

# Preventing Postpartum Depression With Mindful Self-Compassion Intervention

## *A Randomized Control Study*

*Lu Guo, MD, Jing Zhang, MD, Liping Mu, MD, and Zhao Ye, MD*

**Abstract:** Mindfulness and self-compassion are reported to have a preventive effects on depression and anxiety disorders. In the present study, we aimed to assess the effect of mindful self-compassion intervention on preventing postpartum depression in a group of symptomatic pregnant women. Participants were screened and assigned to the intervention and control groups randomly. A 6-week Internet-based Mindful Self-Compassion Program was used to train the participants. Multiple scales were used to assess depressive and anxiety symptoms, mindfulness, self-compassion, and mother and infant well-being. All assessments were performed at three time points: baseline, 3 months, and 1 year postpartum. Compared with the control group, the intervention group showed significant improvement in depressive and anxiety behaviors. In addition, the intervention group became more mindful and self-compassionate at 3 months and 1 year postpartum. More importantly, both mothers and infants experienced substantial improvement in well-being. Our findings indicate that mindful self-compassion intervention is effective in preventing postpartum depression and promoting mother and infant well-being.

**Key Words:** Mindfulness, self-compassion, postpartum depression, anxiety, infant well-being

(*J Nerv Ment Dis* 2020;208: 101–107)

There are three major postpartum psychiatric disorders: postpartum psychosis, postpartum blues, and postpartum depression (PPD) (Rai et al., 2015; Seyfried and Marcus 2003). Postpartum psychosis has a low global prevalence of 0.089 and requires hospitalization (Sit et al., 2006). Although postpartum blues has the highest prevalence of 0.3 to 0.7, it generally resolves in the short term with reassurance (Manjunath et al., 2011). PPD has a relatively high global prevalence of 0.1 to 0.15 and requires medications and behavioral therapy (Zauderer, 2009). Given the economic burden and its adverse consequence, diagnosis and treatment of PPD are usually the physician's priority.

PPD typically develops within 4 to 6 weeks after delivery or as a continuum of prenatal depression. The exact cause of PPD is still unknown. Multiple factors have been reported to contribute to the development of PPD. The physical and hormonal changes resulting from pregnancy predispose postpartum women to depression when stressful and emotional events are concomitants of childbirth (Hahn-Holbrook et al., 2017; Yim et al., 2015). These events can be the stress of being a mother, a complicated labor, lack of financial and family support, and adverse health consequence of childbirth, etc. Particularly, low social economic status has been proposed to be a major contributor (Luecken et al., 2013; Stepanikova and Kukla 2017). The prevalence of PPD in low- and lower-middle income countries is reported to be as high as 18.6%

(Fisher et al., 2012). Women from families with low social economic status generally have limited access to mental health resources, which are more likely to be unequal in their national distribution and inefficient in their use in developing countries. However, recent studies have shown that low self-regulatory skills including emotion regulation abilities, psychological flexibility, and self-compassion are probably major contributors to the development of PPD (Abraham and Feldman 2018; Stewart and Vigod 2016). PPD has adverse effects on not only the mother's health (Woolhouse et al., 2014) but also the mother-infant relationship and child development. Numerous studies have shown that children whose mothers have PPD are at much higher risk for developing interpersonal, behavioral, and cognitive problems (Field, 2010; Sohr-Preston and Scaramella 2006; Surkan et al., 2011). Treatment of PPD is generally effective and beneficial for both mothers and infants.

For severe PPD, medications remain to be the main treatment option (Sharma, 2002). However, medication compliance is poor due to concerns about the potential side effects on both mothers and infants. Given the long-lasting adverse effects of PPD caused by insufficient treatment, there have been increasing efforts to explore preventive approaches such as psychosocial interventions. Recent studies have shown that cognitive-behavior therapy (CBT) can effectively prevent the development of PPD (Huang et al., 2018). Mindful Self-Compassion Program (MBSP) is one of the CBTs developed by Neff and Germer (2013) that has been proven to be preventive in women with high risk. Here, we developed a 6-week, Internet-based MBSP to help promote the self-regulatory skills of women at high risk for PPD and further explore its effects in preventing development of PPD in these patients.

## METHODS

### Clinic Setting

This study was carried out in a reproductive mental health program at Tianjin First Center Hospital. In this multidisciplinary clinic, psychotherapy in individual and group formats is provided to women with moderate to severe mental disorders related to their reproductive life cycle.

