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A CO-PARENT INTERVENTION TO REDUCE PRENATAL DEPRESSION IN LOW-INCOME COUPLES: A PILOT STUDY

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**A CO-PARENT INTERVENTION TO REDUCE PRENATAL DEPRESSION IN
LOW-INCOME COUPLES: A PILOT STUDY**

A Dissertation Presented

by

RACHEL J. HERMAN

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DEDICATION

Dedicated to my grandmother, Pauline Herman, who valued family, education, and service.

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First and foremost, I want to acknowledge my advisor, Maureen Perry-Jenkins. Thank you for empowering me to take on such an ambitious project. Throughout my graduate school journey, you have guided and supported me with passion, trust, and kindness. I am forever grateful.

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Finally, thank you to the families who participated in this research project. You define resilience and courage, and I will carry your stories with me forever.

ABSTRACT

A CO-PARENT INTERVENTION TO REDUCE PRENATAL DEPRESSION IN LOW-INCOME COUPLES: A PILOT STUDY

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Significant health disparities in the U.S. place low-income and racial and ethnic minority families at greater risk for parental depression, stress and poorer outcomes for children. The goal of this quasi-experimental pilot study was to assess the initial feasibility, acceptability, and efficacy of an intervention aimed at reducing stress and depression in a sample of low-income expectant parents early in pregnancy. Twenty-four couples (48 participants) were assigned to the 6-week PREParing for Parenthood (PREP) intervention and 22 couples (46 participants) were assigned to a treatment-as-usual comparison group. The group intervention consisted of six sessions during pregnancy and was taught by paraprofessionals in a community setting. The psychoeducational group was partner-inclusive and focused on a) depression reduction and stress management and b) enhancing the co-parent relationship. Interviews were completed at baseline and post-intervention to assess for depression (CES-D), perceived stress (PSS), and physiological stress via hair CORT. Analyses indicated significant program effects for mothers' depression and fathers' perceived stress. No significant effects were observed for mothers' perceived stress, fathers' depression, or physiological stress. The brief and

accessible nature of the PREP program makes it a promising candidate to enhance at-risk parents' mental health during a critical window of pregnancy.

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CHAPTER 1

INTRODUCTION

One in five expectant mothers will suffer from depression during the perinatal period (defined as the period from pregnancy to 1-year post-childbirth), making it the most common complication of childbirth (Gavin et al., 2005). Rates are even higher among low-income and ethnic and racial minority women, who face a host of social and economic stressors during the transition to parenthood (Ertel, Rich-Edwards, & Koenen, 2011). Decades of research document the consequences of postnatal depression on the entire family system (Goodman et al., 2006; Goodman, 2003); however, there is increasing recognition that mental health problems during the *prenatal period* are also common and harmful (Gavin et al., 2005). Prenatal depression is linked to poorer mental health outcomes for mothers and negative developmental outcomes in offspring, beginning in utero. For example, there is evidence that prenatal depression adversely affects fetal growth and increases the risk of obstetric complications, such as premature delivery (Field, Diego, & Hernandez-Reif, 2006). Additionally, infants born to depressed mothers are more likely to have difficult temperaments and attentional, emotional, and behavioral problems later in childhood (Field, 2011).

Recently, there has been an increased recognition that fathers are also at risk for mental health problems during pregnancy. In fact, research indicates that close to 10% of fathers (and up to 50% of fathers with a depressed partner) experience elevated depressive symptoms during pregnancy (Cameron, 2016). There is emerging evidence that prenatal paternal depression is also associated with negative child outcomes, including behavioral problems later in life (Ramchandani et al., 2008).

Researchers have sought to identify the mechanisms connecting prenatal depression to adverse developmental outcomes. One hypothesis is that prenatal depression places children at risk because it is a strong predictor of parents' postnatal mental health. For both mothers and fathers, depression during pregnancy is the most potent risk factor for postnatal depression, which is associated with less responsive and consistent parenting and poorer child outcomes (Lovejoy, Graczyk, O'Hare, & Neumana, 2000; Paulson, Dauber & Leiferman, 2006). There is also evidence that depression harms the developing fetus through the physiological and hormonal changes associated with depressed mood. Among pregnant women, there is evidence that stress—and its hormonal output cortisol—plays a key role in transmitting the negative effects of depression to offspring (Davis et al., 2007).

In light of the prevalence and potentially negative consequences of prenatal depression and stress for mothers, fathers and infants, there is a pressing need to develop interventions to prevent or mitigate the negative impact of prenatal depression and stress on families. Although many interventions target depressive symptoms in the postnatal period, few specifically target the prenatal period or take a preventative approach. In fact, only 23% of depressed women, and far fewer men, receive any kind of mental health care during pregnancy (Kopelman et al., 2013).

Additionally, there is compelling evidence that mothers' and fathers' mental health are interconnected and that the quality of the partner relationship influences how well new parents cope with the transition to parenthood (Paulson & Bazemore, 2010). Despite evidence that couple-focused interventions yield the strongest effects on parents' mental health, many intervention programs for new parents focus solely on mothers and

do not include fathers or incorporate a family systems approach (Field et al., 2011). Thus, the goal of the present study was to evaluate a novel, couple-focused, preventative intervention designed to reduce stress and depression early in pregnancy. We specifically targeted low-income mothers and fathers expecting their first child, with the aim of building knowledge around effective preventive interventions for vulnerable families.

The following literature review begins with an overview of the prevalence of maternal and paternal depression across the perinatal period. Next, consequences of mothers' and fathers' depression on the family system are reviewed, with an emphasis on the negative effects of prenatal depression and stress on children's development. I then outline the correlates and risk factors for prenatal depression, with the goal of highlighting key sites for intervention. Finally, the review ends with a systematic analysis of existing group-based, prenatal interventions aimed at reducing prenatal depression and stress.

1.1 Maternal Perinatal Depression

Perinatal depression affects up to 20% of new mothers (Gavin et al., 2005). While research has generally focused on postpartum depression, there is increasing recognition that many women also experience elevated depressive symptoms in the prenatal period. In fact, some longitudinal studies indicate that the rate of maternal depression is higher during pregnancy than in the postpartum period. The research literature on the course and stability of maternal depressive symptoms across the perinatal period is inconsistent. For example, Antoinette and colleagues (2011) reported the highest rates of clinical depression during the first trimester of pregnancy, while Bennett (2004) found the highest

rates of depression in the second trimester of pregnancy. There is, however, consistent evidence suggesting prenatal depression is a common and potent risk factor for postnatal depression. Indeed, the majority of cases of postpartum depression are preceded by an episode of prenatal depression (Bowen et al. 2012; Heron et al. 2004; Lee & Chung, 2007).

Prenatal depression is associated with negative developmental outcomes in children, higher levels of marital discord, more interparental and family-level conflict, and an increased risk of long-term mental health problems for mothers and fathers (Paulson & Bazemore, 2010). Depressed women are at greater risk for adverse birth outcomes including premature delivery, low birth weight and pre-eclampsia compared to nondepressed women (Field, 2011).

In terms of child outcomes, research indicates that the negative toll of maternal depression on the offspring begins in utero, via dysregulation of the maternal neuroendocrine system (Field et al., 2005; Davis et al., 2007). Infants born to depressed mothers display higher levels of withdrawal and irritability, are less responsive to facial and vocal expressions, and are less active compared to infants who are not exposed to maternal depression in pregnancy (Feldman et al., 2009; Field, 2010). Young children whose mothers were depressed during pregnancy continue to experience difficulties in early childhood, including reduced concentration, problems with peers, and an increased rate of insecure attachment (Campbell et al., 1995, Meadows et al., 2007, Righetti-Veltima et al., 2003). Longitudinal studies have shown that these negative developmental consequences extend into later childhood. Specifically, prenatal depression has been associated with greater risk of childhood and adolescent behavioral and developmental

problems, such as more negative affect and poorer emotion regulation, less cooperation, poorer cognitive and language functioning, and increased risk of adolescent mental health problems (Pawlby, Hay, Sharp, Waters, & Pariante, 2011, Pearson, 2013). Notably, parental depression does not need to be severe in order to have a deleterious effect on child development. Children exposed to subclinical levels of depression remain at risk for emotional and behavioral problems (Goodman et al, 2011).

1.2 Paternal Perinatal Depression

While maternal perinatal depression has received the bulk of the attention, the developing literature on paternal depression suggests that fathers are also at increased risk of depression during the transition to parenthood. Recent studies indicate that approximately 8-12% of new fathers experience elevated depressive symptoms during the perinatal period; however, prevalence rates are as high as 50% among men with severely depressed partners (Goodman, 2003; Paulson et al., 2006; Perren, von Wyl, Burgin, Simoni, & von Klitzing, 2005; Pinheiro et al., 2006). Similar to the course of maternal prenatal depression, there is evidence that depressive symptoms may be even more common in the prenatal period for men. Moreover, 86% of fathers with prenatal depression continue to experience elevated symptoms during the postnatal period (Kim & Swain, 2007). Given that prevalence estimates for depression among adult men in the US is about 5% (Kessler et al., 2003), the prenatal period is a clearly a window of increased mental health risk for fathers.

