 2013) and intervention research (Burlew et al., 2011) is a significant challenge widely noted in the literature. Early dropout from SUD treatment may be a consequence of the severely disadvantaged economic and social conditions

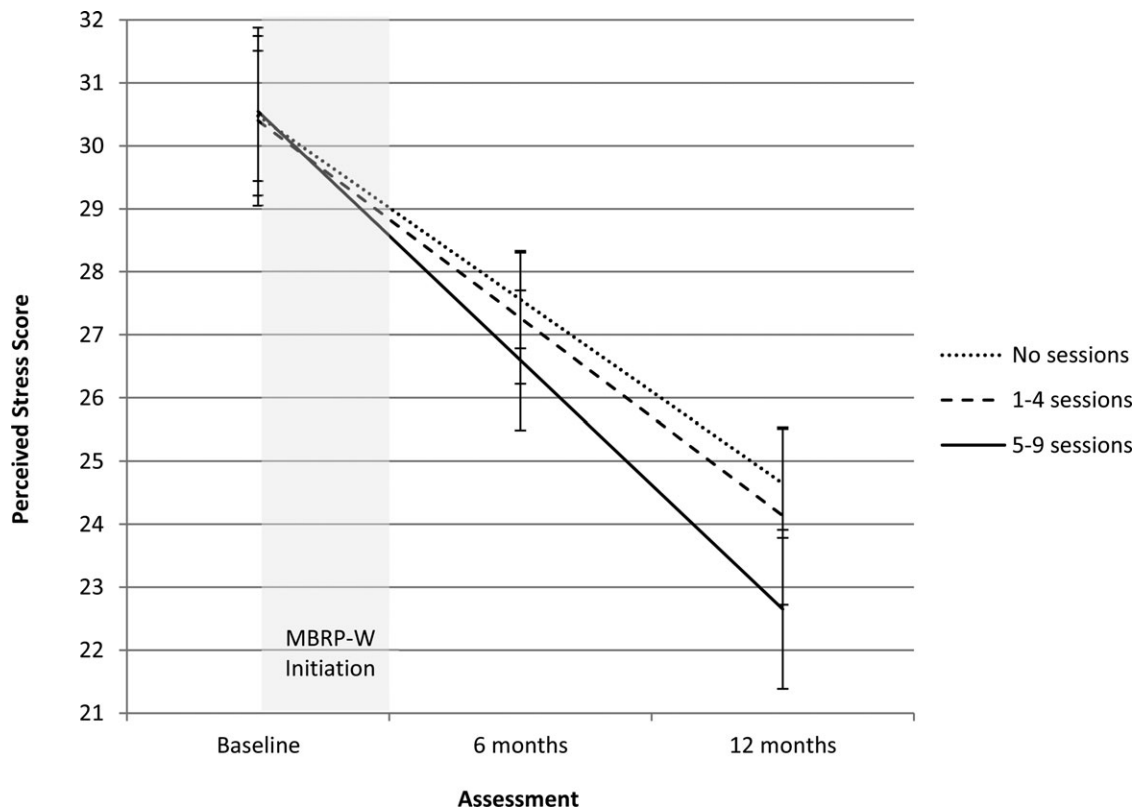


FIGURE 3. Estimated means ( $\pm$ SE) for perceived stress scores at baseline and 6- and 12-month follow-up by MBRP-W dosage ( $N = 318$ ).

as well as the associated stressors that many minority patients face in their daily lives (Amaro et al., 2005).

Our hypothesis, which tested whether MBRP-W dosage would predict better outcomes, was partially supported as demonstrated by greater reductions in alcohol and drug addiction severity and perceived stress among those women receiving the highest dosage relative to lower dosages. In line with previous findings on the effects of MT on substance use outcomes (Bowen et al., 2006; Zgierska et al., 2009), our findings suggest that MBRP-W contributed to reductions in alcohol and drug addiction severity, regardless of the modality of SUD treatment in which women were enrolled, time in treatment, and engagement in treatment at follow-up. In all, our findings indicate that integration of MT may be useful as an integrative intervention during SUD treatment. It is important to note that not all MT approaches may work with culturally-diverse, low-income women with histories of trauma exposure. The intervention used here, although based on MBSR, was significantly adapted to be more accessible and focused on issues of relapse prevention and life stressors experienced by this specific population (Vallejo & Amaro, 2009).

Our findings also indicate that MBRP-W may reduce perceived stress among women in SUD treatment. Interventions that reduce perceived stress are particularly relevant because stress is a key risk factor<sup>5</sup> for relapse and women have been shown to have higher scores on behavioral measures of stress, suggesting a gender difference in stress response (Chaplin, Hong, Bergquist, & Sinha, 2008; Taylor et al., 2000). Moreover, women may be more sensitive to stress during recovery due to higher rates of trauma (Lynch et al., 2002). Therefore, decreasing perceived stress may be an important treatment target, particularly for women in recovery.

