

Research paper

## Perinatal depression prevention through the mother-infant dyad: The role of maternal childhood maltreatment

Obianuju O. Berry<sup>a,b,c,1,\*</sup>, Vanessa Babineau<sup>d</sup>, Seonjoo Lee<sup>c,e,f</sup>, Tianshu Feng<sup>c</sup>, Pamela Scorza<sup>d</sup>, Elizabeth A. Werner<sup>d,e</sup>, Catherine Monk<sup>c,d,e</sup>

<sup>a</sup> NYC Health + Hospitals, Office of Behavioral Health, One Park Avenue, Room 7-223, New York, NY 10016, United States

<sup>b</sup> Department of Child and Adolescent Psychiatry, NYU Langone, United States

<sup>c</sup> New York State Psychiatric Institute, United States

<sup>d</sup> Department of Obstetrics and Gynecology, Columbia University, United States

<sup>e</sup> Department of Psychiatry, Columbia University, United States

<sup>f</sup> Department of Biostatistics, Columbia University, United States



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### ABSTRACT

**Background:** Prevention studies for perinatal depression rarely focus on the mother–infant dyad or consider the impact of maternal childhood maltreatment (CM).

**Methods:** A secondary analysis of two combined randomized controlled trials of Practical Resources for Effective Postpartum Parenting (PREPP) examined the moderating role of CM on the efficacy of preventing perinatal depression and effects on infant behavior at six weeks.

**Results:** 32% of 109 pregnant women endorsed CM (CM+). At six weeks postpartum, women who received PREPP compared to enhanced treatment as usual (ETAU) had significant reductions in depression and anxiety based on the observer-rated Hamilton Rating Scale for Depression (HRSD) and Hamilton Rating Scale for Anxiety (HRSA) (mean difference of  $M = -3.84$  ( $SD = 0.14$ ,  $p < 0.01$ ) and  $M = -4.31$  ( $SD = 0.32$ ,  $p < 0.001$ ) respectively). When CM was added to the models, there no longer was a significant PREPP versus ETAU treatment effect on HRSD and HRSA outcomes in CM+ women though effects remained for CM- women. However, CM+ women who received PREPP vs ETAU reported a mean increase in infant daytime sleep of 189.8 min ( $SE = 50.48$ ,  $p = 0.001$ ). LIMITATIONS: Self-report measures of infant behavior were used.

**Conclusions:** CM+ women versus CM- had limited response to an intervention to prevent perinatal depression yet still reported an increase in infant daytime sleep. This study adds to the growing literature that prevention studies may need to incorporate approaches tailored to fit women with childhood trauma histories while also considering infant functioning as both may be treatment targets relevant to maternal mood.

### Introduction

Perinatal mood and affective disorders, which include, but are not limited to, bipolar affective disorder, major and minor depressive disorders, postpartum psychosis, obsessive compulsive disorder, and other anxiety disorders that occur during pregnancy and up to one year postpartum, are the most common obstetric complications in the US (Gavin et al., 2005; O'Connor et al., 2019). Despite the diverse range of symptoms that can affect pregnant and postpartum women, depression and anxiety are the most prevalent and studied.

Perinatal depression and anxiety adversely affect both maternal and child wellbeing. In the United States, societal costs of untreated perinatal depression and anxiety amount to US \$14.2 billion for all births in 2017 when following the mother-child pair from pregnancy through five years postpartum (Luca et al., 2019). These costs are associated with negative obstetric and delivery complications (Li et al., 2009; Mulder et al., 2002), maternal interpersonal conflict (Howard et al., 2013), and significantly compromised maternal wellbeing including the elevated risk of suicide (Mangla et al., 2019). Perinatal depression and anxiety unfavorably affect infant and subsequent child development, including

\* Corresponding author at: Department of Child and Adolescent Psychiatry, NYU Langone. One Park Avenue, Room 7-223, New York, NY 10016, United States.  
E-mail address: [obianuju.berry@nyulangone.org](mailto:obianuju.berry@nyulangone.org) (O.O. Berry).

<sup>1</sup> Please change the affiliation order for Obianuju O. Berry. NYU should come before NYC Health + Hospitals

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cognitive development (Kurstjens and Wolke, 2001; Rogers, 2020), bonding/attachment (Monk et al., 2008; Dubber et al., 2015), and socio-emotional wellbeing (Rogers, 2020). Specifically, postpartum depression and anxiety disorders (disorders that occur after birth and up to one year postpartum) compromise offspring wellbeing most likely through forms of parenting (Murray et al., 2010; Lovejoy et al., 2000) and attachment/bonding (Beck, 1995; Zerkowicz et al., 2007). These associations also have been implicated in a broad range of child outcomes including increased susceptibility to child and adolescent psychopathology (Rayce et al., 2020; Netsi et al., 2018; Field, 2010; Righetti-Veltema et al., 2002).

Given the public health impact of perinatal depression and anxiety, and in particular perinatal depression, the United States Preventative Task Force (USPTF) commissioned a review of clinical guidelines for prevention. The USPTF found convincing evidence that counseling interventions are effective in preventing perinatal depression and recommended “that clinicians provide or refer pregnant and postpartum persons who are at increased risk of perinatal depression to counseling interventions” (O’Connor et al., 2019). Several risk factors have been identified for both perinatal depression and anxiety. For purpose of this study, history of poor mental health (Bernazzani et al., 1997; Da Costa et al., 2000), low socioeconomic status (Pettersson and Albers, 2001), difficult infant behavior (Agrati et al., 2015; Armitage et al., 2009), and maternal childhood maltreatment (Choi and Sikkema, 2016; Ierardi et al., 2019) are particularly relevant.

One intervention that was included in the USPTF systematic review was a novel dyadic prevention intervention, Practical Resources for Effective Postpartum Parenting (PREPP). Two randomized control trials have demonstrated its efficacy in at-risk populations. Among a sample of 54 pregnant women with sub-threshold symptoms of depression, PREPP was associated with a significant reduction in depression and anxiety symptoms and more than a 50% reduction in the rate of severe postpartum depression at 6 weeks postpartum (Werner et al., 2016). Similarly, among a low SES population, PREPP was associated with improved sub-clinical symptoms of anxiety and depression at six weeks postpartum (Scorza, 2020).

PREPP is unique in that it utilizes a combined, dyadic approach targeting both maternal wellbeing and infant/mother bonding and infant behavior. Emerging data shows strong bi-directional associations between infant behavior and maternal mood dysregulation. In several papers, greater infant fuss/cry and poor sleep behavior were associated with maternal depression (Martin et al., 2007; Hiscock and Davey, 2018) and perinatal depression was associated with higher reported sleep difficulties in infants (Field et al., 2007; Nevarez et al., 2010). In a randomized controlled trial among 156 mothers of infants aged 6–12 months, a behavioral sleep intervention compared to receiving written information led to decreases in depression scores, though more so in the women with moderate depressive scores (Hiscock and Wake, 2002). Furthermore, Werner et al. demonstrated that infants of mothers enrolled in PREPP versus those who received two-sessions of psycho-education on postpartum depression (PPD) had fewer bouts of fussing and crying at 6 weeks postpartum (Werner et al., 2016). Interventions that focus both on augmenting sensitive parenting as well as improving maternal mental health have a greater potential for positive impact on a broader range of outcomes, including maternal, child, and family system functioning (. (Forman et al., 2007; Nylén et al., 2006; van IJzendoorn, 1995)