### Patients

This is a two-arm, open-label, randomized controlled trial. The study design and procedure were reviewed and approved by the Ethics Committees of Tianjin First Center Hospital. Written consent was obtained from each participant. The goal of this study was to evaluate the effectiveness of a Web-based, antenatal psychological intervention for preventing the development of PPD among women with high risk. Between 2016 and 2019, women were enrolled if they met the following criteria: a) aged 18 to 40 years; b) in the second or third trimester of pregnancy before 34 weeks; c) present with antenatal depressive or anxiety symptoms defined by a score equal to or above 9 on the Edinburgh Postnatal Depression Scale (EPDS); and d) have Internet access at home and proficient in reading and speaking Chinese. Exclusion criteria were a) presence of serious physical condition related to pregnancy

Department of Obstetrics and Gynecology, Tianjin First Center Hospital, Tianjin, China. Send reprint requests to Zhao Ye, MD, Department of Obstetrics and Gynecology, Tianjin First Center Hospital, Kangfu Road #24, Nankai District, Tianjin 300192, China. E-mail: yezhao201200@163.com.

Copyright © 2019 Wolters Kluwer Health, Inc. All rights reserved.

ISSN: 0022-3018/20/20802-0101

DOI: 10.1097/NMD.0000000000001096

including diabetes mellitus, severe high blood pressure, or eclampsia; b) previous history or presence of psychiatric disorders including depression, psychosis, mania, and suicidal ideation, and on antipsychotics and psychotherapy currently or within the past 6 months; and c) refuse to provide written consent.

## Intervention

The evaluations were carried out at three time points: in the second or third trimester of pregnancy (T0, baseline assessment), in the third month postpartum (T1), and at one-year postpartum (T2). An automatic inviting e-mail was sent out to each participant 2 days before the evaluation day. For the control group, all evaluations were collected online through a survey platform that had secure access to prevent dual evaluation by the same user.

A Chinese version of the MBSP program was developed based on the original English version “mindfulness and compassion with self and others” developed by Neff and Germer (2013). Compared with the original English version, our Chinese version focused more on the self-compassion given the pressure of being a new mother and incapability in self-regulation, which play major roles in the development of PPD. The 6-week program consisted of 10 hours of training with 36 episodes in total, 6 episodes a week, each episode lasting for about 15 minutes. At the beginning of this program, an initial instruction video providing an outline and information about the procedure was introduced to the participants. In total, six sequential steps involving different types of exercises with guided instructions were performed in a step-wise way. That is, a new exercise will not be available until the prior one has been completed. After completing each exercise, participants were instructed to exercise the steps during the day. The participants provided a graphical overview of the completed steps and an online diary book where they can register their reflections about the exercises.

## Measures

Women who provided a written consent and their contact information were enrolled. The study procedure was described to the participating women by two trained staff. A questionnaire was used to collect sociodemographic information. Risk factors were assessed based on the medical and family history for psychological problems and psychiatric disorders; stressful life events during the past 6 months including unemployment, financial problems, change in work or residence, difficult relationship with partner, own or family illness, and death in the family; and pregnancy-related medical conditions including unplanned pregnancy, pathological pregnancy, parity, history of miscarriage or abortion, and history of complicated delivery. Participants were randomly assigned either to the intervention group, which had access to the 6-week MBSP (Chinese version), or to the wait-list control group, which used the simple randomization method. Briefly, random numbers were generated from random number tables. The whole process of randomization was completed by an independent researcher who had no knowledge of the subjects' information. Besides the number, another independent researcher grouped the subjects after the randomization was completed. Researchers responsible for the recruitment, randomization, and final allocation of subjects were independent and confidential.

The EPDS, the State-Trait Anxiety Inventory I and II, and Beck Depression Inventory II (BDI) were used to assess the depressive and anxiety symptoms.

A Chinese version of the Mindfulness Attention Awareness Scale (MAAS) was constructed based on the English version (Brown and Ryan 2003). The content was modified to adapt to the Chinese culture. It is a 7-point scale, 15-item (1 = almost always, 7 = almost never) self-report instrument. Each item has a single dispositional mindfulness factor. Higher scores represent higher levels of dispositional mindfulness. A Chinese version of Self-Compassion Scale

(SCS) was constructed based on the English version. The Scale focuses on the relationship of self-compassion to positive psychological health. It is a 26-item scale including six subscales that measures facets of self-compassion. The facets involve self-judgment, self-kindness, common humanity, isolation, mindfulness, and overidentification. Questions are rated on a 5-point scale. The total SCS score was recorded as the sum of the means of each subscale. The reliability and validity have been verified in different populations.

The Chinese version of the Well-Being Index World Health Organization Five (WHO-5) (Hajos et al., 2013) was used to measure maternal well-being. The WHO-5 encompasses five items rated on a 6-point scale ranging from 0 (totally not) to 5 (constantly). The score from each item is multiplied by 4. Thus, the final scores are summated to a scale of 0 to 100. A score equal to or lower than 50 is considered as low mood, and a score equal to or lower than 28 as depression. The WHO-5 has demonstrated high validity and has been used to measure the outcomes of interventions. In the present study, Cronbach's alpha value was .85.