Although the research connecting paternal depression to children's development is sparse relative to maternal depression, there is converging evidence that depressive

symptoms in men also have deleterious effects on the couple relationship and children's wellbeing. Ramchandani (2011) found that paternal depression during pregnancy and in the immediate postnatal period, was associated with lower levels of relationship satisfaction, lower levels of partner affection and greater partner criticism, even when controlling for maternal depression. The negative effects of paternal depression on children are observed early, beginning in infancy. For example, studies have found that paternal depressive symptoms during pregnancy were related to excessive infant crying, independent of maternal depressive symptoms (Van Den Berg, 2009). Longitudinal studies have found that, controlling for maternal depressive symptoms, the children of fathers who are depressed during pregnancy are more likely to exhibit problems with hyperactivity, physical aggression, emotional regulation, and peers compared to children whose fathers were not depressed (Fletcher, 2011; Kvalevaag, 2013). Depression in fathers in the early perinatal appears to be a particular risk factor for children's externalizing problems, such as oppositional defiant disorder and conduct disorders (Davis et al., 2011; Paulson et al., 2009; Ramchandani et al., 2005; Ramchandani, O'Connor, et al., 2008).

1.3 Dual Parent Depression

Most recently, there has been recognition of the potential additive effects of dual-parent depression on parental mental health and childhood development. Two recent meta-analyses of paternal depression found a strong correlation between maternal and paternal depression, suggesting that elevated depressive symptomatology in one partner is significantly associated with increased depressive symptoms in the other partner

(Cameron, 2016; Paulson & Bazemore, 2010). The underlying reason for the co-occurrence of depression in couples is undetermined, but it has been suggested that one partner's psychological state may directly influence the other partner; or that men and women who are at risk of depression are more likely to seek out relationships with partners who are also at risk of poor mental health (Deater-Deckard, 1998). In a study examining the interrelationship between paternal and maternal depression among first-time parents, prenatal paternal depression was a significant predictor of change in maternal depressive symptoms such that mothers whose partners were depressed prenatally were more than four times more likely to have worsened depressive symptoms six months later. In contrast, when fathers were not depressed prenatally, maternal depressive symptoms were more likely to improve over time (Paulson, 2016).

Given this couple comorbidity, some researchers have suggested that effects on children's development previously attributed solely to maternal depression may actually be partially accounted for by fathers' mental health or factors related to both parents (Field, 2011; Ramchandani et al., 2008). There is also evidence that exposure to two parents with depression conveys an additive risk of poor developmental outcomes for children above and beyond the sum of the independent effects of each parent's illness (Mezulis, Hyde, & Clark, 2004).

1.4 Transmission of Risk: Prenatal Depression and Stress

The mechanisms underlying the associations between parental depression and child and family outcomes are complex and include a range of genetic, biological, and environmental pathways (Cummings & Davies, 1994; Murray & Cooper, 1997). There is

evidence that risk is transmitted from depressed mothers to offspring beginning in pregnancy. This body of research, sometimes referred to as the “fetal origins hypothesis” or “fetal programming”, suggests that exposure to adverse conditions in utero—such as elevated levels of maternal cortisol—influences fetal neurobehavioral development, which increases the risk of developmental problems later in life. Researchers have found that depressed women exhibit atypical hypothalamic-pituitary-adrenal axis (HPA) function in pregnancy, such as hypersecretion of cortisol, and that maternal cortisol levels mediate the relationship between prenatal depression, fetal growth rate and gestational age (Field, 2011; Diego et al., 2006). It is estimated that 10–20% of maternal cortisol passes through the placenta to the fetus, which, under conditions of stress–induced elevated maternal HPA activity, may exert long-term effects on the developing fetal brain (Sandman et al, 2006).

There is emerging evidence that the impact of stress and depression on fetal development during pregnancy is time-sensitive. Offspring may be particularly vulnerable to maternal stress and depression during the first and second trimesters of pregnancy, because of the significant neural and brain development that takes place early in gestation (DiPietro, 2004; Mulder et al., 2002). Although fathers’ influence on the early intrauterine environment is rarely considered, given the correlation between maternal and paternal depression, it plausible that prenatal, paternal depression indirectly impact fetal development by increasing mothers’ risk for stress and depression early in pregnancy (Davis et al., 2006; Mulder et al., 2002; Sandman et al., 2006).

High or chronic levels of maternal stress may also influence fetal development in the absence of maternal depression. Indeed, there is a substantial body of evidence

suggesting that exposure to prenatal stress increases the likelihood of children developing emotional and cognitive problems, including an increased risk of attention deficit hyperactivity disorder (ADHD), anxiety, and language delay independent of maternal depressive symptoms (Talge et al., 2007). Thus, maternal stress during pregnancy may place babies at risk for negative developmental outcomes even when mothers are not depressed.

Another way prenatal depression may set the stage for downstream developmental consequences in children is through its toll on the home environment and parenting quality. Prenatal depression places parents at increased risk for postnatal depression, which is associated with lower quality parenting and, in turn, poorer socioemotional adjustment in children (Hoffman et al., 2006). Depressed mothers and fathers tend to be less responsive, attuned, and engaged with their infants, which has a long-term impact on children's emotional and cognitive development (Lovejoy et al., 2000).

Given the high prevalence rates of perinatal depression and the clear evidence that depression and stress places mothers, fathers and children at risk for a host of negative developmental consequences beginning in utero, there has been interest in identifying risk and protective factors linked to mental health in pregnancy.

1.5 Risk Factors for Perinatal Depression

In general, findings regarding the correlates of prenatal depression in women are consistent with meta-analyses evaluating postpartum depression. Researchers have found that a history of maternal depression, maternal anxiety, negative life events and life stress (including intimate partner violence), low self-esteem, negative attitude toward

pregnancy, lack of social support, and being uninsured are strong predictors of prenatal depression in women (Gavin, 2011; Lancaster, 2010). The limited literature examining correlates of paternal, prenatal depression generally aligns with the literature on maternal depression risk factors. For fathers, having a depressed partner, unsupportive marital relationship, history of depression, and low social support are the most common risk factors for depression during pregnancy and in the postpartum period (Deater-Deckard et al., 1998, Field et al., 2006, Johnson & Baker, 2004, Goodman, 2004, Schumacher et al., 2008). The core risk factors for maternal and paternal depression are factors are reviewed in more detail below.

1.5.1 Psychological Factors

One of the most consistent findings in the maternal depression literature is that a history of depression significantly increases the odds of women experiencing depression in pregnancy and the postnatal period. In a systematic review of risk factors for depressive symptoms during pregnancy, Lancaster et al. (2009) found that a personal history of depression was significantly associated with an increased risk of depressive symptoms during pregnancy, indicating that prenatal depression, at least in some women, could be viewed as part of a continuum of depressive symptoms across the perinatal period (Forman, 2000).

Additionally, anxiety during pregnancy is a strong predictor of depressive symptoms during pregnancy and in the postnatal period. In a study of 35,374 pregnant women in Australia, Milgrom (2008) found that a previous history of depression and prenatal anxiety and depressive symptoms were key prenatal risk factors for postnatal

depression. Given the high rates of comorbid anxiety and depression in the perinatal period and in the general population (Pollack, 2005), it is unsurprising that women who are anxious in pregnancy are also at increased risk for depression.

Another psychological risk factor for perinatal depression is self-esteem. An inverse relationship between self-esteem and depressive symptoms has been demonstrated in a number of studies (Beck, 2001; Martin et al., 2006; McVeigh and Smith, 2000). In a study of self-esteem and mental health during early pregnancy, the authors found that self-esteem was a significant predictor of depression during pregnancy (Jomeen, 2004). Pregnant women with high levels of self-esteem may have the personal resources to withstand the stressors of new parenthood and maintain a positive sense of self-worth, buffering them from mental health problems like depression.

The psychological factors that predispose men to perinatal depression appear to parallel those of women. Many studies have found that a personal history of depression is a strong predictor of prenatal and postnatal depression in men (Field, 2006, Goodman, 2004, Matthey et al. 2000). Similarly, Buist et al. (2003) found greater anger and anxiety, and low positive and high negative affect among men during pregnancy were associated with increased risk of depression during and after pregnancy.