A dyadic form of intervention capitalizes on the relationship between infant and mother, but a history of childhood maltreatment interferes with this relational bond and also is a risk factor for perinatal depression and anxiety. Childhood maltreatment (CM), defined as sexual, physical and/or emotional abuse and/or physical or emotional neglect, has been shown to complicate treatment of depression in non-perinatal populations, and data indicate that this is the case in perinatal populations as well. The experience of any form of CM more than doubles the risk of developing a major depressive disorder and is associated with an earlier

onset, higher symptom severity, and more severe depressive episodes (Nelson et al., 2017). Moreover, CM survivors are more likely to be non-responders to common treatments (psychological treatment, pharmacotherapy or their combination) (Nelson et al., 2017; Nanni et al., 2012; Miniati et al., 2010; Nemeroff et al., 2003; Reuveni, 2020). Additionally, women with histories of CM respond more slowly or poorly to treatment for perinatal depression as evidenced by Grote et al. (2012). In this study, 53 pregnant women were randomized to brief interpersonal therapy or to usual care. Pregnant women with more cumulative exposure to CM, compared to pregnant women with lower CM exposure, exhibited higher rates of depression severity on the Beck Depression Inventory and a poorer response at three months post intervention. However, at six months post intervention, outcomes for the more traumatized group indicated depression remission and improved functioning (Grote et al., 2012). In another study of 62 mothers treated with nine sessions of psychotherapy, maternal history of CM moderated the improvement in maternal symptoms of depression. The limited improvement also extended to their school aged children. Specifically, children improved when mothers improved, but not among mothers who had histories of childhood maltreatment (Swartz et al., 2018).

Research on dyadic interventions for infants and specifically for parents with CM histories is limited, but growing. In an uncontrolled open trial, called Mom Power (MP), 68 mother-child pairs of children with average age of 21.5 months received a 13-session parenting and self-care skills group. The intervention was associated with reductions in self-reported symptoms of depression, PTSD, and caregiving helplessness, and also improvements in objectively-rated measures of parenting helplessness and parenting reflectivity (Muzik et al., 2015). Would these same outcomes extend to a *prevention* intervention for perinatal depression?

There is little data about the effects of CM on prevention interventions for perinatal depression and the impact on early infant behaviors (i.e. fuss/cry and sleep). Given the challenges and scale of treating perinatal depression, taking the steps to prevent perinatal depression is essential for public health, yet the moderating role of trauma must be specified. To our knowledge, this is the first study to investigate the impact of CM on a dyadic approach to prevent perinatal depression. This study describes the results of a secondary analysis of a combination of two randomized control trials (RCTs) of the PREPP intervention on the efficacy of preventing perinatal depression and optimizing infant regulatory behavior, each outcome moderated by CM. We hypothesized that mothers with a history of CM compared to mothers without would: a) respond to the intervention with a lower reduction in depression and anxiety scores and b) report less change in infant outcomes (i.e. less overall decrease in infant fuss/cry behavior and less increase in infant sleep).

## 2. Methods

### 2.1. Overview

This manuscript reports the findings of a secondary analysis of two combined RCTs from the Werner et al. (2016) and Scorza, 2020) data sets. The primary outcomes were depression and anxiety symptoms during the early postnatal period with secondary outcomes evaluating the decrease in infant fuss and cry behavior. A full overview of methods are described in Werner et al. (2016) and Scorza, 2020). Both studies were conducted at the Columbia University Irving Medical Center (CUIMC), were registered with clinicaltrials.gov: NCT01379781 and NCT02121496, and compared PREPP to Enhanced Treatment as Usual (ETAU) consisting of two sessions with a clinical psychologist (34–38 weeks gestation and 6 weeks postpartum), psychoeducation on PPD, referrals to treatment, and information on local supportive services. All study procedures were approved by the Institutional Review Board of the New York State Psychiatric Institute/CUIMC.

Briefly, women were recruited and screened for eligibility by telephone in the 3rd trimester of pregnancy. Between 34 and 38 weeks gestation, eligible participants provided informed consent and completed mood questionnaire by self-report and interviewer administration (i.e. baseline). Once enrolled, participants received a computer-generated group assignment. Those randomized to PREPP received three consecutive in-person “coaching” sessions with a PhD level psychologist that coincided with timing of their routine obstetric visits: 3rd trimester ultrasound between 34 and 38 weeks; in the hospital postdelivery; and at the 6-week postpartum visit. The psychologist also contacted participants by telephone at two weeks postpartum and using motivational interviewing techniques, encouraged the use of PREPP skills and answered specific participant questions. This coaching intervention encompassed five specific newborn care skills designed to reduce infant fuss/cry behavior and promote sleep and three specific maternal psychological interventions. The specific newborn care skills were: 1) focal feeding, (i.e. feeding the infant between 10pm and midnight, even if the infant must be awakened); 2) accentuate differences between day and night by providing more stimulation during the day; 3) delaying the time to nighttime feeds to extinguish the association between night time waking and feeding; 4) carrying the infant for a minimum of 3 h a day independent of feeding or comforting infant crying; and 5) learning how to swaddle the baby. The mothers also were provided with: 1) psychological support to reflect on their own childhood and development of a parental identity; 2) psychoeducation regarding the postpartum period; and 3) mindfulness techniques aimed at tolerating distress and aiding them in returning to sleep after a nighttime interruption. In the first visit, participants were given a carrier and a swaddling blanket to use with their babies. At 34–38 weeks gestation, participants randomized to the ETAU group completed mood assessments (i.e. baseline) and were given information about PPD, and a referral for treatment if requested by the participant or deemed appropriate by clinical evaluation. At six weeks, 10 weeks, and 16 weeks postpartum, all participants returned to the laboratory to complete follow-up mood assessments. Fig. S1-Supplemental provides a schedule of participants’ PREPP sessions. Further details of the intervention can be found in [Werner et al. \(2016\)](#) and [Scorza, 2020](#).

The Werner et al. RCT consisted of 54 parent-infant dyads, with mothers who were at risk for PPD, defined as scoring above 24 on the Predictive Index of Postnatal Depression ([Cooper et al., 1996](#)) during their 3rd trimester. Fig. S2-Supplemental details the CONSORT diagram of screening, enrollment, and attrition for the Werner study. The Scorza et al. RCT selectively recruited women at risk for PPD based on socio-economic status and thus recruited women who were living in poverty as defined by a) salary indicated to be “Near poor, struggling” (200% of national poverty levels) —  $\leq$  \$47,700 annual for a family of 4, based on self-report, or b) having met income criteria for Medicaid. A score  $>$  17 on the Predictive Index of Postnatal Depression was not a factor for inclusion. Fig. S3-Supplemental provides the CONSORT diagram for the Scorza study.

## 2.2. Participants

Both the Werner and the Scorza RCTs included pregnant women ages 18–45 in their 2nd or 3rd trimester of pregnancy. Both RCTs recruited participants through the Department of Obstetrics and Gynecology at CUIMC. Women who reported smoking tobacco or using recreational drugs, lacking fluency in English, currently receiving psychological/psychiatric treatment, taking psychotropic medications, having a medically complicated pregnancy, or carrying a non-singleton pregnancy were ineligible for enrollment. All major psychiatric disorders (major depressive disorder, bipolar disorder, suicidal intent, substance use, and psychosis) were screened out of the study pools. Participants were compensated for their assessment sessions, and the travel to and from these sessions, but not for intervention sessions.