The Chinese Parenting Stress Index (PSI), a combination of a short form and seven extra items, was used to assess parenting stress. It is a 6-point scale measuring the extent of a parent's subjective incompetence in parenting the child. The participants rated the item from 1 (totally disagree) to 6 (totally agree). A summated score higher than the 95 percentile was considered as clinical, and that higher than the 85 percentile was considered as subclinical. In the present study, Cronbach's alpha value was .90.

The scales of warmth and negativity of the Comprehensive Parenting Behavior Questionnaire 1-year Chinese version were used to assess the maternal warmth and negativity toward the baby. The warmth scale encompasses 16 items assessing the extent of a parent's positive attention to the baby, affection to the baby, and capability to be responsive toward the baby (subscale responsivity). The negativity scale encompasses seven items assessing the extent of a parent's communicating rejection and hostility toward the baby. Each item was rated on a 5-point scale ranging from 1 (totally not applicable) to 5 (completely applicable). In the present study, Cronbach's alpha values were 0.90 for warmth and 0.82 for negativity.

The very short form (Putnam et al., 2014) of the Infant Behavior Questionnaire was translated and modified into a Chinese version and was used to assess the infant temperament. It consists of 37 items rated on a 7-point scale ranging from 1 (never) to 7 (always). The 37 items cover three broad topics: orienting/regulatory capacity, positive affectivity/surgency, and negative emotionality. As the Infant Behavior Questionnaire can be used for children up to 18 months, it was included in the 1-year follow-up. Cronbach's alpha values in the present study were 0.85, 0.73, and 0.77 for the three components, respectively.

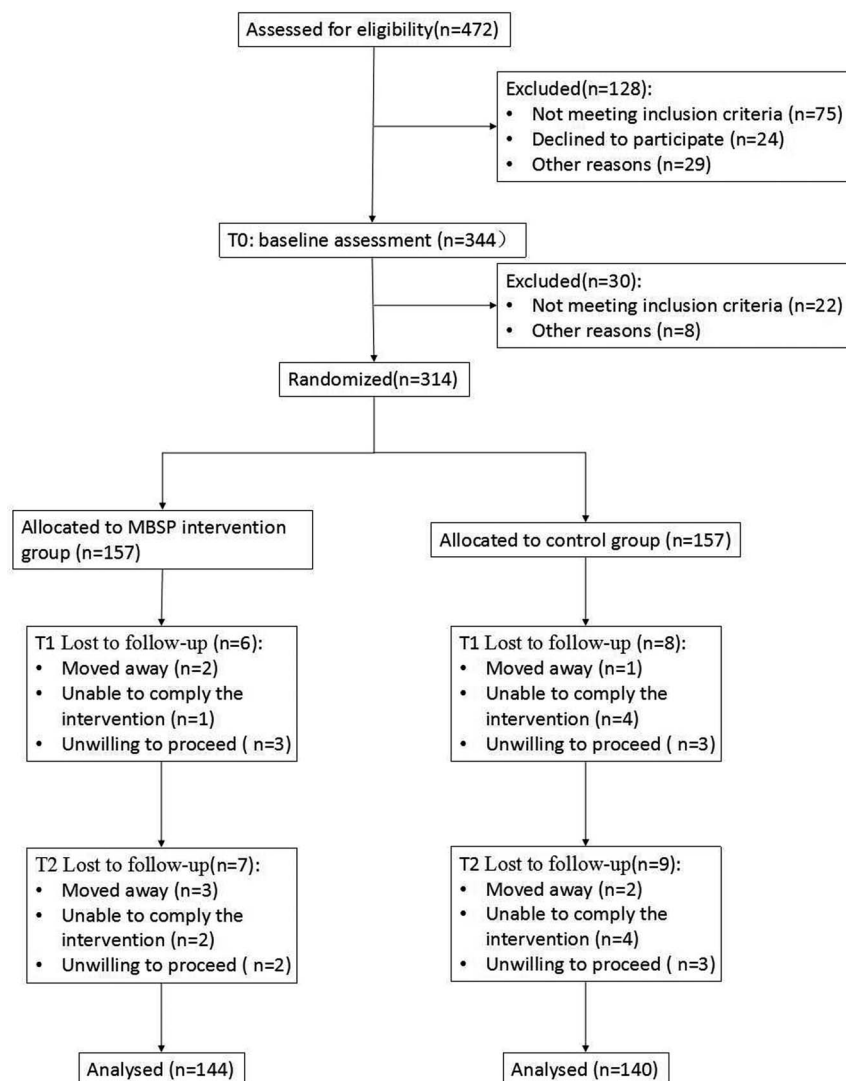
## Statistical Analysis

All data are presented as the means  $\pm$  standard deviation as indicated in graphs. Analysis of variance followed by post hoc Tamhane's tests was used to compare the continuous variables. Chi-square test was used to compare the categorical variables. Paired-sample *t*-test or Wilcoxon test was used for comparison between the prenatal and postpartum scores of the anxiety and depression questionnaires in each group. All statistical tests were evaluated at 5% significance level.

