

Reducing Stress Among Mothers in Drug Treatment: A Description of a Mindfulness Based Parenting Intervention

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Abstract *Background* Parenting women with substance use disorder could potentially benefit from interventions designed to decrease stress and improve overall psychosocial health. In this study we assessed whether a mindfulness based parenting (MBP) intervention could be successful in decreasing general and parenting stress in a population of women who are in treatment for substance use disorder and who have infants or young children. *Methods* MBP participants (N=59) attended a two-hour session once a week for 12 weeks. Within-group differences on stress outcome measures administered prior to the beginning of the MBP intervention and following the intervention period were investigated using mixed-effects linear regression models accounting for correlations arising from the repeated-measures. Scales assessed for pre-post change included the *Perceived Stress Scale-10* (PSS) and the *Parenting Stress Index-Short Form* (PSI). *Results* General stress, as measured by the PSS, decreased significantly from baseline to post-intervention. Women with the highest baseline general stress level experienced the greatest change in total stress score. A significant change also occurred across the Parental Distress PSI subscale. *Conclusions* Findings from this innovative interventional study suggest that the addition of

MBP within treatment programs for parenting women with substance use disorder is an effective strategy for reducing stress within this at risk population.

Keywords Mindfulness · Parenting · Pregnancy · Stress reduction · Substance abuse

Significance

What is already known on this subject? Previous mindfulness based interventions have resulted in a decrease in self-reported stress in general and parenting populations but little is known about the effects of a mindfulness-based intervention on stress outcomes among parenting women undergoing treatment for substance use disorder. *What this study adds?* The mindfulness based parenting (MBP) intervention described here is the first clinic-based program targeting mothers who are in treatment for substance use disorder and who have infants or young children. Results from this innovative program indicate that participants reported significantly less perceived general stress and significantly less parental distress-related stress post-intervention compared to baseline. Such findings could help guide future MBP interventions among women with substance use disorders.

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Background

Opioid use and abuse have become increasingly common among pregnant and reproductive-aged women in the United States (U.S.). Between 2000 and 2009, the number of delivering mothers diagnosed as dependent on or using opioids at the time of delivery increased almost five-fold,

from 1.19 to 5.63 per 1000 hospital births per year (Patrick et al. 2012). During this same time period, there was an 11.9% annual increase in rates of opioid use among pregnancy-related hospitalizations (Salihu et al. 2015). Among pregnant admissions to drug treatment centers, the proportion reporting any prescription opioid abuse increased from 2 to 28% from 1992 to 2012 (Martin et al. 2015), while the reporting of prescription opioids as the primary substance of abuse similarly increased from 1 to 19% (Martin et al. 2015). Lastly, among reproductive-aged women, one quarter of privately insured and over one-third of Medicaid-enrolled women filled a prescription for an opioid each year during 2008–2012 (Ailes et al. 2015).

Addressing the impacts of this epidemic on maternal and child populations should be considered a public health priority given the infant, child and parenting consequences commonly associated with maternal opioid use specifically and maternal substance use in general. Intrauterine exposure to opioids generally increases the risk of adverse birth outcomes, including neonatal abstinence syndrome (Behnke and Smith 2013; Kellogg et al. 2011). Parental substance use is associated with poor parenting outcomes including negative parenting reinforcement (Bauman and Dougherty 1983) and higher levels of parenting stress (Bagner et al. 2009; Kelly 1992) which may impact a mother's confidence in her parenting abilities (Patterson 1980). Stress has also been associated with maternal depression (Thomason et al. 2014) and in individuals being treated for opioid abuse, it is a strong predictor of relapse and continued drug use (Brewer et al. 1998) which is risk factor for child maltreatment (CDC 2015).