There is very limited research examining the relationship between fathers' self-esteem and depressive symptoms; however, there is evidence that anticipatory anxiety and feeling unprepared for fatherhood puts men at risk for stress and adjustment problems during pregnancy and after childbirth. Condon (2004) found that first-time fathers who reported having insufficient information about childbirth, pregnancy and infant care were at greater risk for distress (Condon, 2004). Relatedly, some research

suggests that fathers who endorse the most concern about changes in their social, work, and family life post-childbirth are more likely to develop depressive symptoms (Wee et al., 2011; Gawlik, 2014).

1.5.2 Adverse Life Events, Stress & Daily Hassles

There is consistent evidence that adverse life events, daily hassles, and high perceived stress during pregnancy put women at significant risk for depression during pregnancy and the postnatal period. Stressful life events may be relatively minor “everyday occurrences,” such as work hassles or time pressures (i.e. daily hassles) or significant life events such as illness, death of a relative, separation from partner, or loss of employment. Da Costa et al., (2000) found the hassles score in the first trimester of pregnancy was the most powerful predictor of depression during pregnancy, indicating that high perceived stress early in pregnancy may put women at heightened risk for developing depressed mood later in pregnancy. In a study of low-income, pregnant women, perceived prenatal stress accounted for the greatest proportion of variance in women’s depression scores during pregnancy (Glover, 2014; Schetter & Tanner, 2012).

Many studies have found a relationship between significant adverse life events, trauma and perinatal depression (Abujilban et al., 2014; Bayrampour et al., 2015; Gavin et al., 2011; Glazier et al., 2004). One study found that women who endorsed two or more adverse life events in the previous year were almost three times as likely to have high depressive symptoms during pregnancy (Gavin et al, 2011). Lifetime exposure to traumatic life events, such as domestic violence or emotional, physical or sexual abuse, places women at significant risk for developing depression during pregnancy (Plant et al.,

2013; Robertson-Blackmore et al., 2013). Relatedly, several studies have found that intimate partner violence in the year prior to or during pregnancy, or having experienced a sexual assault, significantly increases the likelihood of maternal depression during pregnancy (Martin et al., 2006). Overall, it appears that stressful or traumatic life events that occur in the year preceding childbirth or during early pregnancy, may be particularly salient risk factors for perinatal depression (Brody et al., 2013; Righetti-Veltima, Conner-Perreard, Bousquet & Manzano, 1998).

Adverse life events and daily hassles also influence fathers' mental health. In a study of 156 depressed and nondepressed, expectant fathers, depressed fathers scored higher on the daily hassles scale during pregnancy than nondepressed fathers (Field, 2006). Likewise, in a recent study following a demographically diverse sample of 3,523 men in New Zealand, the authors found the risk of postpartum depression increased significantly for men who reported higher perceived levels of stress during pregnancy (Underwood, Waldie, D'Souza, Peterson & Morton, 2017). There is very little empirical research examining the relationship between paternal depression in the perinatal period and adverse life events, such as childhood trauma or intimate partner violence.

1.5.3 Social Support and Interpersonal Risk Factors

Social support refers to the exchange of social resources between individuals (Shumaker & Brownell, 1984; Thoits, 1995). Although definitions vary, it is commonly accepted that social support may be emotional, instrumental and/or informational in nature (Haslam, 2006). Social support involves the perception or expectation that support is available as well as the actual provision of resources (Shumaker et al., 1994).

Interestingly, there is some evidence that perceptions of available support may be more influential than actual enacted or received support (Stapleton, 2009). Similarly, the quality of pregnant women's relationships appears to be a stronger predictor of wellbeing than the size of a women's social network (Brugha et al., 1998).

Given that pregnancy is a time of intense physical and emotional change, it is not surprising that social support is one of the strongest and most consistent predictors of new parents' mental health. In a recent review, 100% of the articles reviewed (29/29) found a lack of social support predicted increased depressive symptoms in women during pregnancy and the postnatal period (Biaggi, 2016). In a large cohort study, women with low levels of social support early in pregnancy were more than twice as likely to score above the clinical cut off on the Edinburgh Postnatal Depression Scale throughout pregnancy and post-childbirth, compared to women who reported high levels of social support during pregnancy (Ritter et al., 2000). Social support may be especially protective for low-income, pregnant women who face additional stressors during the perinatal period. Multiple studies have found that low-income women who were dissatisfied with the degree of prenatal support available, were more likely to experience depressed mood during pregnancy and in the immediate postpartum period (Collins, 1993; Westdahl et al., 2007).

The literature suggests that partner support, compared to support provided from other close relationships, may play a particularly critical role during the transition to parenthood (DaCosta, 2007; Dennis & Ross, 2006; Glazier, Elgar, Goel, Holzapfel, 2004; Rini, Dunkel Schetter, Glynn, & Sandman, 2006; Milgrom et al., 2008). In a study of 391 pregnant women, Stapleton et al. (2014) found that higher levels of partner support

during pregnancy were associated with lower levels of prenatal depression, but support from relatives and friends was unrelated to lower prenatal depressive symptoms.

High social conflict (a mother's perceived degree of conflict in her close relationships) is also an interpersonal risk factor for new mothers. In a prospective study following a diverse sample of 1,047 low-income, pregnant women from pregnancy to 1-year postpartum, the authors found that social conflict independently predicted depressive symptoms in pregnancy, above and beyond degree of social support. The questionnaire items that were most strongly linked to depressive symptoms were *feeling let down and unloved, feeling tense from arguing*, and the *frequency of unpleasant and distressing social interactions* (Westdahl et al., 2007).

Turning to men, there is an emerging literature linking paternal depression and social support. Findings generally mirror outcomes on maternal depression, and suggest that expectant fathers who are less satisfied with the support in their close relationships are at greater risk for depression (Edward, Castle, & Mills, 2014; Goodman, 2004). In a large, cohort study of English men during the transition to parenthood, Deater-Deckard and colleagues (1998) found that less social support, lower partnership affection, and higher partnership aggression were all significantly related to elevated paternal depressive symptoms post-childbirth. In one of the only studies examining social support and fathers' mental health prenatally, the quality of fathers' intimate relationships and the size of fathers' social networks were related to fathers' wellbeing during pregnancy (Boyce, Condon, Barton & Corkindale, 2007). Taken together, these studies highlight the critical role of social support during the transition to parenthood for new mothers and

fathers. Of particular relevance are subjective evaluations of social support, partner specific support, and degree of social conflict in interpersonal relationships.

1.5.4 Demographic and Socioeconomic Factors

Multiple risk factors in women's social context compound the chance of developing depression during the perinatal period. Given that racial and ethnic minority mothers, compared to white majority women, are more likely to experience daily stressors, are less likely to report high levels of partner support, and are exposed to a number of societal burdens that cause stress, it is not surprising that minority women are at increased risk for perinatal depression. In a large, cohort study of pregnant women, minority mothers experienced greater depressive symptoms in the prenatal period than white mothers; however, this effect was explained by differences in income, partnership status, and pregnancy intention (Rich-Edwards et al., 2006).

Indeed, many studies have found that indicators of socioeconomic status (SES)—such as unemployment, low income, and low education—are risk factors for perinatal depression (Goyal, Gay & Lee, 2010; Segre, O'Hara, Arndt & Stuart, 2007). There is some evidence that the impact of SES on perinatal mental health may be time-dependent. For instance, in a study of 198 pregnant women (Goyal et al., 2010), low-income women experienced greater depressive symptoms in the third trimester (but not 1-month postnatal) compared to high SES women, suggesting that pregnancy might be a period of elevated risk and particular stress for low-income women.

Very little has been published on the association between demographic and socioeconomic factors and prenatal, paternal depression, but there is some evidence that

younger age, paternal unemployment and financial strain are associated with elevated paternal depressive symptoms (Ballard and Davies, 1996; Boyce et al., 2007; Edward et al., 2015; Figueiredo & Conde, 2011). In a recent study examining the determinants of paternal depression among first-time fathers, the authors found fathers' financial stress (measured by satisfaction with one's present financial situation, income adequacy, and debt) was a significant predictor of elevated depressive symptoms (Da Costa et al., 2017). Overall, SES appears to be a significant risk factor for depression in prenatal and postnatal periods, and when multiple SES risk factors are present, risk for developing perinatal depression is compounded.

The literature on risk and protective factors has informed the development of interventions designed to enhance the wellbeing of new mothers and fathers. Despite the accumulating evidence that many women and men develop depression early in pregnancy (Banti et al., 2011), and the fact that prenatal depression has far-reaching and harmful effects on families, most intervention efforts do not target expectant parents' prenatal mental health, especially early in pregnancy (Field, 2011). However, over the past few years there has been increased interest in developing and testing interventions that target depression in the prenatal period. The following section is a review of group-based interventions that specifically focus on depressive symptoms in pregnancy.