## RESULTS

### Participants

Initially, 472 pregnant women were screened and 128 were excluded. The enrolled 354 participants were then randomly assigned to either the MBSP group or the control group. At the end of the study, 144 women were enrolled into the MBSP group and 140 in the control group. The flow of participants is shown in Figure 1. The baseline sociodemographic and clinical characteristics are shown in Table 1.



**FIGURE 1.** Flow of participants through the randomized clinical trial. MBSP indicates Mindful Self-Compassion Program.

There is no significant difference between these two groups with regard to mean age, relationship status, educational level, economic status, and living condition. In both groups, more than 80% were employed and at high socioeconomic status, and less than 5% were divorced. In addition, both groups had similar EPDS, BDI, and STAI scores. The mean EPDS, BDI, and STAI scores were 12.5, 6.4, and 30.3 in the MBSP group and 12.4, 6.6, and 31.4 in the control group, respectively. Therefore, both groups showed prenatal depressive and anxiety symptoms.

### Feasibility and Acceptability

In the present study, the number of participants who did not finish the program was acceptable. In particular, 17 participants dropped out of the study in the control group and 13 in the MBSP group (Fig. 1). The overall attendance rate was 91.8%, and there was no significant difference between these two groups ( $\chi^2 = 0.84$ ,  $p = 0.56$ ). Therefore, our MBSP demonstrated to be feasible. In a posttest evaluation, 95% of the participants filled out the survey, the results of which indicated high acceptability.

### Measures

#### Changes in the Depression and Anxiety Scores Over Time

Changes in the EPDS scores in the MBSP and control groups throughout the study period are shown in Figure 2. In the MBSP group, the EPDS scores of all the participants decreased to below 9 at the end of 3 months postpartum. In addition, the EPDS scores decreased further in the 12 months postpartum. In contrast, no change in the EPDS scores was observed in the control group from baseline to 3 months postpartum. A mild decrease was observed from 3 to 12 months postpartum. We then performed secondary analyses to find out the extent of improvement in depressive symptoms that could be attributed to MBSP. In particular, we performed the comparison of the EPDS scores at every time point (T0–T2) between the two groups by using repeated-measures analysis of variance. Our results show that the MBSP group had a significant decrease in EPDS scores and had much higher improvements over time compared with the control group.

#### Mindfulness and Self-Compassion

The MAAS and SCS were used to assess mindfulness and self-compassion. Compared with the control group, the MBSP group

**TABLE 1.** Participants' Sociodemographic and Clinical Characteristics at Baseline

Variable	Control Group ( <i>n</i> = 157) Mean (SD)	MBSP Group ( <i>n</i> = 157) Mean (SD)	$\chi^2$	<i>p</i>
Age	29.8 (6.2)	31.4 (5.7)		0.670
Relationship, <i>n</i> (%)			15.42	0.212
Married/living together	145 (92.36)	143 (91.08)		
Single	0 (0.0)	0 (0.0)		
Divorced	3 (1.91)	6 (3.82)		
In a relationship (not living together)	9 (5.73)	8 (5.10)		
Educational level, <i>n</i> (%)			1.62	0.786
Basic education (ninth grade)	16 (10.19)	13 (8.28)		
Secondary education	57 (36.31)	54 (34.39)		
Higher education	69 (43.95)	74 (47.13)		
Postgraduate education (MSc, PhD)	15 (9.55)	16		
Work, <i>n</i> (%)			7.49	0.496
Homemaker	12 (7.64)	11 (7.01)		
Unemployed	29 (18.47)	27 (17.20)		
Employed	87 (55.41)	81 (51.60)		
Self-employed	11 (7.01)	15 (9.55)		
Student	18 (11.46)	23 (14.65)		
Monthly income, <i>n</i> (%)			26.12	0.578
<RMB1000	22 (14.01)	19 (12.10)		
RMB1000–2000	56 (35.67)	61 (38.85)		
>RMB3000	79 (50.32)	77 (49.04)		
Socioeconomic status, <i>n</i> (%)			3.685	0.316
Low	27 (17.20)	31 (19.75)		
Medium/high	130 (82.80)	126 (80.25)		
Residence, <i>n</i> (%)			4.07	0.675
Urban	54 (34.40)	67 (43.51)		
Rural	103 (65.60)	90 (56.49)		
EPDS	12.4 (2.5)	12.5 (2.8)		0.327
BDI	6.6 (3.8)	6.4 (3.2)		0.574
STAI-I	31.4 (8.5)	30.3 (7.9)		0.135

Continuous variables were compared between the two study groups using analysis of variance, whereas the categorical variables were compared among the groups using  $\chi^2$  test.