Given the relationship between substance use, increased stress, and poor parenting, it is possible that parenting women with substance use disorder could benefit from interventions aimed at decreasing stress and improving overall psychosocial health. An intervention that includes a mindfulness component may be one potential program. Mindfulness is an ability to pay attention in a particular way: on purpose, in the present moment, and nonjudgmentally (Kabat-Zinn 1994). Mindfulness has been shown to positively affect a variety of psychological issues, including preventing relapse for depression (Segal Z 2002) and substance abuse (Blume and Marlatt 2009, Hsu et al. 2008; Marlatt and Witkiewitz 2010; Zgierska et al. 2009) and reducing negative physical and psychological responses to stress in the general population (Kabat-Zinn 1982; Kabat-Zinn et al. 1985, 1992). Mindfulness has also been shown to reduce negative responses to stress in pregnant women (Dunn et al. 2012) and has been linked to positive parenting in various populations (Dawe and Harnett 2007; Dumas 2005; Kabat-Zinn and Kabat-Zinn 1998; Steinberg 2004).

Mindfulness-based stress reduction (MBSR) is a structured program led by trained instructors, based on the core

principle of mindfulness, and intended to help participants reduce stress and enhance well-being. It has been recognized by the Substance Abuse and Mental Health Services Administration as an evidenced based program through the National Registry of Evidence-based Programs and Practices (SAMHSA 2015). MBP builds upon the stress-reduction and other components of MBSR and aims to teach parents to be present with their children when interacting, while simultaneously highlighting the key themes of mindfulness including non-judgment, self-compassion, self-regulation, and emotional awareness. The major themes of MBP are presented in Table 1. It is possible that MBP is an effective method for mothers in drug treatment to deal with general and parenting-related stress. However, to our knowledge, no studies have examined the effect of MBP on reducing stress in this population.

Materials and Methods

Project Overview

The MBP intervention in this report is part of a larger on-going project entitled “Practicing Safety Mindfulness Project for Mothers in Drug Treatment” (PSMDT), a multifaceted intervention with three main components including MBP, *Practicing Safety* and enhanced case management. The first component is a course on MBP for mothers being treated for opioid dependence. The second element of PSMDT is *Practicing Safety*, a quality improvement project implemented at a pediatric practice that treats a portion of children born to women attending the substance abuse treatment center. *Practicing Safety* aims to increase screening for possible child abuse and neglect by pediatric practices to parents of children ages 0–3 years (Pediatrics 2016). Lastly, the *Practicing Safety* and MBP strategies are supported by enhanced case management linking a caseworker at the substance abuse treatment center and a social worker at the pediatric practice. All procedures for PSMDT were approved by the Thomas Jefferson University and the City of Philadelphia Institutional Review Boards.

Settings

Women being treated at Family Center or at My Sister's Place were eligible to participate in the MBP intervention. Family Center provides comprehensive outpatient treatment services for approximately 250–300 pregnant and parenting women with substance use disorders annually, with 8–10 new admissions per month. It is licensed with the Commonwealth of Pennsylvania and is accredited by the Joint Commission to provide both methadone and buprenorphine medication-assisted treatment. Family

Table 1 Major themes of mindfulness based parenting and corresponding parenting behaviors promoted or decreased through practice

Theme	Effective parenting behaviors promoted through this practice	Parenting behaviors decreased through this practice
Listening with full attention	Correctly discerning child's behavior cues and accurately perceiving child's verbal communication	Reduced use and influence of cognitive constructions and expectations
Nonjudgmental acceptance of self and child	Healthy balance between child, parent, and relationship needs, sense of parenting self-efficacy	Reduction in self-directed concerns and fewer unrealistic expectations of child's attributes
Emotional awareness of self and child	Responsiveness to child needs and emotions	Less dismissing of child's emotions and less discipline that results from parent's strong negative emotion (e.g., anger, disappointment, shame)
Self-regulation in the parenting relationship	Emotional regulation in parenting and parenting with goals and values	Less overreactive and "automatic" discipline and less dependence on child's emotions
Compassion for self and child	Positive affection in parent child relationship and more forgiving view of own parenting efforts	Less negative affect displayed in the parent-child relationship and less self-blame when parenting goals are not achieved

Adapted from: Duncan L, Coatsworth JD, Greenberg MT. A model of mindful parenting: implications for parent-child relationships and prevention research. *Clin Child Fam Psychol Rev*, 2009;12 (3):255–270 (Duncan et al. 2009)