Participants enrolled in the Werner RCT differed from those in the

Scorza RCT in the following factors: race/ethnicity, education, family income, number of pregnancies, and baseline anxiety and depressive symptoms. See Table S1-Supplemental. Five women were not accounted for in the final dataset ( $n = 109$ ) as childhood maltreatment scores were not obtained. These women did not differ from the overall group on demographic variables or symptom severity. In both RCTs, compliance with intervention sessions was very high—100% for Werner RCT and 83% for Scorza RCT.

## 2.3. Maternal Measures

Maternal symptoms of depression and anxiety were evaluated at enrollment (34–38 weeks gestation, baseline), at six weeks, ten weeks, and 16 weeks postpartum, using the primary outcomes, the observer-rated Hamilton Rating Scale for Depression (HRSD) ([Hamilton, 1960](#)), self-report Edinburgh Postnatal Depression Scale (EPDS) ([Cox et al., 1987](#)), and the observer-rated Hamilton Rating Scale for Anxiety (HRSA) ([Hamilton, 1959](#)). On the HRSD, values of 8–13 indicate mild depression, 14–18 indicate moderate depression, and 19–22 indicate severe depression ([Hamilton, 1960](#)). On the HRSA, values less than 17 indicate mild severity, 18–24 indicate mild to moderate anxiety, and 25–30 indicate moderate to severe anxiety. The validity and reliability of the HRSD and HRSA are well established ([Maier et al., 1988](#); [Ramos-Brieva and Cordero-Villafafila, 1988](#); [Trajković et al., 2011](#)). The correlation between gravidity and parity with HRSD and HRSA at baseline was very weak with the Spearman’s correlation coefficients ranging between  $r = -0.14$  to 0.08. Thus, for the primary hypothesis testing, we did not adjust for these variables during pregnancy. In prior literature, clinician-rated scales, such as HRSD take into account prior childbirth experience and longitudinal time course of pregnancy ([Ji et al., 2011](#)). For the EPDS a cut-off value of 9 was used as it has been found to be optimal among low-income, urban women for detecting likely depression ([Chaudron et al., 2010](#)).

Maternal exposure to childhood maltreatment was ascertained using the Childhood Trauma Questionnaire (CTQ) ([Bernstein and Fink, 1998](#)). The CTQ is one of the most widely-used and valid instruments for identifying abuse and neglect experiences in childhood and adolescence ([Baker, 2009](#)). The tool is a 28-item self-report measure that uses a five-point scale (1=never true to 5=very often true) to assess frequency of exposure to specific traumatic events during childhood in the domains of emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Cut-off values for moderate or greater exposure provided in the CTQ manual ([Bernstein and Fink, 1998](#)) were used to create dichotomous variables of exposure for each CTQ subscale (emotional abuse  $\geq 13$ ; physical abuse  $\geq 10$ ; sexual abuse  $\geq 8$ ; emotional neglect  $\geq 15$ ; and physical neglect  $\geq 10$ ). From these, an overall binary variable was computed indicating exposure to at least one type of childhood maltreatment (CM+) vs. no or low exposure (CM-) similar to approach adopted by [Moog et al. \(2018\)](#).

## 2.4. Infant Measures

Maternal report on infant fuss/cry episodes were obtained using the Baby’s Day Diary (Barr 1985) measurement tool. During four consecutive 24-hr periods, mothers hand recorded the duration and frequency of body contact with their infants and seven infant behavioral states: awake, alert, fussing, crying, inconsolable crying, feeding, and sleeping. Using similar methodology to the Werner PREPP RCT ([Werner et al., 2016](#)), the total number of episodes during which the infant was in each of the seven behavioral states was averaged over the four days to arrive at an average daily frequency. These measures have been well validated in previous literature ([Barr et al., 1988](#); [Wolke et al., 1994](#)) and have not been shown to be biased by caregiver depressive symptoms ([Miller et al., 1993](#)). Data from the Baby Day Diary was available on a subset of participants enrolled in the current study ( $n = 30$ ); this subsample did not differ significantly from the complete sample on any of the demographic variables or mood symptoms.

2.5. Statistical analysis

To assess the effect of the PREPP intervention on participants' psychiatric symptomatology, longitudinal mixed effects regression models were used for each of the maternal mood measures (i.e. HRSD, HRSA). Regression models were adjusted for RCT study, baseline EPDS scores, social support, education, family income, and number of pregnancies. Descriptive analysis comparing PREPP and ETAU by CM status were tested using Fisher's exact tests or t tests, as appropriate. In the mixed-effects models, time was treated as a categorical variable to examine the fixed effects for time, intervention condition, childhood maltreatment group, and their interactions. In intention-to-treat analyses, generalized linear mixed effect modeling was used with the appropriate links for the distributions of the dependent variables using baseline, 6, 10, and 16-week follow-up data. However, models were limited up to 6 weeks postpartum as results after 6 weeks were unstable due to significant drop out in both RCTs and inability to do multivariate analyses within the child maltreatment groups (See consort diagrams in Supplemental). Attrition rates did not vary by RCT study, key demographic variables, or symptom severity. To calculate the effect of PREPP on mood measures (i.e. HRSD, HRSA), a difference in differences (DID) calculation was used to compare the average change over time in the mood measures for PREPP compared to the average change over time for ETAU. A univariate analysis of variance (ANOVA) was used to test whether women who endorsed childhood maltreatment in the PREPP and ETAU groups differed in their report of infant behavior measures. Due to significant values of the variable day sleeping, linear regressions were run to account for differences in PREPP and ETAU, controlling for the same set of covariates: site, baseline EPDS scores, social support, education, family income, and number of pregnancies. All statistical analyses were performed with alpha=0.05.

3. Results

3.1. Demographics and baseline mood measures

Participants were  $M = 29.3$  ( $SD=6.1$ ) years of age and had  $M = 14.3$  ( $SD=3.0$ ) years of education; 51.4% of the sample had a family income <\$25 K; 74.5% identified as Hispanic/Latina; 35.3% were primiparous; and 32.1% were CM+. Of the overall dataset ( $N = 109$ ), those randomized to PREPP did not differ from those to ETAU on CM status, baseline demographic factors, or mood measures (See Table S2—Supplemental).

Table 1 provides demographic information by intervention and CM status. Within the PREPP group, CM+ women compared to CM- women did not differ on key demographic factors, except for a higher distribution of Hispanic/Latina women in the CM- group ( $p = 0.013$ ). They also did not differ statistically on baseline mood measures of HRSA and HRSD, although the raw values indicated that CM+ women were more likely to be in the moderate severe category of depression ( $M = 15.1$ ,  $SD=11.9$ ), while CM- women were more likely to be in the mild category ( $M = 9.5$ ,  $SD=10.6$ ).

3.2. Overall PREPP treatment effect

Women who received the PREPP intervention had a significant decrease in their HRSD scores ( $\beta=-0.49$ ,  $SE=0.15$ ,  $p = 0.001$ ) from baseline to 6 weeks postpartum. In contrast, women in the ETAU group had no significant change between baseline and the 6-week postpartum HRSA assessment ( $\beta=0.05$ ,  $SE=0.19$ ,  $p = 0.797$ ). When comparing the treatment effects of PREPP vs ETAU, there was a significant time by treatment group interaction ( $\chi^2(1) = 4.13$ ;  $p<=0.05$ ), such that women who received PREPP, compared to ETAU, had lower HRSD scores at 6 weeks, characterized by a mean difference of  $M=-3.84$  ( $SD= 0.14$ ,  $p<0.01$ ). More specifically, at baseline these women had moderate HRSD scores ( $M = 11.2$ ,  $SD=11.2$ ), and at 6 weeks did not meet criteria

Table 1 Participant demographic information and mood variables by childhood maltreatment status and intervention status.