1.6 Prenatal Group-Based Psychosocial Interventions for Depression

Twenty-two group-based prenatal depression interventions were identified through an electronic database search and a reference list search. Study characteristics and findings are summarized in Appendix A. The studies reviewed varied widely in terms

of theoretical background, mode of delivery, and intervention intensity. Most interventions fell under one of four major approaches: (1) Mind-Body Approaches (MBA), (2) Cognitive-Behavioral Therapy (CBT), (3) Interpersonal Psychotherapy (IPT), and (4) Family/Systems Therapy (FST). Of the 22 studies reviewed, the breakdown of approaches utilized was: 1) four mindfulness studies (Gambrel et al., 2015; Guardino et al., 2014; Vieten et al., 2008; Woolhouse et al., 2014); seven cognitive-behavioral (CBT) studies (Austin et al. 2008; Bittner et al. 2014; Brughha et al., 2000; Elliott et al., 2000; Ortiz et al., 2014; Le et al. 2011; Muñoz et al., 2007); six Interpersonal Psychotherapy (IPT) studies (Crockett et al., 2008; Gao et al., 2010; Kozinszky et al. 2012; Leung & Lam 2012; Zlotnick et al., 2001; Zlotnick et al., 2006); and five family-focused interventions (Buist et al.1999; Daley & McCoy, 2014; Feinberg et al. 2008; Matthey et al. 2004; Shapiro et al., 2005), that is, they explicitly focused on family dynamics and strengthening co-parenting relationships. A few studies combined theoretical approaches (Gambrel, 2015; Kozinksy, 2012; Ortiz, 2014).

1.6.1 Sample Characteristics of Intervention Studies

Lumley and colleagues (2004) described three potential intervention populations: indicated, selected, and universal. Indicated populations include participants currently experiencing elevated mental health symptoms. Selected populations include individuals who are at increased risk of experiencing mental health problems; and universal populations include all individuals within a particular group. Four of the intervention studies reviewed targeted an indicated population (i.e., individuals with elevated depressive symptoms), nine targeted a selected population (i.e., individuals at-risk for

depression or individuals with a history of depression), and nine were universal (i.e. all expectant parents). There were more IPT- and CBT- focused interventions targeting selected or indicated populations, whereas family-focused interventions tended to be universal. Five studies reported results for men.

1.6.2 Structural Characteristics of Intervention Studies

Seventeen studies provided detailed information on intervention intensity. Intervention length ranged considerably, from two to twenty hours. The average intervention length across studies was 10.5 hours. The number of intervention sessions also ranged widely from one to ten sessions, with an average of six sessions per intervention. Six interventions included a postnatal component; typically, a brief postnatal booster session or an individual phone call. There was only one intervention (Feinberg et al., 2008) that included an equal number of prenatal and postnatal sessions. Most interventions occurred in the late 2nd or 3rd trimester, although some studies did not report on intervention timing. Thirteen interventions were mother-focused and did not include partners. Of the nine interventions that did include partners, involvement ranged from “invitations” to attend a single intervention session to attendance at every session. Only seven interventions included partners in more than one intervention session. Family-focused interventions were the most likely to include partners.

Most (10) interventions were taught by licensed clinical psychologists or psychiatrists and other health care professionals. Five were co-taught by psychologists and other health care workers, including nurses (2), social workers (1), and health workers (2). The remaining interventions were facilitated by midwives (5) and

researchers (2). Five studies did not report instructor qualifications. The results of these interventions are summarized below.

1.6.3 Mind-Body Interventions

Interventions comprising mind-body practices are a relatively new approach to the prevention of mental health problems in the perinatal period. Of the four mind-body interventions reviewed, three focused on relaxation techniques and one focused on mindful attunement in relationships. Kabat-Zinn (1994) describes mindfulness as “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally (Kabat-Zinn, 1994, p. 4).” Five factors have been identified as potential mechanisms of change through which mindfulness may impact mental health: exposure, cognitive change, self-management, relaxation and acceptance (Kabat-Zinn, 2003; Dhillon, 2017).

There have been several small trials studying the impact of mindfulness-based group programs during pregnancy. Woolhouse et al. (2014) conducted a small RCT in an Australian hospital to evaluate the feasibility and efficacy of a 6-week group mindfulness intervention (MindBodyBaby). The program introduced participants to the mindfulness approach and strategies, including formal and informal mindfulness practices, mindful movement, and cognitive exercises. The authors found significant within group improvements for anxiety and mindfulness (but not depression or stress) within a universal/low risk population, but there was no evidence of between group differences when comparing the intervention group to the usual care control group. In a similar pilot intervention—Mindful Motherhood—31 pregnant women with “mood concerns” were offered an 8-week mindfulness-based class focused on improving stress and improving

mood in pregnancy and the postnatal period. Compared to the control group, mothers who received the intervention showed reduced negative affect and anxiety scores post intervention, but between group differences were not significant at the 3-month follow up (Vieten, 2008). There were no significant findings for mothers' perceived stress. Another pilot randomized control trial (Guardino, 2014) targeted 47 women with increased stress and anxiety. The authors found significant decreases in pregnancy specific anxiety immediately post-intervention, but the effects were not sustained 3-months postpartum and the intervention did not have a significant impact on mothers' mood or perceived stress compared to the control group. A final pilot study (Gambrel and Piercy, 2014) focused on enhancing relational mindfulness and intrapersonal attunement. There were no significant differences in postnatal depression or perceived stress between the intervention and control groups. However, men in the intervention group reported significant improvements in relationship satisfaction and declines in negative affect post-intervention compared to men in the control group.

Taken together, there is some evidence from small pilot studies suggesting that mindfulness-based interventions may hold promise during the prenatal period, but in general results suggest that the effects are not sustained postpartum. Given that Mind-Body interventions teach participants stress reduction strategies, it is notable that none of the interventions significantly reduced perceived stress. Interestingly, in the one study that included partners, the authors reported stronger effects for men compared to women. Since this study focused on relationship attunement and empathy, it is unclear whether improving relationship satisfaction or enhancing mindfulness skills accounted for the improvements in men's wellbeing.

1.6.4 Cognitive Behavioral Therapy (CBT) Interventions

CBT is a structured, short-term, present-oriented approach to psychotherapy that helps individuals modify unhelpful patterns of thinking and behavior in order to resolve current problems. Treatment also involves helping clients identify, challenge, and modify negative beliefs about themselves, the world, and the future that can lead to depressed mood (Beck, 1991).

One of the earliest CBT-based, prenatal interventions was conducted by Burgha and colleagues (2000), and evaluated the impact of CBT-enhanced, prenatal education program on mothers' wellbeing. In this study, mothers in the intervention group attended prenatal psychoeducational classes targeting social and emotional risk factors for depression. Mothers' partners were encouraged to attend one class and were present at baseline interviews. There were no significant between group differences for mothers' depression. The authors suggested that intervention efforts that target women with clinically significant symptoms (instead of a universal approach) may be more effective.

One of the largest trials of a CBT-based, prenatal intervention was conducted by Kozinszky and colleagues (2012) in Hungary. In this study, 728 women were randomly selected for the CBT/IPT preventive group intervention, while 1,034 women received routine prenatal education. The authors reported that "the fathers were allowed to attend with the mothers" but did not provide information on partner attendance rates. At 6-weeks postpartum, women in the intervention group were less likely to develop depression than control group women, but the intervention was most effective for women who were already experiencing elevated depressive symptomology at baseline. Similarly, Bittner (2014) tested a CBT intervention with pregnant women in their second and third

trimester in a large German hospital. The 8-session intervention consisted of psychoeducation, introduction to cognitive behavioral strategies and progressive muscle relaxation. The authors found no intervention effects on mothers' depressive symptoms three months postpartum other than for participants with clinically elevated depressive symptoms in the first trimester of pregnancy.

A few studies have utilized a CBT approach to specifically target women "at risk" for postnatal depression. For example, Austin et al. (2008) completed an RCT with 277 "at risk" women who endorsed a history of depression or had elevated depressive symptoms. Participants were randomized to a CBT group intervention or control condition (information booklet). Over the course of the study, depression scores decreased significantly among women with high baseline depression scores (EPDS > 12) in the control and intervention groups; however, there were no significant between-group differences. The authors posited that the CBT booklet of information provided to women in the control condition was a more powerful intervention than expected.

There have also been efforts to develop and test CBT interventions for populations at sociodemographic risk for depression. Le et al., (2011) evaluated the Mothers and Babies Course, which specifically targeted low-income, Latina mothers in the US. The program consisted of eight CBT group sessions and focused on mood regulation skills. Women assigned to the control group received usual prenatal care. The intervention significantly reduced depressive symptoms for women in the intervention group compared to the control group immediately after the intervention, but the effects were not sustained postpartum.