Center has a multi-disciplinary team that includes master level clinicians, nurses, psychiatrists, obstetricians, parent-child specialists, a case manager, and a peer specialist. My Sister's Place is a comprehensive, long-term, residential treatment program serving pregnant and parenting women and their children. It is licensed by the Commonwealth of Pennsylvania as a non-hospital based residential treatment facility and is credentialed both as a 3b and 3c level of care as defined by the Pennsylvania Client Placement Criteria and admits women with opioid use disorder as well as other substance use disorders. Patients at My Sister's Place with opioid use disorder receive medication-assisted treatment through Family Center. My Sister's Place can serve up to 22 mothers and 30 children at any given time, and patients can remain at My Sister's Place for up to 1 year. Children must be under six of age to reside at My Sister's Place. Family Center and My Sister's Place are administered within the division of Maternal Addiction Treatment, Education, and Research (MATER) at Thomas Jefferson University (Philadelphia, PA).

Participants

All participants gave their informed consent prior to their inclusion in the study. English speaking clients of Family Center or My Sister's Place who were between the ages of 18 and 40 years and at least 28 weeks gestation or delivered within the past 3 years were eligible to enroll. All participants were receiving medication-assisted opioid treatment.

Recruitment

MBP recruitment signs were placed in the waiting area of the Family Center clinic and at My Sister's Place. The PSDMT caseworker encouraged treatment counselors to distribute MBP informational brochures and to invite eligible women to speak with the casework to learn more about the MBP group.

Mindfulness Based Parenting Intervention

The curriculum for the MBP course was adapted from previous MBSR and MBP courses. Adaptation processes included interviews with key personnel and stakeholders and consideration of substance abuse treatment guidelines and the population served by MATER. The curriculum was designed to be trauma informed and culturally sensitive, and meet appropriate literacy levels. Participants attended a 2-hour MBP session once a week for 12 weeks in a classroom at Family Center. The sessions were led by a certified mindfulness instructor and co-led with a clinician from the treatment program trained in mindfulness. Class time each week was divided between meditation practice, group discussions, body awareness, and mindfulness skill-building and other activities such as utilizing one's breath as a tool to breathe in calm, taking three relaxing sighs, and pausing to allow a space between a stressful event and a reaction. Stress-related topics covered during the course included: stressful moments in parenting, identifying stress and breathing, and stress versus stressor. Instructors also taught parenting skills related to realistic developmental expectations and building healthy and caring mother-child

relationships. Childcare was provided at Family Center during the group sessions. Participants were encouraged to practice mindfulness outside of class for at least 5–15 min per day. Instructors believed that this amount of time would help participants feel successful in their practice given the time constraints of their parenting and treatment obligations. Mp3 players with teacher-led meditations were available to participants to use while practicing outside of class at Family Center or My Sister's Place. Participants received 1 mid-week email written by their MBP instructor, which contained audio meditations, provided reinforcement of the topics discussed during the previous session, offered encouragement to practice the mindfulness skills that had been learned, and helped build rapport between participants and MBP instructors. Similarly, a text message reminder was sent to participants the day before each class as a reminder. Additional reminders were given by the case-worker directly to participants' counselors to encourage weekly participation. Three out of the 12 weekly sessions included a mother/child dyad instruction, whereby the children joined their mothers in class for one hour of mindful play with MBP instructors on hand to offer real-time feedback and guidance. There was a graduation ceremony and celebratory luncheon during the last week of the class.

Incentives

Participants received a \$25.00 gift card at the third, ninth and twelfth sessions and for perfect attendance at all 12 classes. At week six participants received an Mp3 player with recordings of guided meditations. Participants received a \$25.00 gift card upon completion of all baseline assessments and another \$25.00 gift card upon completion of all post-intervention assessments. Lastly, if mothers attended four consecutive MBP sessions for the entirety of the session, they received a "fast pass". This pass allowed the mothers to bypass the waiting line for medication in the Family Center clinic.