Variables	PREPP CM + (n = 16)		CM - (n = 39)		Diff between groups p-value <sup>a</sup>	ETAU CM + (n = 19)		CM - (n = 35)		Diff between groups p-value <sup>a</sup>
	n	Mean (SD) or%	n	Mean (SD) or%		n	Mean (SD) or%	n	Mean (SD) or%	
<b>Demographics</b>										
Race/Ethnicity					0.013					0.507
Hispanic / Latina	7	46.70%	32	84.20%		13	68.40%	27	79.40%	
Not Hispanic / Latina	8	53.30%	6	15.80%		6	31.60%	7	20.60%	
Age	16	31.6 (7.8)	38	28.3 (5.5)	0.085	19	29.7 (4.8)	35	29 (6.4)	0.673
Education	15	15.8 (5.2)	38	14.7 (2.2)	0.282	19	14 (2.1)	35	13.3 (2.8)	0.341
Family income					0.207					0.852
\$0-\$15,000	3	18.80%	9	24.30%		9	47.40%	14	42.40%	
\$16,000-\$25,000	3	18.80%	7	18.90%		3	15.80%	6	18.20%	
\$26,000-\$50,000	2	12.50%	12	32.40%		4	21.10%	8	24.20%	
\$51,000-\$100,000	3	18.80%	6	16.20%		1	5.30%	0	0.00%	
\$101,000-\$250,000	3	18.80%	3	8.10%		2	10.50%	3	9.10%	
Above \$250,000	2	12.50%	0	0.00%		0	0.00%	2	6.10%	
Number of children					1					0.141
=0	8	53.30%	21	55.30%		10	55.60%	11	32.40%	
>=1	7	46.70%	17	44.70%		8	44.40%	23	67.60%	
Number of pregnancies					1					1
=0	7	50.00%	14	45.20%		2	20.00%	7	23.30%	
>=1	7	50.00%	17	54.80%		8	80.00%	23	76.70%	
Baby sex					0.549					0.232
Male	6	37.50%	18	50.00%		11	64.70%	14	42.40%	
Female	10	62.50%	18	50.00%		6	35.30%	19	57.60%	
<b>Baseline symptoms &amp; disorders</b>										
Anxiety	16	14.9 (14.2)	36	9.5 (10.7)	0.131	17	10.8 (9.3)	34	8.9 (7.9)	0.452
Depression	16	15.1 (11.9)	36	9.5 (10.6)	0.1	17	10.6 (8.8)	34	9.1 (9.1)	0.592

<sup>a</sup> Baseline differences are assessed using t-tests for continuous measures and Fisher's exact test for categorical measures.



for depression ( $M = 7.9, SD=7.6$ ). See Fig. 1.

The results for HRSD are consistent with the results for HRSA such that women in PREPP demonstrated a significant decrease in their HRSA scores between baseline and 6 weeks postpartum ( $\beta = -0.65, SE=0.10, p<0.001$ ) whereas those in the ETAU group did not demonstrate this change in scores over this time period ( $\beta=-0.01, SE= 0.203, p = 0.971$ ). When comparing treatment effects of PREPP to ETAU over time, there was also a significant time by treatment group interaction ( $\chi^2 (1) = 5.76, p<0.02$ ), such that women who received PREPP, compared to women who did not, had lower HRSA scores at 6 weeks with a mean difference of  $M=- 4.31 (SD= 0.32, p <0.001)$ . See Fig. 1.

3.2.1. Moderating role of childhood maltreatment on depressive symptoms

When childhood maltreatment was added to the model, the variance between PREPP and ETAU appeared to be explained by childhood maltreatment. For depressive symptoms, CM+ women who received the PREPP intervention had a significant decrease in HRSD scores from baseline to 6 weeks ( $\beta=-0.52, SE=0.25, p = 0.035$ ) with a mean change in depressive scores of  $M=-2.29 (SD= 0.19, p= <0.0001)$ . CM- who received PREPP also saw a similar decrease in HRSD scores from baseline to 6 weeks ( $\beta=-0.6, SE= 0.21, p = 0.021$ ), with a mean change of  $M=-4.48 (SD=0.19, p = 0.002)$ . The overall treatment effect of PREPP among CM+ women, however, was not significant ( $M=-3.49, SE=0.36, p = 0.208$ ), whereas the overall treatment effect of PREPP among CM-women was significant ( $M=-4.21, SE=0.32, p = 0.046$ ). See Fig. 2.

3.2.2. Moderating role of childhood maltreatment on anxiety symptoms

For anxiety symptoms, among CM+ women, those who received PREPP had no significant change between their baseline and 6-week postpartum assessment scores of HRSA ( $\beta=-0.32, SE= 0.18, p = 0.076$ ). In contrast, CM- women who received PREPP had significant decreases in their HRSA scores from baseline to 6 weeks ( $\beta=-0.64, SE= 0.22, p = 0.004$ ) with a mean change of  $M=-7.10 (SE= 0.15, p<0.001)$ . For CM+ women, there was no significant treatment effect of PREPP. Among CM-, the treatment effect of PREPP compared to ETAU from baseline to 6 weeks (i.e. difference in difference) was significant, resulting in a group difference of  $M=-5.74 (SD=0.28, p = 0.002)$ . See

Fig. 2.

3.3. Effects on infant behavior

Results from the ANOVA used to test for differences between infants in the PREPP versus ETAU conditions demonstrated that infants did not differ in variables of night sleep, day/night fuss, day/night cry, but they did differ in day sleeping. More specifically, in the linear regression models, mothers in the PREPP intervention compared to those in ETAU reported greater infant daytime sleeping with a mean difference of 126.7 min ( $SE= 58.58, p<0.0001$ ). However, when CM was added to the model, this group difference was largely accounted for by childhood maltreatment status such that CM+ women who received PREPP as compared to ETAU described their babies sleeping more with a mean difference of 189.8 min ( $SE= 50.48, p = 0.001$ ). Among CM-, comparing PREPP to ETAU, the mean difference was significant at 63.43 min ( $SE= 32.25, p = 0.049$ ). See Fig. 3.

4. Discussion

In this study, we examined the moderating role of maternal childhood maltreatment on the efficacy of an intervention to prevent perinatal depression in women at risk. Although this study is a secondary analysis of two small clinical trials, the prevalence of childhood maltreatment in our study (32.1%) is consistent with estimates from larger epidemiological studies in the general population (Hussey et al., 2006). Our results were consistent with our initial hypotheses that women with childhood maltreatment history will report diminished response to the intervention compared to women without childhood maltreatment history as reflected in no significant treatment effects from baseline to six weeks postpartum in depressive and anxiety symptoms. Strikingly, despite not having a significant response to the intervention on maternal depression/anxiety symptoms, there was a significant mother-child dyad response among women with childhood maltreatment who underwent PREPP, with an approximately three-hour increase in infant daytime sleep reported by mothers who received the intervention compared to those who did not.