Urizar and colleagues (2007) examined the impact of the Mothers and Babies program on perceived stress and salivary cortisol in 86 women at risk for depression. This is one of the only studies to examine whether a prenatal intervention influences salivary cortisol and self-reported stress in low-income women. The authors found lower maternal cortisol levels in the intervention group at 1 and 18 months postnatal compared to women in the control group, and significantly lower levels of perceived stress among women in the intervention group at 6 months postpartum. This study focused on stress and did not report results for mothers' depression.

Only two CBT-focused interventions included partners. Ortiz et al. (2014) randomly assigned 184 couples at psychosocial risk for depression (low-income, low social support) to a standard prenatal care or a unique intervention that included humanistic and cognitive components, such as connecting somatic symptoms to emotion and enhancing affective bonds between partners. No significant between group differences were reported for depression; however, women in the intervention group experienced lower rates of preterm birth. The authors did not collect outcome data from men. Elliott et al., (2000) assigned women to a 5-session CBT/psychoeducational intervention or standard care. Partners were encouraged to attend one of the five intervention sessions. The authors reported significantly lower depression scores at 12 months postnatal, but only for first-time mothers.

Taken together, the evidence supporting CBT-based preventative interventions is inconclusive. The strongest evidence for these programs appears to be for women who are already depressed, are at greater risk for experiencing depression in the perinatal period or are first-time mothers. In one of the only studies that significantly reduced

maternal postnatal depression, partners were encouraged to attend one intervention session. Therefore, it is possible that the inclusion of partners was protective and enhanced treatment response. No CBT-focused interventions collected outcome data from men, so it is unclear if CBT interventions are effective in reducing paternal depression. Likewise, only one of the interventions reviewed collected outcome data on stress, so the impact of CBT-focused interventions on stress is undetermined.

1.6.5 Interpersonal Interventions

Interpersonal psychotherapy is a time-limited form of psychotherapy that focuses specifically on improving or changing expectations regarding interpersonal relationships (Klerman, Weissman, Rounsaville, & Chevron, 1984; Stuart, & Robertson, 2003).

Interpersonal Psychotherapy (IPT) is designed to treat depression by helping individuals resolve interpersonal problem areas, such as interpersonal role disputes, role transitions, grief, and interpersonal deficits that are related to the onset and maintenance of depression (Grote, 2009).

One of the first IPT-based antenatal interventions targeted depression among low-income pregnant women (Zlotnick, 2006). The authors randomly assigned 99 women at risk for depression to a 5-session IPT intervention or to standard antenatal care. The ROSE intervention focused on improving close relationships and familial communication, enhancing social networks, and managing role transitions. The authors reported that at three months postnatal, 20% of the women in the standard antenatal care condition had developed postpartum major depressive disorder compared with 4% in the intervention condition.

These results were consistent with an earlier pilot study of the ROSE program (Zlotnick, 2001), and suggest that IPT-based programs hold promise for women at increased risk for depression.

Crockett (2008) adapted the ROSE program for rural, low-income, African-American women. Participants were 36, African-American pregnant women at risk for postpartum depression (PPD). Women were randomly assigned to the ROSE intervention or a standard care control group. While women in the intervention group experienced a decline in depressive symptoms over time, differences between the control and intervention group were not significant. Likewise, there were no significant, between-group differences on postnatal parenting stress.

Two other IPT-based, antenatal interventions for depression have been conducted in China (Gao et al., 2010 & Leung et al., 2012). Gao and colleagues randomly assigned 194 first-time mothers to standard antenatal care or to a brief IPT intervention targeting interpersonal problem areas, such as role transitions and interpersonal conflicts. Women receiving the IPT intervention reported significantly fewer depressive symptoms at 6-weeks postpartum compared to women who received routine childbirth education. Leung et al (2012), evaluated a novel IPT group intervention that focused specifically on intergenerational family conflict. Participants were 156 pregnant women who planned to involve grandparents in childcare. The 4-week program was IPT-based and designed to help new parents manage intergenerational conflicts in sharing childcare; the control group received standard antenatal care. The authors found no significant differences in depression between the intervention group and control group. Perceived stress was significantly lower immediately post-intervention in the intervention group, but effects

were not sustained postnatally. Of note, the effects of the intervention were stronger for women who were depressed at baseline, suggesting the intervention may be more effective for a higher risk sample.

In sum, the evidence supporting IPT prenatal interventions is promising, particularly for women who are at increased risk for postnatal depression. Only one IPT-focused intervention collected outcome data on perceived stress, and results were promising (Leung & Lam, 2012). Despite the focus on role transitions and improving close relationships, none of the IPT interventions included fathers.

1.6.6 Family-Focused Interventions

Family therapy is based on systems theory, and focuses on the ways in which family interactions affect individual and overall family functioning. Family therapies target perinatal depression through modifying family dynamics and enhancing communication, emotional support, conflict management, and problem-solving skills (Cluxton-Keller, 2018).

One of the first antenatal, family-focused, preventative interventions for prenatal depression was conducted by Buist and colleagues (1999). In this small Australian pilot study, 43 women at risk for postnatal depression were randomly assigned to standard care or a 10-week prenatal class focused on preparing for parenthood, coping skills, and family life. The majority of women in the intervention group attended classes with a partner. No significant changes in depression scores were observed for women in the study, and no outcome data were collected from men.

There is some indication that family-focused interventions may be more effective among women at psychosocial risk. Matthey, Kavanagh, Howie, Barnett, and Charles (2004) evaluated the effects of a single, 2-hour class (added to a standard six-week prenatal class) designed to help first-time parents develop greater empathy for one another and increase psychosocial adjustment. Couples were randomized to the intervention group, standard prenatal care, or a non-specific “baby-play” control group. Women with low, prenatal self-esteem who received the intervention reported reduced postpartum depression at six weeks postpartum compared to women in the control conditions, but effects were not observed at 6 months postpartum. There was no intervention effect on men’s depression scores.

Feinberg (2008) found stronger intervention effects among women with lower levels of education and with higher baseline depression scores. The authors randomly assigned couples to standard care or an intervention focused on conflict management, co-parenting, problem solving and communication. The intervention was delivered to couples in pregnancy and the postpartum period (4 classes prenatal, 4 classes postnatal). Women in the intervention reported significantly lower levels of postnatal maternal depression and anxiety compared to women in the control group, but there was no effect on fathers’ depression. Moderator analyses revealed that the intervention consistently had a stronger effect for less educated mothers. Of note, given that the intervention included classes during pregnancy and post-childbirth, the authors could not assess whether the program’s impact on maternal depression occurred before the baby’s birth.

A few family-focused interventions have also had a positive impact on fathers’ mental health. Shapiro et al. (2005) assigned couples to a waitlist control group or a two-

day workshop focused on strengthening the couple relationship, facilitating father involvement, and providing parents with information about infant development and parenting. Postpartum depression changed quadratically for mothers and fathers in the intervention group compared to participants in the control group (that is, depression scores increased from baseline to 3 months but then improved significantly from 3 months to 1 year postpartum). The authors hypothesized that the intervention may have increased couple conflict immediately post-intervention, which could lead to temporary distress, but that over time parents' new conflict resolution skills were protective.

A low-intensity, prenatal intervention to enhance relationship functioning during the transition to parenthood also found positive effects for fathers (Daley et al., 2014). One family-therapy focused session was added to the typical antenatal education class and targeted (1) enhancing realistic expectations about becoming parents and (2) the development of communication skills to improve problem-solving. The control group received usual care. Women's depression scores decreased over time, but the effect was nonsignificant. However, a medium effect was found for men in the intervention condition who reported significant improvements in psychological distress compared with men in the control condition.

In general, family-focused interventions are more likely to target (and measure) both maternal and paternal wellbeing compared to other approaches. While results have been mixed, there is evidence that these programs are protective for parents' mental health and wellbeing. In general, results tend to be stronger among "at risk" women with higher baseline depression scores or lower levels of self-esteem; however, the majority of family-focused interventions are universal and do not target high risk families. Two out

of the four family-focused interventions that collected data from men had a positive effect on men's wellbeing, suggesting that family-focused approaches may benefit mothers and fathers. None of the family-focused interventions reviewed collected outcome data on perceived stress.

1.7 Implications for Interventions Targeting Prenatal Depression

A review of the prenatal intervention and prevention literature indicates that group-based treatment and support during pregnancy may prevent depressive symptoms from increasing or developing in the postnatal period, but results tend to be modest and findings are inconsistent. There is not clear evidence supporting one theoretical orientation over another; however, the effects of mind-body interventions on depression may be less likely to be sustained over time relative to other approaches. Most mind-body intervention studies collected outcome data on perceived stress, but results were nonsignificant. Given how few other studies collected outcome data on stress, it is unclear whether these programs reduce stress in the prenatal period.