There is some evidence that MT produces positive changes in posttraumatic stress disorder (PTSD) severity (Boden et al., 2012); however, the present study found no differences between MBRP-W groups on posttraumatic stress symptomatology. The time effects were positive, suggesting that all groups improved over time. The time effect as well as the lack of time-by-group effects may be due to participants' exposure to integrated trauma treatment, which was part of services provided at the study sites. Another possible explanation is that there was insufficient attention paid to trauma-related issues such as rumination and avoidance of intrusive thoughts described

<sup>5</sup>The reader is asked to consider that concepts and processes such as "risk" and "protective" factors are often noted in the literature, without adequately delineating their dimensions (linear, nonlinear, rates of development, sustainability and cessation, etc.), their "demands", the critical necessary conditions (– endogenously as well as exogenously; micro to macro levels) which are necessary for them to operate (begin, continue, become anchored and integrate, change as de facto realities change, cease, etc.) or not to operate, and whether their underpinnings are theory-driven, empirically-based, individual, and/or systemic stake holder-bound, historically-bound, based upon "principles of faith" or what. This is necessary to clarify, if possible, if these terms are not to remain as yet additional shibboleths in a field of many stereotypes. Editor's note.

in recent studies of trauma and mindfulness (Bernstein, Tanay, & Vujanovic, 2011; Boden et al., 2012). It is important to note that the study did not assess history of a PTSD diagnosis. While all participants had a history of trauma, changes in trauma symptomatology may be more likely to occur among those with a history of PTSD.

### Study's Strengths and Limitations

This study addressed a major gap in the literature on mindfulness-based interventions, which has lacked a focus on the effects of MT on the mental health of women, primarily women from diverse racial/ethnic groups and those with low-income status, recently enrolled in SUD treatment. Results from this study provide useful preliminary evidence of the benefits of MBRP-W. A full trial testing the efficacy of MBRP-W compared with treatment as usual and other relapse prevention approaches is warranted.

Findings from this study must be understood within the context of several limitations. First, the study design did not include randomization or a control group, creating multiple threats to internal validity, including history, maturation, and testing effects. To address this problem, we included differences in baseline characteristics, treatment modality, time in treatment, and engagement in treatment at follow-up as covariates in our analyses. However, other potential differences between dosage groups that were not measured in this study, such as motivation, may account for the findings. Second, reliance on self-report measures of substance use may have introduced social desirability bias. Biological measures of substance use may have been useful in corroborating the self-report data (Brewer et al., 2009; Matousek, Dobkin, & Pruessner, 2010); however, these were not available. Third, satisfaction ratings were obtained in the last session, which did not provide information on satisfaction among those who did not attend the last session. Integrating satisfaction ratings and feedback throughout the course of the intervention would have been helpful. Finally, the small sample sizes of White, Asian, and American Indian women prevented the inclusion of separate groups for these women in the analyses. Combining women from White, Asian, and American Indian backgrounds is not ideal because it masks their unique characteristics and precludes the identification of important disparities by race/ethnicity.

### CONCLUSIONS

Findings from this study suggest that use of MBRP-W as an integrative intervention for women with SUDs and a history of trauma exposure may reduce addiction severity and stress symptoms highly associated with relapse. Because most MT interventions have not been adapted to the specific needs of women in this population, including considerations related to trauma, low literacy, and low attention span, MBRP-W offers an alternative that makes MT potentially more accessible and attractive to similar groups of patients in treatment (Vallejo & Amaro, 2009). In addition, MBRP-W was found to be highly acceptable

to those who completed treatment. Our findings suggest that achieving positive outcomes from MBRP-W requires a high level of participation, because benefits were seen only among those who attended five or more sessions. Thus, programs implementing MBRP-W should facilitate participation through intensive follow-up with those who miss sessions, provision of child-care services and transportation if these are obstacles, and a focus on patient engagement strategies. In addition, participation may be increased for those in residential treatment by offering MBRP-W groups on a continuous basis or make up session to allow participants to attend missed sessions.

Further research on the use of MT as an adjunct intervention in SUD treatment is warranted and should focus on controlled studies to test the efficacy of MT approaches and adaptations for diverse populations. In addition, such studies would benefit from the use of biomarkers to measure stress reactivity (e.g. Brewer et al., 2009) and biological measures of substance use. Finally, there is a need to further understand the mechanisms at work in mindfulness training interventions with individuals in treatment for substance use and mental health disorders.

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## Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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## GLOSSARY

**Mindfulness:** “The awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003).

**Mindfulness training (MT):** Instruction focused on the development of awareness and acceptance of moment-to-moment experiences. Common strategies taught in MT include breathing exercises, yoga, stretches, and meditation.

**Mindfulness-based relapse prevention (MBRP):** An intervention that combines mindfulness strategies with relapse prevention techniques to help people with substance use disorders cope with cravings by increasing their awareness of thoughts, emotions, and environments that lead to using substances and developing coping skills to prevent relapse.

**Mindfulness-based stress reduction (MBSR):** A mindfulness training method that combines mindfulness meditation and yoga. It was originally developed for populations with chronic pain and stress-related disorders. In addition to meditation and yoga, MBSR training teaches participants to practice mindfulness during ordinary activities like walking, standing, and eating.

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