Data Collection

Sociodemographic characteristics and history of exposure to childhood trauma were collected prior to the first MBP class. For cohorts 1 through 4, sociodemographic related data were gathered from MATER intake forms. These forms are completed by all women once they enter the treatment program. During cohort 4, study investigators realized that demographic information was missing from intake forms for several women so for subsequent cohorts (i.e., cohorts 5 through 10), sociodemographic characteristics were collected using a self-administered data collection form specific designed and approved for this study. A survey with questions from the Adverse Childhood Exposure

(ACE) questionnaire (Felitti et al. 1998) was used to assess exposure to childhood trauma. Participants were also asked to complete several psychosocial assessments, including the *Perceived Stress Scale-10* and *Parenting Stress Index-Short Form*, prior to the first MBP class. All assessments, including sociodemographics and history of childhood trauma, were self-administered and completed in a bound booklet at Family Center. Participants were asked to complete the same psychosocial assessments again within 1 month of completing the MBP course. Pre- and post-MBP data from all participants were aggregated into one analytic dataset void of personal identifiers.

Assessments

General Stress

The 10 item *Perceived Stress Scale-10* (PSS) is a self-reported questionnaire that was designed to measure the degree to which individuals appraise situations in their lives as stressful (Cohen et al. 1983). The PSS items evaluate the degree to which individuals believe their life has been unpredictable, uncontrollable, and overloaded during the previous month. Participants rate 10 items using a five-point Likert scale ranging from 'never' to 'very often' and subsequently receive a total stress score between 0 and 40, with high scores representing higher perceived stress. The PSS has been widely used in multi-racial, ethnic, and gender populations and in pregnant women (Cohen 1988; Cohen et al. 1995) and internal consistency has been indicated (Cronbach's α between 0.84 and 0.86) (Cohen et al. 1983).

Parenting Stress

Parenting stress was measured using the *Parenting Stress Index-Short Form* (PSI-SF). The PSI-SF uses a five-point Likert scale ranging from 'strongly agree' to 'strongly disagree' to rate 36 items. The PSI-SF includes an overall total stress score as well as three domains of parenting stress: Parent-Child Dysfunctional Interaction, Difficult Child and Parental Distress. The scores in the Parent-Child Dysfunctional Interaction domain focus on the state of the relationship between a parent and children and whether or not the parent may have negative feelings towards his or her child. High scores in the Difficult Child subscale suggest stress related to regulating the child's behavior. Parental Distress subscale determines the potential for maladjustment to parenting due to personal factors such as parenting competence, lack of social support, and/or stresses in other life roles. Responses to each of the items were summed to create a total stress score which provides an indication of the overall level of parenting stress experienced. This total

stress score has sound test–retest reliability ($r=0.84$) and good internal consistency (Cronbach's $\alpha=0.91$) (Abidin 1995).

Statistical Analysis

Data from the first 10 MBP cohorts were used in our analyses. Baseline sociodemographic characteristics and maternal adverse childhood exposures were described using mean and standard deviations for continuous variables and frequency counts and percentages for categorical variables. Within-group differences in the MBP participants on the two stress outcome measures administered (1) prior to the beginning of the MBP intervention (baseline), and (2) following the 12-week MBP intervention period were examined. Scales assessed for pre-post change included the *Perceived Stress Scale-10* and the *Parenting Stress Index-Short Form*. The homogeneity of those with and without complete data, in respect of demographics variables, was evaluated using Chi square tests. Changes in the stress measures (total scores and subscales) from pre to post were investigated using mixed-effects linear regression models implemented via maximum likelihood accounting for correlations arising from the repeated-measures. The mixed model uses all data available from each participant under the assumption of missing at random and gives unbiased estimates and standard errors. Moreover, it is appropriate method accounting for adjusted factors such as sociodemographic characteristics. Sensitivity analyses were performed by repeating the analysis without subjects with missing data and assuming no changes for the subjects with missing data. Sensitivity analyses showed that results stayed same. Models were adjusted for sociodemographic characteristics and total number of ACEs to account for variations in characteristics and/or exposures that may influence stress levels. Effect sizes were computed by calculating the difference of the means on general and parenting stress at the pre and post assessments, divided by the pooled standard deviations. We next divided participants into three groups based on their baseline total stress score, as measured by the PSS to examine differing patterns of change by baseline general stress. Baseline total stress score was categorized as low, moderate, or high on the basis of tertiles of the total stress score (with 17 and 22 being the cutoffs) and changes in total stress from baseline to post-MBP as a function of this grouping were assessed. Lastly, a Pearson correlation was conducted to determine if change parental stress (as measured by the change in PSI total and subscale scores) was related to change in total general stress (as measured by the change in total PSS score). All statistical analyses were performed using SAS version 9.4 (SAS Institute, Cary, NC, USA) and data were regarded as statistically significant at $P<0.05$.