Most intervention studies and many health services aimed at improving mental health in the prenatal period target mothers and do not collect outcome data from fathers. In general, prenatal interventions are more effective among women who have greater baseline distress or are otherwise "at-risk." Among the studies that have collected outcome data from men, two had no effect on men's mental health and three studies reported positive outcomes for men. Therefore, there is emerging evidence that prenatal interventions can have a positive impact on mothers' and fathers' mental health in

pregnancy and beyond; however, conclusions are limited because methodological approach—including population, intervention intensity, and content— vary considerably.

While there is an increasing number of preventative interventions targeting depression in the prenatal period, most interventions target parental mental health in the late third trimester or in the postnatal period. Given the emerging research base suggesting that the first 26 weeks of pregnancy are a particularly sensitive time for fetal development and parents' mental health, another reason for the modest effects of many prenatal interventions may be that they occur too late pregnancy. Another limitation is that most prenatal interventions do not explicitly target stress during pregnancy. Most studies did not collect outcome data on perceived stress or physiological stress. Given that stress plays a key role in the onset, maintenance, and transmission of risk from depressed mothers to offspring, there is a critical need to understand whether prenatal interventions can reduce physiological and perceived stress, a known risk factor for poor obstetric and poor child outcomes.

Finally, despite evidence that low-income and racial and ethnic minority parents are more likely to experience depression during the perinatal period, only six of the 22 interventions reviewed specifically targeted low-income or minority individuals. All of the family-focused interventions that reported sample demographics targeted middle-class couples. In fact, there are no known family-focused, prenatal depression interventions that have explicitly targeted low-income, or racially and ethnically diverse populations. Partner support is a core protective factor during pregnancy; thus, there is a pressing need to develop partner-inclusive interventions for underserved families aimed at reducing depression and stress in the prenatal period.

1.8 PREParing for Parenthood: A Co-Parent Intervention to Reduce Prenatal Stress and Depression

Our research team endeavored to develop a novel, community-based intervention to prevent stress and depression in first-time, low-income parents. The intervention was developed by this investigator in collaboration with family interventionists and community collaborators. The intervention was developed through a review of the risk and protective factors associated with perinatal depression. Guided by the literature on risk and protective factors associated with perinatal depression as well as research on intervention development, we focused on the contextual factors and risk mechanisms that are considered most malleable in the perinatal period (Wright et al., 2016). Partner support and the quality of the marital relationship emerged as consistent protective factors for expectant parents' mental health. High stress and low parenting self-efficacy during pregnancy were associated with poor mental health during the perinatal period (Glover, 2014; Jomeen, 2004; Schetter & Tanner, 2012). Thus, we reasoned that targeting co-parent relationships, enhancing parental self-efficacy, and decreasing stress early in the prenatal period could reduce stress and depression during pregnancy and after birth. Indeed, several relationship-focused interventions have been shown to decrease depression, stress, and anxiety during the perinatal period (Daley et al., 2014; Feinberg & Kan, 2008; Shapiro et al., 2005).

During the intervention development phase, we also drew from our own qualitative experiences working directly with families clinically and from two existing relationship-focused interventions (the developers of these interventions collaborated with the first author to develop the PREP program). The PREP curriculum includes

exercises from the evidence-based Supporting Father Involvement (SFI) program (Cowan, Cowan, Pruett & Pruett, 2007) and Choices in Childbirth and Co-Parenting Program (Straus, 2016). Supporting Father Involvement (SFI) has been shown to enhance the stability of couple relationships and reduce parenting stress, anxiety and depression (Pruett, 2017); however, due to the program's duration and intensity (16 sessions and led by masters-level clinicians), there are challenges to disseminating the model broadly, particularly within communities with limited resources. The other program we drew from—Choices in Childbirth and Co-Parenting (3CP)—is a couples-focused group intervention that has not yet been empirically evaluated but has been successfully implemented in Family Resource Centers across Massachusetts. Neither of these programs focuses specifically on the early pregnancy period. Thus, our goal was to build on these existing relationship-focused interventions to develop a new program appropriate for the early pregnancy period, that is both aligned with the stressors and risk factors facing low-income, racially and ethnically diverse expectant parents, and that can be feasibly delivered by community-based family support agencies operating with limited resources.

1.9 Intervention Development

Weisz and colleagues (2004) have suggested a deployment-focused model of intervention development that focuses on developing and testing interventions with the kinds of participants and in the contexts for which the interventions are ultimately intended. This framework also involves incorporating feedback and perspectives from multiple stakeholders early in the intervention testing process. Therefore, we collaborated

with a local family agency that supports young parents in the greater Springfield community while we developed PREP. This agency offers the Healthy Families Program through the Maternal Infant and Early Childhood Home Visiting (MIECHV) initiative. The Healthy Families program matches first-time parents with trained family educators who visit families' homes to provide support during pregnancy and the child's first three years of life. The Healthy Families program also includes parent education and support groups. In order to develop a sustainable program, we designed PREP to be consistent with Healthy Families group guidelines. For example, we limited the intervention to six weeks (2 hours per class) and developed content that was consistent with the educational background and skill level of the Healthy Family instructors. Although six weeks of programming is relatively short compared to many perinatal interventions; a primary aim was to develop a program that, if effective, could be easily incorporated into current programming practices. Thus, relative to previous couple-focused interventions, the PREP program is shorter and largely psychoeducational rather than process-oriented or psychotherapeutic in nature.

Investigators developed the initial PREP instructor guide through an iterative feedback process involving multiple meetings. Table 1 presents known risk factors for perinatal depression, the specific components of the PREP intervention that target these factors, and the expected outcomes for each program component. This curriculum was reviewed with community collaborators in order to tailor the content and intervention format to the needs of the collaborating community agency and instructors. For example, one major adaption we made to the SFI and 3CP programs was broadening the definition of co-parent. SFI and 3CP (and other relationship-focused transition to parenthood

interventions) (Feinberg & Kan, 2008) require women to participate with the baby's father or current romantic partner. While this approach is consistent with the goal of bolstering father involvement and enhancing couple relationships, it excludes many young mothers whose primary support during pregnancy is a family member or friend (McHale, 2009; Jones & Lindahl, 2011). In our program, we focused on engaging fathers whenever possible, but took a more inclusive approach to co-parenting, and invited mothers to participate with a non-father support person when appropriate. This approach was recommended by staff from our partner agency, who shared that many mothers in the Healthy Families program did not have relationships with the baby's biological father, but received support during and after pregnancy from family members. We reasoned that these relationships were subject to similar strains and stressors that romantic partnerships are, and that strengthening all forms of co-parenting relationships would benefit families. Indeed, the co-parenting literature does not specify that a romantic or marital relationship is inherent in the co-parenting construct (McHale & Lindahl, 2011). Instead, co-parenting quite simply refers to the coordination of childrearing responsibilities between two adults.

Another decision we made was to integrate pragmatic information on pregnancy, childbirth, and newborn care into our relationally-focused program. We received feedback from our community partners that first-time parents were less likely to enroll in a program that exclusively focused on relationship dynamics, because it could be viewed as stigmatizing or less pertinent to the educational needs of first-time parents. We were also aware that many of the young expectant couples we were recruiting were not in stable or long-term romantic partnerships, and that a program that was presented as exclusively focused on relationships and co-parenting could be viewed as intimidating or

irrelevant. Additionally, because the cost of childbirth education and parenting classes in the area is prohibitive for many low-income families, we decided to incorporate information on birth plans and choices in childbirth into the curriculum. We reasoned that providing this information could help empower parents and increase feelings of agency, competence and self-efficacy, which are related to improvements in mental health for both mothers (Wernand et al., 2014) and fathers (Juntala et al., 2015). However, given our goal of enhancing the co-parent relationship, we intentionally structured these exercises to be partner-inclusive and emphasized the role of fathers and couple communication. Similarly, the curriculum exercises that focused on stress reduction emphasized the role of partner support (e.g., couple activity focused on coping with daily hassles and increasing daily “uplifts” and positive exchanges between partners). By integrating content from relationship-focused interventions, depression and stress-reduction interventions, and parenting preparation programs, we aimed to: 1) strengthen the co-parenting relationship, 2) reduce stress and enhance wellbeing, and 3) increase knowledge and preparation for childbirth.

A session-by-session curriculum guide is presented in Appendix B. This guide presents the focus and rationale of each curriculum exercise in greater detail. Curriculum sessions include: one session on choices in childbirth, one session on newborn care, and four sessions focused on strengthening the co-parenting relationship (e.g., enhancing communication, problem solving and conflict resolution skills) and reducing parental stress and depression. In terms of structure, the curriculum integrates short instructional presentations, videos, interactive activities, mindfulness, and couple/partner discussion. The curriculum was designed to be led by a male and female instructor pair.