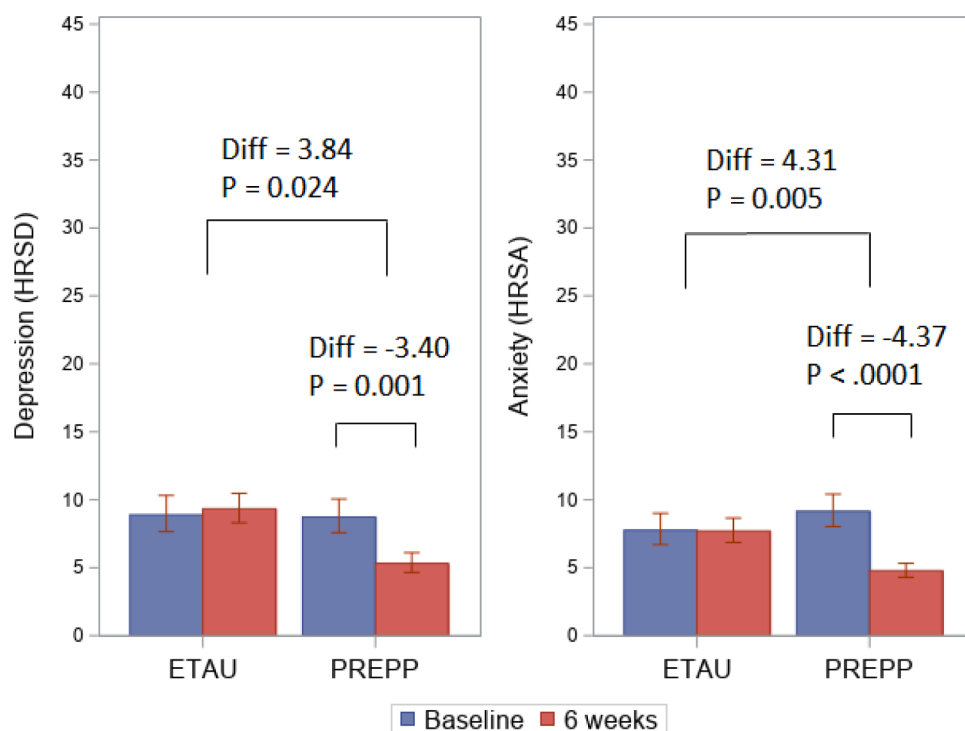


Fig. 1. Overall Hamilton rating scale for depression and Hamilton rating scale for anxiety change scores by PREPP intervention status.

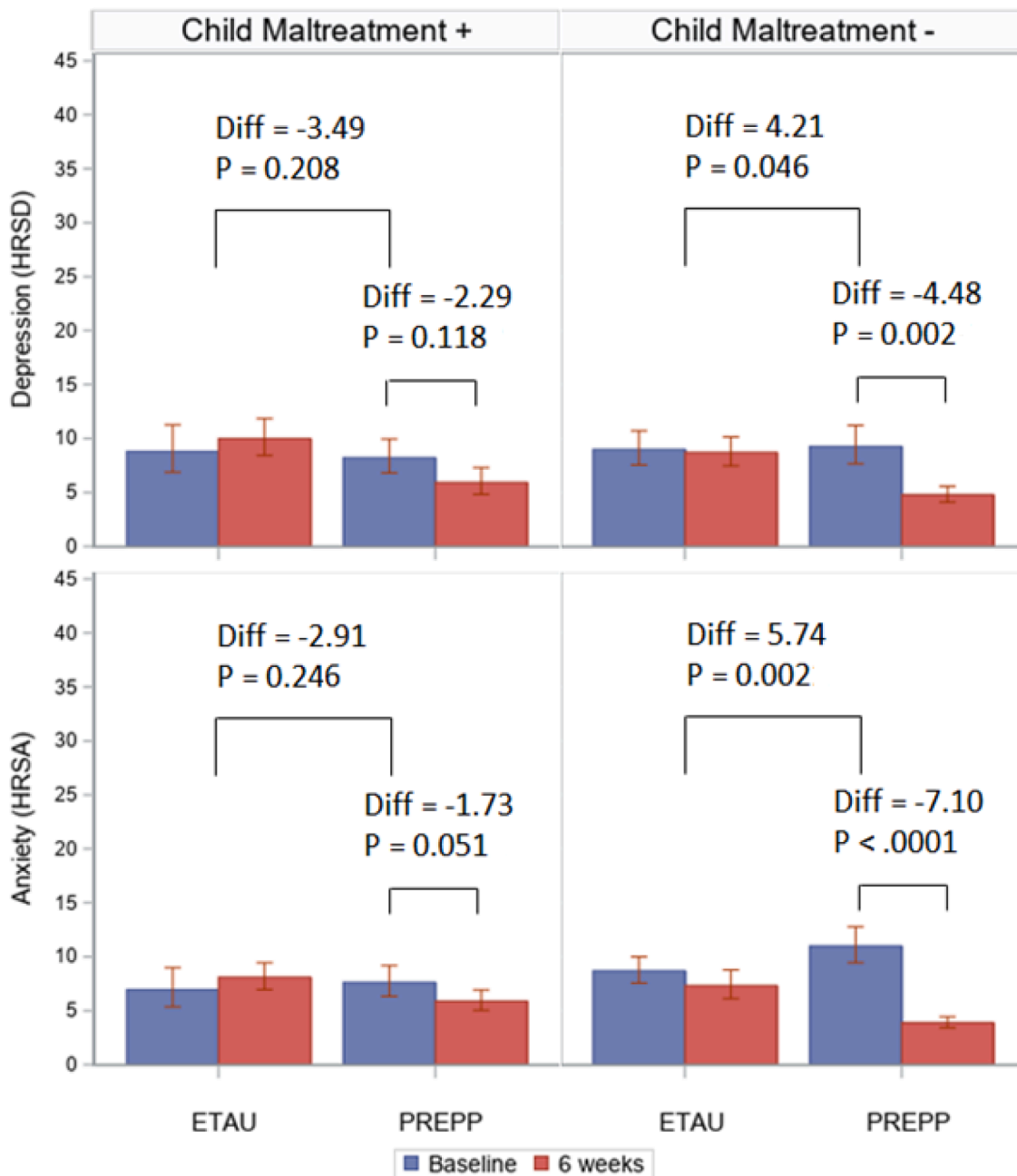


Fig. 2. Hamilton rating scale for depression and Hamilton rating scale for anxiety change scores by PREPP intervention status and by childhood maltreatment status.

Overall, women who received PREPP intervention had significant decreases in both depressive and anxiety symptoms from baseline to 6 weeks with treatment effect reductions of 3.84 and 4.31 points respectively. When childhood maltreatment was considered, these same treatment effects were not seen in CM+ women. Although CM+ women who received PREPP had a significant decrease in depressive symptoms from baseline to 6 weeks, (CM+ women at baseline met criteria for mild depression and did not meet criteria for depression after intervention), the outcomes were not significant when evaluating treatment effects. Thus, we cannot specifically attribute the small reduction from baseline to 6 weeks among CM+ women to PREPP. For anxiety, there were no significant reductions in anxiety symptoms among CM+ women from baseline to 6 weeks receiving PREPP, nor significant treatment effects when comparing PREPP to ETAU over the six weeks. Among CM-women, there were significant reductions in both depressive and anxiety symptoms among those who received the intervention compared to

those who did not. These results highlight the important moderating role of CM in treatment efficacy in preventing postpartum depression and anxiety.