Results

Results from 59 participants from the first ten MBP cohorts are presented. The mean number of MBP sessions attended was 10. Table 2 provides sociodemographic characteristics of the participants. The mean age of participants was approximately 30 years (range 22–40 years) and participants had, on average, more than two children and a history of four pregnancies. The majority of the participants was white, unmarried, and not employed, and had a high school or less education. Almost all participants received some form of public assistance. Participants reported experiencing an average of 3.9 (SD=2.3) general adverse childhood exposures prior to the age of 18 years (results not shown). The percentage of positive responses for the questions included in the eight categories of adverse childhood exposures ranged from 32.8% for psychological/emotional abuse to 69.5% for parental divorce or separation. Participants with and without complete PSS or PSI data did not differ according to sociodemographic characteristics.

Results from mixed-effects linear regression models are presented in Table 3. Forty-six (77%) had complete outcome data for PSS and forty-one (69%) had complete data for the PSI. The sensitivity analysis showed that participants with missing data did not differ significantly from participants without missing data with regard to sociodemographic characteristics. Total scores on the PSS decreased significantly from baseline (19.7, standard error [se] 0.80) to post-MBP (16.1, se 1.0). Figure 1 depicts the change in total stress score according to baseline stress score. [Fig. 1] Women with low and women with high baseline stress scores experienced statistically significant decreases in total stress score. Women with the lowest baseline stress had a mean difference of -2.5 (95% confidence interval [CI] $-4.6, -0.41$; $p=0.02$) while women with highest baseline stress had a mean difference of -6.51 (95% CI $-9.9, -3.1$; $P<0.001$) (results not shown). The change in total stress among women with moderate baseline stress was not statistically significant ($P=0.31$) (results not shown).

Three women were excluded from the analysis of the PSI for scoring a 10 or less on the Defensive Responding subscale as a low score indicates that they may be trying to minimize any problems, stress, or negativity in their relationship with their child and caution should be used in interpreting any of the sub-scale or total stress scores. While there was not a significant change in the Total Stress Scores from baseline (73.8, se 1.8) to post-MBP (74.4, se 2.8), the Parental Distress subscale did show a significant improvement (Table 3). On the Parental Distress subscale, participants reported significantly less stress post-intervention compared to baseline. No significant changes were found with the Parent–Child Dysfunctional Interaction

Table 2 Characteristics of Mindfulness Based Parenting participants

Characteristic	MBP Participants N = 59 Percent
Number of times pregnant (mean)	4.0
Number of children (mean)	2.6
Number of children	
1	28.3
2–3	48.9
4+	22.8
Age (mean)	30.8 years
Race	
Black	5.4
White	73.2
Multiracial	5.4
Other	14.3
Don't know/refused	1.8
Highest level of education	
Less than high school	35.2
High school/GED	29.6
Some college/trade/vocation training	31.5
College	3.7
Employment status	
Unemployed/disabled/unable to work/student	96.1
Employed	3.9
Recipient of public assistance ^a	
Yes	92.7
No	7.3
Relationship status	
Single	49.1
Partner/domestic partner/significant other	40.9
Married	9.9
Adverse childhood experiences (ACEs)	
Witnessed physical violence between parents/guardians ^b	38.9
Physically harmed by parent, guardian or caregiver	44.0
Unwanted sexual experience	40.7
Psychological/emotional abuse ^b	32.8
Household substance use	64.4
Parental divorce or separation	69.5
Depressed or mentally ill household member	59.3
Household member went to jail	44.0
Total number of ACEs	
0	5.2
1–3	41.4
4–8	53.5

Missing observations: age, n = 3; number of children, n = 6; number of pregnancies, n = 7; race, n = 4; education, n = 5; employment, n = 8; public assistance, n = 4; relationship status, n = 4; adverse childhood experiences, n = 1

^aAssistance with transportation or from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and/or the Supplemental Nutrition Assistance Program (SNAP)

^bOften, for a few years, or greater

Table 3 Comparison of pre- and post-interventional data among participants of mindfulness based parenting