Members of the research team provided a two-day training with a small group of Healthy Family educators who had been selected by their supervisors to be PREP instructors. The training involved an overview of the theoretical underpinnings and research base that informed the PREP curriculum, teaching demonstrations and role-plays. Given that the goal of this pilot study was to first examine the feasibility and acceptability of PREP under the “best” circumstances, we also scheduled weekly supervision time with instructors once the program began. During supervision meetings, we reviewed feedback forms from participants, summarized content for the upcoming session, and offered support and guidance around managing classroom dynamics (e.g., interruptions or disruptions). Iterative and incremental adjustments were made to the curriculum based on instructors’ feedback and the research team’s observations.

1.10 The Current Study and Research Questions

The primary goal of the research study was to collect pilot feasibility and outcome data on a new group-based preventative intervention—PREParing for Parenthood (PREP)— aimed at reducing depression and stress (both perceived and physiological-cortisol) among expectant low-income mothers and their partners early in the prenatal period. This study addressed three primary research questions:

Research Question 1): What is the feasibility and acceptability of the PREP intervention for first-time pregnant women and their partners?

Research Question 2): Does the PREP intervention reduce prenatal depressive symptoms among first-time pregnant women and their partners compared to a comparison group that does not receive the intervention?

Hypothesis 2): Women and partners in the intervention group will exhibit lower mean depression scores and greater within group change in depressive symptoms at Time 2 (post-intervention) compared to mothers and partners in the comparison group.

Research Question 3): Will the PREP intervention reduce self-reported and physiological stress (hair cortisol) among a community sample of first-time pregnant women and their partners compared to a group that does not receive the intervention?

Hypothesis 3): Women and partners in the intervention group will exhibit lower mean levels of perceived stress and hair cortisol and greater within group change in perceived and physiological stress at Time 2 (post-intervention) compared to mothers and partners in the comparison group.

CHAPTER 2

METHOD

2.1 Research Design

To evaluate PREP, we conducted a pilot, pre-post quasi-experimental study. Twenty-four couples (48 participants) were assigned to the intervention group (6-week PREP class) and 22 couples (44 participants) were assigned to the comparison group (usual care with optional home visiting). This number was consistent with recommendations for pilot and feasibility studies where samples of 15-25 participants per group have been deemed adequate to assess feasibility outcomes (Cocks & Torgerson, 2013; Whitehead, Cooper, & Campbell, 2016). As shown in Figure 1, data from participants were collected at pre-and post-intervention. Self-report measures of depression, perceived stress, and hair cortisol were collected from all participants at both time points, as well as qualitative information regarding the feasibility and acceptability of the PREP program. All study procedures were approved by the Institutional Review Board at the University of Massachusetts Amherst. This project is part of an ongoing pilot study examining the PREP program. The larger study includes a third wave of data collection approximately eight weeks post-birth.

2.2 Recruitment and Study Setting

We collaborated with OBGYN offices in Springfield MA to facilitate recruitment into the study. The goals and the details of the study were explained to doctors, midwives, and staff at participating recruitment sites. During prenatal visits, providers described the study to first-time mothers who were 18 years or older. If mothers were

interested in learning more about the project, they completed a permission slip allowing the provider to share their contact information with the research team. The study RA followed up with the mother within 48 hours to share more information about the study and to confirm eligibility.

Social media was also used to recruit participants. The research team used targeted Facebook advertisements to identify potential participants for the study. We specifically targeted women ages 18-30 who live in the greater Springfield MA area and indicated an interest (on Facebook) in pregnancy, prenatal care, or childbirth. Women who clicked the advertisement were routed to the study Facebook page, where they were invited to contact the research team over Facebook messenger, phone, or email to learn more about the study.

Participant eligibility was assessed through an initial screening phone call with the study RA. Women were eligible to join the study if they were 18 years or older, 10-20 weeks pregnant with their first child, fluent in English, had an identifiable co-parent or support person, and were MassHealth eligible (our index of low-income status). During this phone call, the RA provided potential participants with more detailed information about the study, answered questions, and confirmed eligibility criteria. If the baby's father was unknown or was uninvolved, women were informed that a support person, such as a close family member, could participate. Women were told that some participants would attend a six-week prenatal class and other participants would be offered home visiting. If women and their partners were eligible, interested and available to attend the prenatal class, they were assigned to the intervention group. If otherwise eligible women were either unable to attend the prenatal class due to scheduling

constraints or enrolled in the study when the intervention was not being offered (due to instructor unavailability or insufficient number of participants to run a class), they were assigned to the comparison group. Following the initial phone call, the RA scheduled an in-person, Time 1 interview to collect informed consent and baseline measures. After eight couples were recruited and had completed their Time 1 interview, the first six-week PREP program began; we then repeated this process a second and third time, resulting in three intervention groups. Comparison group couples were enrolled into the study on an ongoing basis.

Family support professionals (one male and one female) from Square One, a family support agency in Springfield, MA, were trained by the research team to deliver the intervention. Our goal was to train paraprofessionals in the community to deliver the intervention so that it would be sustainable into the future. As such, the class was developed and structured to meet Square One requirements for a parenting group. The six-week intervention was held at the UMass Center in downtown Springfield, MA.

2.3 Procedure

Baseline (Time 1) interviews were conducted at participants' homes or at the UMass Center in Springfield. After obtaining informed consent, mothers and partners were interviewed separately by trained graduate students or the study PI. Interviews lasted approximately 1.5 hours, and each participant was paid \$25 for completing the interview (\$50 per couple). Baseline data on participants' depression and stress levels were collected at this time. Participants were also given the option to participate in the

cortisol component of the study, and study staff collected hair samples at the Time 1 interview from willing participants.

Participants assigned to the intervention group attended a six-week, group prenatal class beginning in the 2nd trimester of pregnancy and were also offered home visiting through the Healthy Families program at Square One. Eight couples enrolled in each six-week series, which were taught by male and female Healthy Families Educators who were trained by study staff.

To examine the feasibility of PREP, we collected data on session attendance (including explanations for missed sessions). After each session, we collected acceptability and satisfaction data via brief questionnaires from participants and Healthy Family Educators. Research staff monitored sessions to assess intervention fidelity (i.e., whether each intervention component was delivered in a comparable manner across groups). The RAs used fidelity checklists to monitor and document adherence to the PREP curriculum.

Participants assigned to the comparison group were offered home visiting only. Couples in the comparison group who opted to enroll in regular home visiting received monthly visits from a Healthy Families Educator. Visits become more frequent as the mother's due date approached. Home visitors taught participants proper baby care, promoted nurturing and attachment, and ensured parents acquired a solid understanding of healthy child development. They also counseled parents on achieving personal goals such as returning to school or obtaining employment. Participants in the comparison group who did not elect to receive home visiting received standard prenatal care. Given

that home visiting is a universal support offered to all first-time parents in Massachusetts, the comparison group constitutes “usual care” for first-time couples in the state.

Time 2 interviews occurred approximately 8-10 weeks after the Time 1 interviews (1-3 weeks after class completion for the intervention group). All baseline measures were repeated and hair samples were again collected from willing participants at this time. Study staff completed semi-structured qualitative interviews with participants during the Time 2 interview regarding participants’ experiences in the class (See Appendix E for qualitative interview).

2.4 Measures

2.4.1 Demographic Variables

Participants provided detailed information on demographic variables (race/ethnicity, age, income, previous mental health history, education, employment status, marital status, pregnancy intention, gestational age) during face-to-face interviews at baseline. Participants were also asked to report on perceived financial strain using a single item: “How difficult is it for you to live on your total household income right now?” Responses are rated on a four-point scale ranging from 0 (not at all difficult) to 4 (feels impossible).

2.4.2 Depressive Symptoms

Parental symptoms of depression were measured via the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item questionnaire designed to measure

depressive symptomatology. Participants were asked to consider the previous seven days and to indicate how often they experienced depressed mood, feelings of helplessness and hopelessness, sadness, loss of appetite, and sleep disturbances. Sample items include, “I felt sad,” “I was bothered by things that don’t usually bother me,” and “I felt hopeful about the future.” Responses are rated on a four-point scale, ranging from 0 (rarely or none of the time; less than one day a week) to 3 (most or all of the time; 5 – 7 days a week). CES-D scores range from 0 to 60; the higher the score, the greater the depressive symptomatology. A CES-D score of 16 or above indicates clinical levels of depression. Cronbach’s alpha was .87 for women and 0.82 for men. See Appendix C for complete measure.