There are no statistical differences between the groups at baseline ( $p > 0.05$ ).

MBSP indicates Mindful Self-Compassion Program; STAI-I, State-Trait Anxiety Inventory I.

showed a significant increase in MAAS and SCS scores ( $p < 0.05$ ; Table 2). A secondary analysis using the repeated-measures analysis of variance between two consecutive time points showed that the MBSP group experienced significant improvement in mindfulness and self-compassion compared with the control group (Table 2).

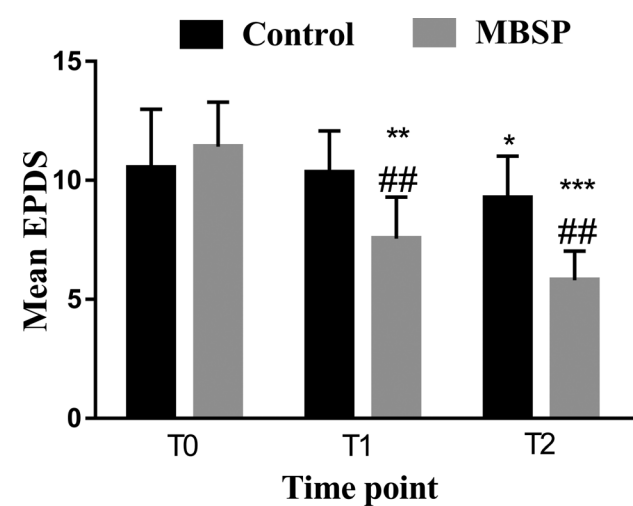
### Maternal and Infant Well-Being

Scores on maternal and infant well-being are reported in Table 3. Compared with the control, the MBSP group experienced significant improvement in maternal well-being and maternal psychopathology at 3 months and 1 year postpartum ( $p < 0.05$ ). Improvement in maternal parenting stress (PSI) was observed in both groups, whereas the MBSP showed significantly higher improvement than the control group at 3 months postpartum ( $p < 0.05$ ). Both groups improved further in the PSI at 1 year postpartum and showed no significant difference ( $p > 0.05$ ). In terms of maternal warmth and negative behavior toward the infant (CPBQ), six subscales showed significant improvement at 3 months postpartum, namely, warmth, attention, affection, responsibility, negativity, and hostility. In addition, warmth, attention, and affection improved further at 1 year postpartum. Rejection did

not improve. The subscale of positive affectivity/surgency infant temperamental behavior also improved. However, no improvement was observed in the other subscales including orienting/regulatory capacity and negative emotionality.

### DISCUSSION

Parenting a neonate is a major life stress for women at childbearing age. A considerable number of women experience difficulty coping with this major life transition (Sheinkopf et al., 2006). Although most women have sufficient resilience to the adverse consequences of stress (Holopainen and Hakulinen 2019), numerous women develop psychological symptoms that impair their function in parenting the newborn and in the workplace (Steen, 2016; Weis et al., 2017). In the present study, we hypothesized that women with antenatal depressive and anxiety symptoms would benefit from the mindful self-compassion intervention. To test this hypothesis, we assessed the effect of a Chinese MBSP on a group of pregnant women with depressive and anxiety symptoms. Our results show that this program alleviated the depressive and anxiety symptoms and improved mindful parenting, maternal mindfulness, well-being, self-compassion, psychopathology, parenting stress, warmth



**FIGURE 2.** Changes in the mean EPDS scores during pregnancy and in postpartum of the two groups. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$  when compared with T0. ## $p < 0.01$  when compared with the control group at the corresponding time point. T0 indicates baseline assessment; T1, 3 months postpartum; T2, 12 months postpartum.

and negativity toward the baby, and infant temperament. In addition, these effects last for 1 year postpartum. The dropout rate was low, and the participants who completed this program rated it as highly useful. Therefore, our results demonstrate that this program is feasible and acceptable for women experiencing stress during pregnancy and motherhood.

A large body of studies have shown that mindfulness and self-compassion are key processes in alleviating depressive and anxiety symptoms during pregnancy, which could have a potential negative effect on the mother and the baby (Lonnberg et al., 2018; Luberto et al., 2018; Potharst et al., 2017; Roy Malis et al., 2017). Specifically, our results were consistent with the prediction that training in mindfulness and self-compassion in pregnant women with depression and anxiety led to improvements in a broad range of psychological outcomes (Janssen et al., 2018; Krieger et al., 2019; Meyer et al., 2019). In line with this prediction, all participants in the intervention group had a significant decrease in EPDS scores. At baseline, all participants had EPDS scores above 9 and met the criteria for a diagnosis of depressive disorder (Fig. 2). Three months after training, the mean EPDS scores in the MBSP group dropped to below 9, and most of their depressive and