These results of a reduced efficacy of an intervention among women with childhood maltreatment is consistent with prior literature. The speculation is that those with trauma history, who may not be diagnosed with DSM-5 PTSD, may have a subtype of major depression that is more severe and treatment-resistant (Miniati et al., 2010). Those with childhood histories of maltreatment are at greater risk of cognitive and biological risk profiles (Beck, 2008), heightened stress sensitivity (Hammen et al., 2000), elevated inflammation levels (Danese et al., 2008), all of which have been associated with poor treatment response (Lanquillon et al., 2000). Furthermore, higher baseline mood and anxiety symptoms have been correlated with delayed treatment response (Grote, 2012; Nanni et al., 2012; Robertson, 2004). In our study, at baseline, CM+ women reported moderate levels of depression while CM-

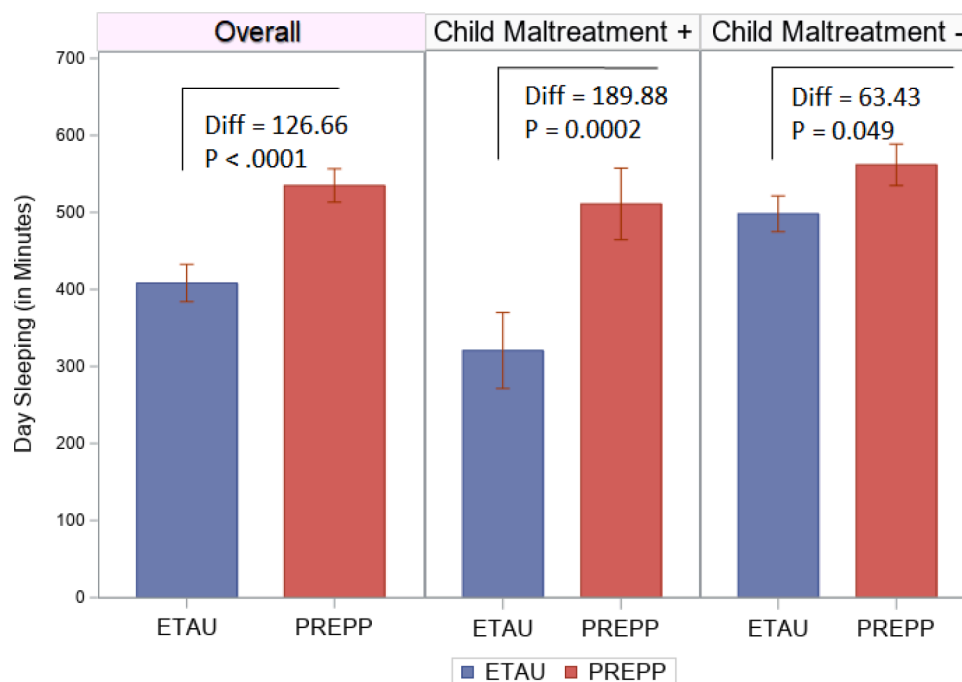


Fig. 3. Mean infant day time sleep change scores by intervention group.

women reported mild levels of depressive symptoms. Studies also suggest that women with histories of childhood maltreatment take longer to fully respond to interventions (Grote et al., 2012). Our results were only captured up to six weeks as we did not have enough statistical power to assess up to the full 16 weeks of the intervention study. It is possible that had there been less attrition in assessment follow up sessions, CM+ women might have achieved similar rates of reduction in depressive and anxiety symptoms at later testing sessions.

The measurement of anxiety is important in postpartum depression treatment as perinatal depression and anxiety are highly correlated and perinatal anxiety has been identified as a very strong predictor of postpartum depression, even when controlling for prenatal depression levels (Matthey et al., 2003; Robertson et al., 2004; Sutter-Dallay et al., 2004). A reduction in perinatal anxiety might have a profound relevance for perinatal prevention studies as a recent meta-analysis reported that perinatal anxiety is more prevalent than previously thought, with about 1 in 5 (20.7%) pregnant women meeting diagnostic criteria for at least one DSM-5 anxiety disorder (Fawcett et al., 2019). This is higher than the reported prevalence of perinatal depression: 8.9–14.9% (O'Connor et al., 2019). It's possible that in order to see a more significant reduction in depressive symptoms and a treatment effect among CM+ women receiving the intervention, there would have had to be a more pronounced reduction in anxiety symptoms.

A striking finding of our report is the impact on infant sleep among CM+ women such that in the context of no intervention effect on mood, women in PREPP versus ETAU endorsed longer duration of infant sleep. Several studies demonstrate a bi-directional association between maternal depression and poor infant sleep and leverage this for treatment approaches. In a meta-analysis of nine randomized clinical trials, small to moderate effects were found for psychosocial infant sleep interventions on improved maternal mood and improved maternal report of infant nocturnal sleep (Kempner et al., 2016). However, another systematic review of 43 such studies indicated that behavioral interventions aimed at improving infant sleep during the first 6 months of life do not improve long-term outcomes for mothers or infants and may increase risk of unintended outcomes, such as early discontinuation of breastfeeding and increased anxiety among new mothers (Douglas and Hill, 2013). Our results indicate that PREPP, which targets more than

infant sleep, can positively influence infant sleep duration and/or maternal assessment of it even in the context of no treatment effect on mood— suggesting the possibility of downstream influence on maternal mood in the future, one that is mediated via changes in the infant (or maternal perception of the infant).

There are limitations to this study in that it is a secondary data analysis of two different RCTs with two participant populations: one at risk for PPD based on prior mood and anxiety symptoms and one at risk for PPD based on socioeconomic factors. Studies demonstrate that combining two different RCTs has added advantages and is a growing trend within psychological sciences. Goh et al., suggests that combining studies within one manuscript can allow for finding effects that are only detectable cumulatively rather than in a single study (Goh et al., 2016). This is the case for this study as we examined the moderating effect of childhood maltreatment which would have been difficult to evaluate due to small sample sizes of each individual study. Due to sample size, we were unable to capture a more nuanced picture of childhood maltreatment such as examining differences in frequency, type (including subscale CTQ measures), duration, or timing of childhood trauma. Despite robust findings at six weeks, the current study was unable to carry out the findings to 16 weeks due to attrition for assessment sessions and lack of power to carry out analyses. Furthermore, as with the original RCTs, 16 weeks may not even have been late enough in the postpartum period as previous research by Hiscock et al. (2004) found that treatment to prevent infant sleep and cry problems had effects on maternal report of depression symptoms at 6 months but these effects were not seen at 4 months (Hiscock et al., 2014). Another limitation is the maternal report of infant behavior. Mothers with greater depressive symptoms are more likely to endorse greater infant night awakenings and shorter infant sleep (Dennis and Ross, 2005). Including mother-child dyad observations would have allowed for objective reporting as well as examination of correlations between infant temperament and infant behaviors in relation to maternal mood. Although we did not collect information on the father's role, social support was evaluated and controlled for in this study.

The findings from this study provide promising evidence that an innovative, dyadic approach to preventing postpartum depression, one leveraging behavioral techniques to address maternal care and

providing parenting tools, may need specific intervention targets for women with histories of childhood maltreatment. Although this manuscript identified reduced efficacy of PREPP for women with childhood trauma histories in relation to depressive and anxiety symptoms, it is worth noting that infant sleep saw a robust response. It is yet unknown whether this finding could lead to improvement in depression symptoms for women with childhood maltreatment histories. This study emphasizes the need for further research into prevention studies with women with childhood maltreatment using a dyadic framework. The paucity of evidence for psychological interventions tailored to the experiences of women affected by childhood trauma, especially for those in the perinatal period, means that it is unclear whether specialized, trauma-informed treatments are more effective than non-specialized interventions (Berry and Monk, 2020).

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#### Supplemental materials

- Fig. S1. Schedule of Participants’ Assessment and PREPP Sessions.
- Fig. S2. CONSORT diagram of screening, enrollment, and attrition for the werner paper.
- Fig. S3. CONSORT diagram for the Scorza paper.
- Table S1. Demographics by RCT.
- Table S2. Demographics by Intervention Group.