	Pre-MBP Mean (se)	Post-MBP Mean (se)	Pre to Post Mean difference (95% CI)	P-value ^a	ES
Perceived Stress Scale Total stress score	19.7 (0.8)	16.1 (1.0)	-3.5 (-5.3, -1.8)	<0.001	0.64
Parenting Stress Index Total stress score	74.8 (2.01)	74.5 (2.9)	-0.30 (-5.18, 4.58)	0.90	0.04
Subscales					
Difficult child	23.4 (1.0)	25.8 (1.3)	2.4 (-0.41, 5.1)	0.093	0.26
Parent-child dysfunctional interaction	19.9 (0.72)	21.7 (1.1)	1.8 (-0.15, 3.7)	0.070	0.21
Parental distress	31.8 (0.98)	28.3 (1.2)	-3.5 (-5.8, -1.1)	0.005	0.31

CI confidence interval, ES effect size, MBP mindfulness based parenting, se standard error

^aP-value from the mixed effect linear regression models

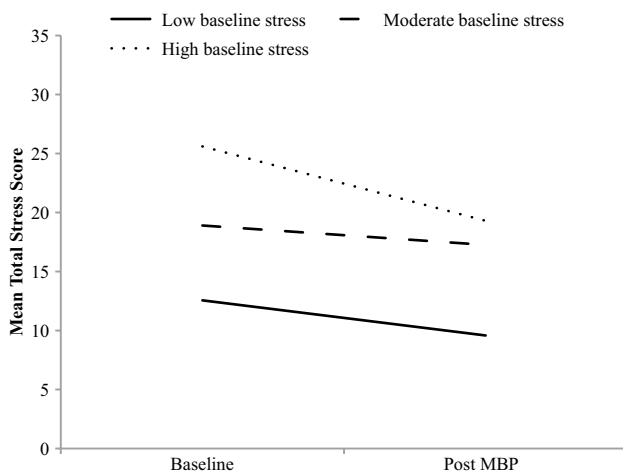


Fig. 1 Total stress scores as measured by the Perceived Stress Scale for women who reported low, moderate and high baseline total stress scores. MBP mindfulness based parenting

Table 4 Pearson correlation coefficients

	PSS Total	PSI Total	PSI-DC	PSI-PCDI	PSI-PD
PSS Total	1.00				
PSI Total	0.33	1.00			
PSI-DC	0.16	0.82*	1.00		
PSI-PCDI	-0.04	0.59 *	0.52*	1.00	
PSI-PD	0.49*	0.71*	0.32	0.07	1.00

Abbreviations: DC, Difficult Child; PCDI, Parent–Child Dysfunctional Interaction; PD, Parental Distress; PSI, Parenting Stress Index; PSS, Perceived Stress Scale

*P < 0.01

subscale or the Difficult Child subscale. Adjustment for sociodemographic variables and total ACE score through the use of mixed effects linear regression did not meaningfully change any of the PSS or PSI-related estimates (data not shown).

Correlation results indicated that change in general stress was not significantly related to change in total parenting stress (Table 4). Moreover, pre-post intervention change in general stress was not significantly associated with changes in parenting stress as measured through the domains of Difficult Child and the Parent–Child Dysfunctional Interaction.

Discussion

Finding effective approaches to preventing negative impacts of parental substance use disorder on infants and children should be considered a public health priority. Here we described the stress-reduction effects of a 12 week MBP intervention, a program aimed at improving parenting skills of mothers in drug treatment, enhancing coping mechanisms, and providing these mothers with a method for dealing with stress.

Preliminary results from the first ten MBP cohorts indicate that self-reported general stress decreased significantly from baseline among participants. Our findings suggest that the MBP intervention had the greatest impact on women with the highest levels of general stress, as women with the highest baseline stress experienced the greatest change in total stress score. Moreover, stress levels among our participants were only slightly higher than the general U.S. population (Cohen et al., 2012) at program completion. Further, because results remained significant even after adjusting for total ACE score, our findings suggest that MBP may be sensitive enough to help reduce stress among women with such high exposures to childhood trauma.