anxious behaviors disappeared or were alleviated. The depressive/anxious subscales in both the EPDS and BDI were all within reference range after 1 year of training. Furthermore, during the training, participants were more mindful, both in their parenting and in general. They became more compassionate toward themselves, and this improvement remained during the 1-year follow-up. Maternal warmth, attention, affection, responsibility, negativity, and hostility improved at 3 months postpartum and improved further at 1 year postpartum. This improvement is consistent with the findings of previous research that mindfulness is the mechanism of action for psychological outcomes (Alsubaie et al., 2017). In contrast, the control group showed much less improvement with regard to their antenatal depressive and anxiety symptoms and little effect on mindful parenting and mindfulness. Therefore, our data suggest that the possibility of spontaneous recovery over time after delivery and adjustment to parenting is pretty small.

More importantly, our results are consistent with the previously reported findings that the mother's training in mindfulness and self-compassion improves the baby's well-being (de Camps Meschino et al., 2016; Potharst et al., 2017; Zeegers et al., 2019). It has been reported that parental behaviors influence infant well-being, and mindfulness of mother is associated with infant temperament (Lotzin et al., 2016; Moore et al., 2016). In the present study, infant well-being was assessed with a scale evaluating temperament. We found that the mother's mindfulness and mindful parenting showed a positive effect on infant temperament. The subscale of positive affectivity/surgency infant temperamental behavior improved significantly at 3 months and 1 year postpartum. However, no improvement was observed in the other subscales including orienting/regulatory capacity and negative emotionality. One possible explanation is that it is easier for infants to become more active when they perceive more attention from the mothers, whereas it takes much longer for internal phenotypes, such as emotion, to improve. Another explanation is that because the infant's activities were reported by the mothers, it might be easier for the mothers to recognize the infant's activities than recognize their affects. In addition, when interpreting the infant's temperaments, changes in the mother's perception should be considered. When mothers are more attentive and positive toward their infants, it is more likely for them to bias the infant's positive activities. Therefore, a third party, like fathers, might be more objective in reporting changes in the infant's temperament.

CONCLUSIONS

The goal of present study was to identify women with antenatal depressive and anxiety behaviors and assess the preventive and treatment effects of a modified Chinese MBSP. Our findings confirm its potential usefulness in preventing PPD and promoting infants' well-being. In addition, this Chinese program could be implemented nationwide for a

**TABLE 2.** Changes in Mindfulness and Self-Compassion Over Time in the Intervention and Control Groups

Variable	Time Point	Control Group (n = 140)		MBSP Group (n = 144)	
		Mean (SD)	p	Mean (SD)	p
MAAS	Baseline/T0	3.42 (0.75)		3.47 (0.81)	
	T1	3.39 (0.69)	0.6243 <sup>a</sup>	3.89 (0.61)	0.0096 <sup>a</sup>
	T2	3.76 (0.47)	0.0235 <sup>a</sup> /0.0556 <sup>b</sup>	4.17 (0.60)	0.0017 <sup>a</sup> /0.0562 <sup>b</sup>
SCS	Baseline/T0	2.41 (0.64)		2.35 (0.49)	
	T1	2.60 (0.58)	0.2874 <sup>a</sup>	2.92 (0.76)	0.0124 <sup>a</sup>
	T2	2.84 (0.46)	0.0232 <sup>a</sup> /0.6121 <sup>b</sup>	3.15 (0.45)	0.0441 <sup>a</sup> /0.4852 <sup>b</sup>

The significance level was set at  $p < 0.05$ .  
<sup>a</sup> $p$  value of T1 or T2 versus baseline.  
<sup>b</sup> $p$  value of T1 versus T2.