#### CRedit authorship contribution statement

**Obianuju O. Berry:** Formal analysis, Writing – original draft, Writing – review & editing. **Vanessa Babineau:** Writing – review & editing. **Seonjoo Lee:** Validation, Writing – review & editing. **Tianshu Feng:** Validation, Writing – review & editing. **Pamela Scorza:** Writing – review & editing. **Elizabeth A. Werner:** Conceptualization, Visualization, Writing – review & editing. **Catherine Monk:** Conceptualization, Visualization, Writing – review & editing.

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#### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jad.2021.04.068](https://doi.org/10.1016/j.jad.2021.04.068).

#### References

- Forman, D.R., O’Hara, M.W., Stuart, S., Gorman, L.L., Larsen, K.E., Coy, K.C., 2007. Effective treatment for postpartum depression is not sufficient to improve the developing mother-child relationship. *Dev Psychopathol* 19. <https://doi.org/10.1017/S0954579407070289>.
- Gavin, N.I., et al., 2005. Perinatal depression: a systematic review of prevalence and incidence. *Obstet. Gynecol.* 106 (5 Pt 1), 1071–1083.
- Nylen, Kimberly, Moran, Tracy E., Franklin, Christina, O’Hara, Michael W., 2006. Maternal depression: A review of relevant treatment approaches for mothers and infants. *Infant Ment Health J.* <https://doi.org/10.1002/imhj.20095>.
- O’Connor, E., et al., 2019. Interventions to prevent perinatal depression: evidence report and systematic review for the US preventive services task force. *JAMA* 321 (6), 588–601.
- Luca, D.L., et al. Societal costs of untreated perinatal mood and anxiety disorders in the United States. 2019.
- Li, D., Liu, L., Odouli, R., 2009. Presence of depressive symptoms during early pregnancy and the risk of preterm delivery: a prospective cohort study. *Hum. Reprod.* 24 (1), 146–153.
- Mulder, E.J., et al., 2002. Prenatal maternal stress: effects on pregnancy and the (unborn) child. *Early Hum. Dev.* 70 (1–2), 3–14.
- Howard, L.M., et al., 2013. Domestic violence and perinatal mental disorders: a systematic review and meta-analysis. *PLoS Med.* 10 (5), e1001452.
- Maier, W., Buller, R., Philipp, M., Heuser, I., 1988. The Hamilton Anxiety Scale: reliability, validity and sensitivity to change in anxiety and depressive disorders. *J Affect Disord.* [https://doi.org/10.1016/0165-0327\(88\)90072-9](https://doi.org/10.1016/0165-0327(88)90072-9).
- Mangla, K., et al., 2019. Maternal self-harm deaths: an unrecognized and preventable outcome. *Am. J. Obstet. Gynecol.* 221 (4), 295–303.
- Kurstjens, S., Wolke, D., 2001. Effects of maternal depression on cognitive development of children over the first 7 years of life. *J. Child Psychol. Psychiatry* 42 (5), 623–636.
- Monk, C., Leight, K.L., Fang, Y., 2008. The relationship between women’s attachment style and perinatal mood disturbance: implications for screening and treatment. *Arch. Womens Ment. Health* 11 (2), 117–129.
- Dubber, S., et al., 2015. Postpartum bonding: the role of perinatal depression, anxiety and maternal-fetal bonding during pregnancy. *Arch. Womens Ment. Health* 18 (2), 187–195.
- Murray, L., Halligan, S., Cooper, P., Wachs, T., G, B., 2010. Effects of postnatal depression on mother-infant interactions, and child development. *Handbook of Infant Development*. Wiley-Blackwell, Malden, MA. Editors.
- Lovejoy, M.C., et al., 2000. Maternal depression and parenting behavior: a meta-analytic review. *Clin. Psychol. Rev.* 20 (5), 561–592.
- Beck, C.T., 1995. The effects of postpartum depression on maternal-infant interaction: a meta-analysis. *Nurs. Res.* 44 (5), 298–304.
- Zelkowitz, P., Bardin, C., Papageorgiou, A., 2007. Anxiety affects the relationship between parents and their very low birth weight infants. *Infant Ment. Health J.* 28 (3), 296–313.
- Ramos-Brieva, J.A., Cordero-Villafañila, A., 1988. A new validation of the Hamilton Rating Scale for Depression. *J Psychiatr Res.* [https://doi.org/10.1016/0022-3956\(88\)90024-6](https://doi.org/10.1016/0022-3956(88)90024-6).
- Rayce, S.B., et al., 2020. Effects of parenting interventions for mothers with depressive symptoms and an infant: systematic review and meta-analysis. *BJPsych Open* 6 (1), e9.
- Netsi, E., et al., 2018. Association of persistent and severe postnatal depression with child outcomes. *JAMA Psychiatry* 75 (3), 247–253.
- Field, T., 2010. Postpartum depression effects on early interactions, parenting, and safety practices: a review. *Infant Behav. Dev.* 33 (1), 1–6.
- Reuveni, I., et al., 2020. The impact of childhood trauma on psychological interventions for depression during pregnancy and postpartum: a systematic review. *Arch. Womens Ment. Health.* <https://doi.org/10.1007/s00737-020-01066-4>.
- Righetti-Veltama, M., et al., 2002. Postpartum depression and mother-infant relationship at 3 months old. *J. Affect. Disord.* 70 (3), 291–306.
- Bernazzani, O., et al., 1997. Psychosocial predictors of depressive symptomatology level in postpartum women. *J. Affect. Disord.* 46 (1), 39–49.
- Da Costa, D., et al., 2000. Psychosocial correlates of prepartum and postpartum depressed mood. *J. Affect. Disord.* 59 (1), 31–40.
- Pettersson, S.M., Albers, A.B., 2001. Effects of poverty and maternal depression on early child development. *Child Dev.* 72 (6), 1794–1813.
- Agrati, D., et al., 2015. Maternal anxiety from pregnancy to 2 years postpartum: transactional patterns of maternal early adversity and child temperament. *Arch. Womens Ment. Health* 18 (5), 693–705.
- Armitage, R., et al., 2009. Early developmental changes in sleep in infants: the impact of maternal depression. *Sleep* 32 (5), 693–696.
- Choi, K.W., Sikkema, K.J., 2016. Childhood Maltreatment and Perinatal Mood and Anxiety Disorders: a Systematic Review. *Trauma Violence Abuse* 17 (5), 427–453.
- Ierardi, E., et al., 2019. Maternal and paternal depression and anxiety: their relationship with mother-infant interactions at 3 months. *Arch. Womens Ment. Health* 22 (4), 527–533.
- Trajković, Goran, Vladan Starčević, Milan Latas, Leštarević, Miomir, Ille, Tanja, Bukumirić, Zoran, Marinković, Jelena, 2011. Reliability of the Hamilton Rating Scale for Depression: a meta-analysis over a period of 49 years. *Psychiatry Res.* <https://doi.org/10.1016/j.psychres.2010.12.007>.
- van IJzendoorn, M.H., 1995. Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological Bulletin.* <https://doi.org/10.1037/0033-2909.117.3.387>.
- Werner, E.A., et al., 2016. PREPP: postpartum depression prevention through the mother-infant dyad. *Arch. Womens Ment. Health* 19 (2), 229–242.
- Rogers, A., et al., 2020. Association between maternal perinatal depression and anxiety and child and adolescent development: a meta-analysis. *JAMA Pediatr.* 1 (174(11)), 1082–1092. <https://doi.org/10.1001/jamapediatrics.2020.2910>.
- Martin, J., et al., 2007. Adverse associations of infant and child sleep problems and parent health: an Australian population study. *Pediatrics* 119 (5), 947–955.
- Hiscock, H., Davey, M.J., 2018. Sleep disorders in infants and children. *J. Paediatr. Child Health* 54 (9), 941–944.
- Field, T., et al., 2007. Sleep disturbances in depressed pregnant women and their newborns. *Infant Behav. Dev.* 30 (1), 127–133.
- Nevarez, M.D., et al., 2010. Associations of early life risk factors with infant sleep duration. *Acad. Pediatr.* 10 (3), 187–193.
- Hiscock, H., Wake, M., 2002. Randomised controlled trial of behavioural infant sleep intervention to improve infant sleep and maternal mood. *BMJ* 324 (7345), 1062–1065.
- Nelson, J., et al., 2017. Childhood maltreatment and characteristics of adult depression: meta-analysis. *Br. J. Psychiatry* 210 (2), 96–104.