The Parental Distress subscale of the PSI also changed significantly from pre to post-MBP. This subscale determines the potential for maladjustment to parenting due to personal factors such as parenting competence, lack of social support, and/or stresses in other life roles. This improvement could be a reflection of what the MBP curriculum targets during the first six weeks of the intervention.

The first half of the 12 week course is spent focusing primarily on supporting the mother by guiding her to become less critical of herself both in and outside of the parenting role. Major themes included in the curriculum are self-compassion and non-judgment. Thus, this kindness to oneself through self-compassion and non-judgment may be contributing to the decrease of this subscale. Moreover, social support is a specific factor evaluated by this subscale and so it is possible that the group support provided by the MBP intervention could account for the improvement in scores seen from baseline to post-intervention.

On the contrary, no significant changes were seen with the other two PSI subscales (i.e., Parent–Child Dysfunctional Interaction and Difficult Child). There are several potential reasons as to why we did not find significant changes on these subscales. The Difficult Child subscale is concerned with behavioral characteristics of the child. It is possible that the mothers may have faced increasing difficulties with regulation of child behaviors as their children aged over the 12 week period and they were faced with new developmental stages. The Parent–Child Dysfunctional Interaction subscale focuses on the perception of parents in regard to the bond and relationship with their child. Mothers may have acquired more realistic expectations and a deeper understanding and awareness about their children's cues and need for support over the course of the MBP intervention which in turn may have increased perceived stress levels. Future analyses will be conducted to assess and evaluate the effectiveness of the specific components of the MBP curriculum on targeted outcomes. Given that mindfulness is multifaceted, determining which aspects predict improved outcomes could help to inform future MBP interventions.

These results add to the growing literature that mindfulness techniques can be effective at lessening stress in parents. While, to our knowledge, this is the first clinic-based program among mothers of infants or young children undergoing drug treatment, previous mindfulness based interventions have resulted in a decrease in self-reported stress in other parenting populations. In a small pilot study incorporating mindfulness techniques with pregnant women and their partners attending an urban community clinic, Duncan and Bardacke found a small significant decrease in general stress as measured by the PSS from pre to post (Duncan et al., 2010). Anderson et al. conducted a mindfulness intervention among parents of children with attention-deficit/hyperactivity disorder and reported a significant decrease in the PSI Total Stress Scale after the intervention as well as across the Parental Distress and Parent–Child Dysfunctional Interaction PSI subscales (Anderson and Guthery 2015). Furthermore, several studies have linked mindfulness to positive parenting (Dumas 2005; Kabat-Zinn and Kabat-Zinn

1998; Steinberg 2004) including a family-focused intervention that incorporated elements of mindfulness with parents receiving methadone maintenance (Dawe and Harnett 2007). The results of this study indicated improved family functioning and reduced child abuse potential when compared to a control group (Dawe and Harnett 2007). The authors also found that those receiving the intervention showed significant reductions in PSI Total Stress Score from pre to post (Dawe and Harnett 2007).

There are several potential limitations to consider when interpreting our results. First, the small sample size may have afforded inadequate power to detect significant differences and to examine differences by demographic characteristics. Second, no formal evaluation of other types of support participants may have received or other stress-reduction programs they may have been participating in, in addition to the MBP intervention, was conducted. However, given that participants were receiving treatment from the same center, it is likely that these women also had similar support systems making our results generalizable to those receiving services from our treatment programs. Third, while the intervention was open to all eligible women, selection bias may have been present as women who chose to participate may have been more ready to attend to their stress. Information on those who did not participate was not available. Fourth, all data were self-reported and may have been subject to reporting bias. Lastly, although this study used a longitudinal design, it did not include a control group of mothers who did not participate in MBP nor did it include longer-term follow-up. Despite these limitations, these results are promising and could help guide future MBP interventional studies.

In summary, mindfulness based parenting, as described here, is a program with potential important application to mothers engaged in treatment for substance use disorder. Participants of the MBP intervention reported significantly less perceived general stress post-intervention compared to baseline. Our findings also suggest that MBP participants decreased self-reported parental distress-related stress which is linked to personal factors such as parenting competence, lack of social support, and/or stresses in other life roles. Future analyses will provide additional information on the program's overall effectiveness compared to a no treatment comparison group, and impact on parenting skills.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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