**TABLE 3.** Effect of MBSP on Maternal and Infant Well-Being Over Time

Variable	Time Point	Control Group (n = 140)	MBSP Group (n = 144)	p
		Mean (SD)	Mean (SD)	
Well-being	T1	45.3 (18.6)	51.8 (22.5)	0.0135
	T2	50.5 (21.4)	54.7 (13.6)	0.0087
Parenting stress and lack of confidence (PSI)				
Parenting stress	T1	2.8 (1.0)	2.5 (0.8)	0.0329
	T2	2.4 (0.8)	2.3 (0.7)	0.0894
Lack of confidence	T1	2.9 (0.9)	2.4 (0.7)	0.0175
	T2	2.5 (0.8)	2.0 (0.7)	0.0233
Parenting behavior (CPBQ)				
Warmth	T1	4.2 (0.5)	4.4 (0.6)	0.0124
	T2	4.3 (0.5)	4.7 (0.3)	0.0041
Attention	T1	4.1 (0.8)	4.2 (0.6)	0.0448
	T2	4.3 (0.7)	4.6 (0.5)	0.0253
Affection	T1	4.5 (0.6)	4.6 (0.7)	0.0685
	T2	4.7 (0.5)	4.9 (0.2)	0.0404
Responsivity	T1	3.8 (0.6)	4.1 (0.6)	0.0385
	T2	4.2 (0.6)	4.4 (0.6)	0.0387
Negativity	T1	2.3 (0.7)	2.1 (0.6)	0.0430
	T2	2.0 (0.6)	1.8 (0.6)	0.0572
Rejection	T1	1.8 (0.7)	1.9 (0.7)	0.0534
	T2	1.7 (0.7)	1.6 (0.6)	0.0872
Hostility	T1	2.4 (0.8)	2.1 (0.7)	0.0114
	T2	2.1 (0.7)	1.8 (0.6)	0.0609
Infant temperament				
Positive affectivity/surgency	T1	4.9 (0.8)	5.3 (0.7)	0.0135
	T2	5.3 (0.8)	5.7 (0.6)	0.0376
Orienting/regulatory capacity	T1	5.2 (0.7)	5.4 (0.6)	0.0624
	T2	5.5 (0.7)	5.6 (0.8)	0.408
Negative emotionality	T1	4.1 (0.8)	4.0 (0.7)	0.432
	T2	4.3 (0.7)	3.8 (0.6)	0.0513

The significance level was set at  $p < 0.05$ .

MBSP indicates Mindful Self-Compassion Program.

diagnostic-therapeutic purpose and for building specific interventions to prevent PPD among symptomatic women.

## DISCLOSURE

The authors declare no conflict of interest.

## REFERENCES

- Abraham E, Feldman R (2018) The neurobiology of human allomaternal care; implications for fathering, coparenting, and children's social development. *Physiol Behav*. 193:25–34.
- Alsubaie M, Abbott R, Dunn B, Dickens C, Keil TF, Henley W, Kuyken W (2017) Mechanisms of action in mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR) in people with physical and/or psychological conditions: A systematic review. *Clin Psychol Rev*. 55:74–91.
- Brown KW, Ryan RM (2003) The benefits of being present: Mindfulness and its role in psychological well-being. *J Pers Soc Psychol*. 84:822–848.
- de Camps Meschino D, Philipp D, Israel A, Vigod S (2016) Maternal-infant mental health: Postpartum group intervention. *Arch Womens Ment Health*. 19:243–251.
- Field T (2010) Postpartum depression effects on early interactions, parenting, and safety practices: A review. *Infant Behav Dev*. 33:1–6.
- Fisher J, Cabral de Mello M, Patel V, Rahman A, Tran T, Holton S, Holmes W (2012) Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: A systematic review. *Bull World Health Organ*. 90:139G–149G.
- Hahn-Holbrook J, Cornwell-Hinrichs T, Anaya I (2017) Economic and health predictors of national postpartum depression prevalence: A systematic review, meta-analysis, and meta-regression of 291 studies from 56 countries. *Front Psychiatry*. 8:248.
- Hajos TR, Pouwer F, Skovlund SE, Den Ouden BL, Geelhoed-Duijvestijn PH, Tack CJ, Snoek FJ (2013) Psychometric and screening properties of the WHO-5 Well-Being Index in adult outpatients with type 1 or type 2 diabetes mellitus. *Diabet Med*. 30:e63–e69.
- Holopainen A, Hakulinen T (2019) New parents' experiences of postpartum depression: A systematic review of qualitative evidence. *JBI Database System Rev Implement Rep*. 17:1731–1769.
- Huang L, Zhao Y, Qiang C, Fan B (2018) Is cognitive behavioral therapy a better choice for women with postnatal depression? A systematic review and meta-analysis. *PLoS One*. 13:e0205243.
- Janssen M, Heerkens Y, Kuijter W, van der Heijden B, Engels J (2018) Effects of mindfulness-based stress reduction on employees' mental health: A systematic review. *PLoS One*. 13:e0191332.
- Krieger T, Reber F, von Glutz B, Urech A, Moser CT, Schulz A, Berger T (2019) An Internet-based compassion-focused intervention for increased self-criticism: A randomized controlled trial. *Behav Ther*. 50:430–445.