- Nanni, V., Uher, R., Danese, A., 2012. Childhood maltreatment predicts unfavorable course of illness and treatment outcome in depression: a meta-analysis. *Am. J. Psychiatry* 169 (2), 141–151.
- Miniati, M., et al., 2010. Clinical characteristics and treatment outcome of depression in patients with and without a history of emotional and physical abuse. *J. Psychiatr. Res.* 44 (5), 302–309.
- Nemeroff, C.B., et al., 2003. *Differential responses to psychotherapy versus pharmacotherapy in patients with chronic forms of major depression and childhood trauma*. Proc. Natl. Acad. Sci. USA, 100 (24), 14293–14296.
- Grote, N.K., et al., 2012. Impact of childhood trauma on the outcomes of a perinatal depression trial. *Depress. Anxiety* 29 (7), 563–573.
- Swartz, H.A., et al., 2018. Moderators and mediators of a maternal depression treatment study: impact of maternal trauma and parenting on child outcomes. *Compr. Psychiatry* 86, 123–130.
- Muzik, M., et al., 2015. Mom Power: preliminary outcomes of a group intervention to improve mental health and parenting among high-risk mothers. *Arch. Womens Ment. Health* 18 (3), 507–521.
- Hamilton, M., 1960. A rating scale for depression. *J. Neurol.* 23 (1), 56 neurosurgery, and psychiatry.
- Cooper, P.J., Murray, L., Hooper, H., West, A., 1996. The development and validation of a predictive index for postpartum depression. *Psychol Med.* <https://doi.org/10.1017/s0033291700035698>.
- Cox, J.L., Holden, J.M., Sagovsky, R., 1987. Detection of postnatal depression: development of the 10-item Edinburgh postnatal depression scale. *Br. J. Psychiatry* 150 (6), 782–786.
- Hamilton, M., 1959. The assessment of anxiety states by rating. *Br. J. Med. Psychol.* 32 (1), 50–55.
- Ji, S., et al., 2011. Validity of depression rating scales during pregnancy and the postpartum period: impact of trimester and parity. *J. Psychiatr. Res.* 45 (2), 213–219.
- Chaudron, L.H., et al., 2010. Accuracy of depression screening tools for identifying postpartum depression among urban mothers. *Pediatrics* 125 (3), e609–e617.
- Bernstein, D., Fink, L., 1998. Childhood Trauma Questionnaire: A Retrospective Self-Report Manual. The Psychological Corporation, San Antonio, TX.
- Baker, A., 2009. Adult recall of childhood psychological maltreatment: definitional strategies and challenges. *Child. Youth. Serv. Rev.* (31), 703–714.
- Moog, N.K., et al., 2018. Intergenerational effect of maternal exposure to childhood maltreatment on newborn brain anatomy. *Biol. Psychiatry* 83 (2), 120–127.
- Barr, R.G., et al., 1988. Parental diary of infant cry and fuss behaviour. *Arch. Dis. Child.* 63 (4), 380–387.
- Wolke, D., Meyer, R., Gray, P., 1994. Validity of the crying pattern questionnaire in a sample of excessively crying babies. *J. Reprod. Infant Psychol.* 12, 105–114.
- Miller, A.R., Barr, R.G., Eaton, W.O., 1993. Crying and motor behavior of six-week-old infants and postpartum maternal mood. *Pediatrics* 92 (4), 551–558.
- Hussey, J.M., Chang, J.J., Kotch, J.B., 2006. Child maltreatment in the United States: prevalence, risk factors, and adolescent health consequences. *Pediatrics* 118 (3), 933–942. <https://doi.org/10.1542/peds.2005-2452>.
- Beck, A.T., 2008. The evolution of the cognitive model of depression and its neurobiological correlates. *Am. J. Psychiatry* 165 (8), 969–977.
- Hammen, C., Henry, R., Daley, S.E., 2000. Depression and sensitization to stressors among young women as a function of childhood adversity. *J. Consult. Clin. Psychol.* 68 (5), 782–787.
- Danese, A., et al., 2008. Elevated inflammation levels in depressed adults with a history of childhood maltreatment. *Arch. Gen. Psychiatry* 65 (4), 409–415.
- Lanquillon, S., et al., 2000. Cytokine production and treatment response in major depressive disorder. *Neuropsychopharmacology* 22 (4), 370–379.
- Matthey, S., et al., 2003. Diagnosing postpartum depression in mothers and fathers: whatever happened to anxiety? *J. Affect. Disord.* 74 (2), 139–147.
- Robertson, E., et al., 2004. Antenatal risk factors for postpartum depression: a synthesis of recent literature. *Gen. Hosp. Psychiatry* 26 (4), 289–295.
- Scorza, P., et al., 2020. Preventing maternal mental health disorders in the context of poverty: pilot efficacy of a dyadic intervention. *Am. J. Obstet. Gynecol. MFM* 2, 100230. <https://doi.org/10.1016/j.ajogmf.2020.100230>.
- Sutter-Dallay, A.L., et al., 2004. Women with anxiety disorders during pregnancy are at increased risk of intense postnatal depressive symptoms: a prospective survey of the MATQUID cohort. *Eur. Psychiatry* 19 (8), 459–463.
- Fawcett, E.J., et al., 2019. The Prevalence of Anxiety Disorders During Pregnancy and the Postpartum Period: a Multivariate Bayesian Meta-Analysis. *J. Clin. Psychiatry* 80 (4).
- Kempler, L., et al., 2016. Do psychosocial sleep interventions improve infant sleep or maternal mood in the postnatal period? A systematic review and meta-analysis of randomised controlled trials. *Sleep Med. Rev.* 29, 15–22.
- Douglas, P.S., Hill, P.S., 2013. Behavioral sleep interventions in the first six months of life do not improve outcomes for mothers or infants: a systematic review. *J. Dev. Behav. Pediatr.* 34 (7), 497–507.
- Goh, J.X., Hall, J.A., Rosenthal, R., 2016. Mini meta-analysis of your own studies: some arguments on why and a primer on how. *Soc. Personal Psychol. Compass* 10 (10), 535–549.
- Hiscock, H., et al., 2014. Preventing early infant sleep and crying problems and postnatal depression: a randomized trial. *Pediatrics* 133 (2), e346–e354.
- Dennis, C.L., Ross, L., 2005. Relationships among infant sleep patterns, maternal fatigue, and development of depressive symptomatology. *Birth* 32 (3), 187–193.
- Berry, O.O., Monk, C., 2020. Intimate partner violence and psychological interventions in low-income and middle-income countries. *Lancet Psychiatry* 7 (2), 114–116.