- Lonnberg G, Nissen E, Niemi M (2018) What is learned from mindfulness based childbirth and parenting education?—Participants' experiences. *BMC Pregnancy Childbirth*. 18:466.
- Lotzin A, Schiborr J, Barkmann C, Romer G, Ramsauer B (2016) Maternal emotion dysregulation is related to heightened mother-infant synchrony of facial affect. *Dev Psychopathol*. 28:327–339.
- Luberto CM, Park ER, Goodman JH (2018) Postpartum outcomes and formal mindfulness practice in mindfulness-based cognitive therapy for perinatal women. *Mindfulness (N Y)*. 9:850–859.
- Luecken LJ, Lin B, Coburn SS, MacKinnon DP, Gonzales NA, Cmic KA (2013) Prenatal stress, partner support, and infant cortisol reactivity in low-income Mexican American families. *Psychoneuroendocrinology*. 38:3092–3101.
- Manjunath NG, Venkatesh G, Rajanna (2011) Postpartum blue is common in socially and economically insecure mothers. *Indian J Community Med*. 36:231–233.
- Meyer EC, Szabo YZ, Frankfurt SB, Kimbrel NA, DeBeer BB, Morissette SB (2019) Predictors of recovery from post-deployment posttraumatic stress disorder symptoms in war veterans: The contributions of psychological flexibility, mindfulness, and self-compassion. *Behav Res Ther*. 114:7–14.
- Moore GA, Quigley KM, Voegtline KM, DiPietro JA (2016) Don't worry, be (moderately) happy: Mothers' anxiety and positivity during pregnancy independently predict lower mother-infant synchrony. *Infant Behav Dev*. 42:60–68.
- Neff KD, Germer CK (2013) A pilot study and randomized controlled trial of the Mindful Self-Compassion Program. *J Clin Psychol*. 69:28–44.
- Potharst ES, Aktar E, Rexwinkel M, Rigterink M, Bogels SM (2017) Mindful with your baby: Feasibility, acceptability, and effects of a mindful parenting group training for mothers and their babies in a mental health context. *Mindfulness (N Y)*. 8:1236–1250.
- Putnam SP, Helbig AL, Gartstein MA, Rothbart MK, Leerkes E (2014) Development and assessment of short and very short forms of the infant behavior questionnaire-revised. *J Pers Assess*. 96:445–458.
- Rai S, Pathak A, Sharma I (2015) Postpartum psychiatric disorders: Early diagnosis and management. *Indian J Psychiatry*. 57:S216–S221.
- Roy Malis F, Meyer T, Gross MM (2017) Effects of an antenatal mindfulness-based childbirth and parenting programme on the postpartum experiences of mothers: A qualitative interview study. *BMC Pregnancy Childbirth*. 17:57.
- Seyfried LS, Marcus SM (2003) Postpartum mood disorders. *Int Rev Psychiatry*. 15:231–242.
- Sharma V (2002) Pharmacotherapy of postpartum depression. *Expert Opin Pharmacother*. 3:1421–1431.
- Sheinkopf SJ, Lester BM, LaGasse LL, Seifer R, Bauer CR, Shankaran S, Bada HS, Poole WK, Wright LL (2006) Interactions between maternal characteristics and neonatal behavior in the prediction of parenting stress and perception of infant temperament. *J Pediatr Psychol*. 31:27–40.
- Sit D, Rothschild AJ, Wisner KL (2006) A review of postpartum psychosis. *J Womens Health (Larchmt)*. 15:352–368.
- Sohr-Preston SL, Scaramella LV (2006) Implications of timing of maternal depressive symptoms for early cognitive and language development. *Clin Child Fam Psychol Rev*. 9:65–83.
- Steen M (2016) The perfect mum doesn't exist but a good enough mum does: Building resilience for better maternal mental health. *Aust Nurs Midwifery J*. 24:39.
- Stepanikova I, Kukla L (2017) Is perceived discrimination in pregnancy prospectively linked to postpartum depression? Exploring the role of education. *Matern Child Health J*. 21:1669–1677.
- Stewart DE, Vigod S (2016) Postpartum depression. *N Engl J Med*. 375:2177–2186.
- Surkan PJ, Kennedy CE, Hurley KM, Black MM (2011) Maternal depression and early childhood growth in developing countries: Systematic review and meta-analysis. *Bull World Health Organ*. 89:608–615.
- Weis KL, Lederman RP, Walker KC, Chan W (2017) Mentors offering maternal support reduces prenatal, pregnancy-specific anxiety in a sample of military women. *J Obstet Gynecol Neonatal Nurs*. 46:669–685.
- Woolhouse H, Gartland D, Perlen S, Donath S, Brown SJ (2014) Physical health after childbirth and maternal depression in the first 12 months post partum: Results of an Australian nulliparous pregnancy cohort study. *Midwifery*. 30:378–384.
- Yim IS, Tanner Stapleton LR, Guardino CM, Hahn-Holbrook J, Dunkel Schetter C (2015) Biological and psychosocial predictors of postpartum depression: Systematic review and call for integration. *Annu Rev Clin Psychol*. 11:99–137.
- Zauderer C (2009) Postpartum depression: How childbirth educators can help break the silence. *J Perinat Educ*. 18:23–31.
- Zeegers MAJ, Potharst ES, Veringa-Skiba IK, Aktar E, Goris M, Bogels SM, Colonnese C (2019) Evaluating mindful with your baby/toddler: Observational changes in maternal sensitivity, acceptance, mind-mindedness, and dyadic synchrony. *Front Psychol*. 10:753.