2.4.3 Perceived Stress

We utilized the Perceived Stress Scale (PSS; Cohen, 1983), a ten-item questionnaire, to measure perceived stress. Items assess the degree to which individuals believe their life has been unpredictable, uncontrollable, and overloaded during the previous month. Sample items include, “In the past month, how often have you been unable to control important things in your life” and “In the past month, how often have you felt nervous and stressed.” Responses are rated on a five-point Likert scale, ranging from 0 (never) to 4 (very often). PSS scores range from 0 to 40; the higher the score, the greater the perceived stress. Cronbach’s alpha was .86 for women and .81 for men. See Appendix D for complete measure.

2.4.4 Physiological Stress

Hair samples were collected in order to assess chronic levels of cortisol. Hair cortisol is a relatively new and reliable way to measure cumulative cortisol exposure as opposed to the momentary assessments provided by salivary cortisol, and provides a superior measure for assessing levels of chronic stress (Meyer & Novak, 2012). Hair samples (>10mg) were used to assess each participant's average level of cortisol for the past three months. The hair was obtained from a one cm area in the posterior vertex region of the head using round-tipped scissors cutting close to the scalp. Hair samples were cut and measured at the time of collection, placed in aluminum foil, and delivered to the UMass Amherst laboratory to be assayed.

2.4.5 Satisfaction Survey

A participant satisfaction questionnaire was designed for this study. Research staff collected the anonymous survey following each intervention session. The first 10 items asked participants to assess their satisfaction with various aspects of intervention on a 5-point scale, with responses ranging from *strongly disagree* (1) to *strongly agree* (5). Sample items include, “The group leaders were engaging and held my interest”, “The topics covered were relevant to me”, and “The group leaders were warm and welcoming.” Four other items on the satisfaction survey were presented in an open-ended format, and inquired into what participants liked and disliked about the session. See Appendix F for complete survey.

2.5 Data Analysis Plan

Research Question 1) Feasibility outcomes included successful recruitment and retention of trial participants, intervention fidelity, identification of barriers to implementation of the intervention, and the feasibility of collecting outcome assessment data. To assess program feasibility, feedback provided from participants (post-session and at program end) was reviewed and coded to identify recurrent themes concerning acceptability of the intervention and satisfaction with intervention content. Fidelity data from RAs were used to assess program content and transmission across groups. To determine retention, we calculated proportions of participants who attended all intervention sessions or only a portion of them.

Research Questions 2 & 3) Pearson chi-square analyses for categorical variables and independent sample t-tests for continuous data were conducted to test for baseline group differences in demographic variables in order to identify potential covariates to be included in multivariate analyses of intervention effects. Intervention effects on depressive symptoms, self-reported stress and physiological stress were examined by two-way repeated measures ANCOVAs (group \times time (T1 & T2)) controlling for gestational age. Effect sizes for all outcomes were calculated using Cohen's d , which represents the difference between two means divided by the pooled standard deviation for those means.

CHAPTER 3

RESULTS

3.1 Research Question 1: Feasibility

3.1.1 Recruitment

Our initial goal was to recruit participants from area medical providers; however, we had more success recruiting participants over social media than through outreach to community OBGYN clinics. Three participants were recruited directly from medical providers, one from Square One, and one from the Healthy Families Home Visiting program. All other couples who enrolled in the study were recruited via Facebook.

Eligibility criteria were quite specific, and we struggled to recruit women from local OBGYN practices. Our recruitment process was especially challenging given that we were targeting a specific period of pregnancy. That is, the group had to start shortly after initiating recruitment in order to ensure mothers would be in their second trimesters. The barriers to recruitment from OBGYN practices tended to be pragmatic. Most commonly, midwives reported having a very limited amount of time with patients, which left little time to screen patients for eligibility or discuss optional activities such as research projects. We were also limited by IRB restrictions which prevented providers from directly recommending our program to families. Other barriers included lack of interest and staff “buy-in,” and a limited number of potential participants due to the stringent eligibility criteria. There was also some concern regarding content overlap with clinic offerings. For example, one midwife at a community clinic expressed concern that referring patients to the PREP program might reduce attendance at the practice’s own

group prenatal care program. Given these recruitment challenges, we focused our efforts on recruiting potential participants through social media.

The investigator used Facebook's self-service application to create six ads, each accompanied by a different image but with similar copy: "Having your first baby? Receive free prenatal education and get paid for participating in a research study at the same time. Message us to learn more!" Ad images included stock photos of pregnant women and other pregnancy related imagery. Ad copy and images adhered to Facebook and IRB guidelines. The ad was designed to display to Facebook users who were 18 years or older, English-language speakers, and lived within 15 miles of Springfield, MA. We used Facebook's interest-based targeting capacities to target women who had indicated Facebook "interest" (through Facebook page "likes" and Facebook Apps) in at least one of the following topics: baby shower, pregnancy, childbirth, and prenatal care. Facebook estimated that approximately 7,100 Facebook users matched these audience parameters. Daily budget was set to \$5.00 per day and was optimized for maximizing link clicks. The ad ran for several weeks at a time during active recruitment windows. The total campaign cost over the 18-month recruitment period was \$3,200.

Clicking on the ad led users to the Facebook messaging platform, where they were automatically sent to a screening survey to assess eligibility. The initial screening survey included the following questions: 1) Where do you live?; 2) Are you pregnant with your first baby?; 3) What is your due date?; and 4) Are you 18 years or older? After initial eligibility information was collected, follow-up screening questions were sent via Facebook messenger or reviewed by phone, and more detailed information about the

study was shared with the family by phone. Informed consent was collected from study participants at the Time 1, baseline in-person interviews with research staff.

A total of 346 women (and four men) clicked our Facebook advertisement to request more information about the study. Of the participants who clicked the ad, 39% (n=136) did not answer initial screening questions or reply to the introductory welcome message. Of the 210 mothers who responded to the Facebook ad, 34 mothers answered the initial screening questions over FB messenger, appeared eligible, but did not provide a telephone number or respond to follow-up FB messages. Nineteen (19) mothers answered initial screening questions over FB, appeared eligible, provided their contact information, but did not respond to phone calls or texts from the research team. Of the remaining 157 women who were screened over FB messenger or by phone: (a) 38 were not eligible because their family income exceeded \$50,000; (b) 31 were not eligible because they were not first-time mothers; (c) 30 were not eligible because they were too far along in their pregnancies; (d) 20 could not participate due to scheduling or logistical problems (e.g., work schedule, lack of time, class location inconvenient, or temporary living situation); (e) 19 were not eligible because they did not have a support person who could participate with them; (f) nine were not interested (unknown reasons) after hearing more about the study; (g) four were not eligible because they had serious pregnancy complications (e.g., baby diagnosed with anencephaly or severe morning sickness); (h) two only wanted home visiting; (i) two were Spanish speakers, and; (j) two were not comfortable providing personal information (e.g., due date or birthdate) over phone or Facebook.

3.1.2 Participants

A total of 46 dyads (92 participants) enrolled in the study and completed baseline measures (refer to Figure 2 for CONSORT flow diagram). Twenty-four (24) couples were assigned to the intervention condition and attended the prenatal group, and 22 couples were assigned to the comparison group. Table 2 presents demographics by group assignment and Table 3 presents participant demographics. The majority of women enrolled in the study with the baby's biological father (n=37; 80.4%). Six women (13.0%) participated with their own mothers, two (4.3%) enrolled with a sister, and one (2.2%) enrolled with a friend. The majority of women (n=33, 73.3%) were not married to the baby's father but were currently in a romantic relationship with the baby's father and cohabitating (n=33; 73.3%). Mothers and fathers tended to be in their early to mid-twenties, and the sample was diverse in terms of race and ethnicity. The majority of mothers (60.9%) and partners (82.6%) were employed. Most women and partners had graduated from high school, and some attended college. Average family income was \$44,656. Most women (65%) and men (56%) indicated that it was "somewhat difficult" or "very difficult" to live on their current household income. About half (n=22) of the women were receiving public assistance at enrollment. The majority of mothers at baseline reported that their pregnancy was unplanned (n=27; 58.7%). Mean gestational age at baseline interview was 20 weeks and 87% (n=40) of women were in their first or second trimester of pregnancy at study enrollment.

Allocation to the intervention versus comparison group appeared to yield equivalent groups, as analyses indicated no significant differences between groups on a broad range of baseline variables. Specifically, there were no statistically significant baseline differences between mothers assigned to the intervention versus the comparison

condition in terms of age ($t=-1.10, p > .05$), income ($t=-0.01, p > .05$), weeks gestation ($t=1.02, p > .05$), employment status ($t=2.9, p > .05$), marital status ($t=-0.67, p > .05$), previous mental health diagnosis ($t=2.90, p > .05$), baseline depression ($t=-1.54, p > .05$), baseline perceived stress ($t=-0.77, p > .05$), or baseline hair CORT ($t=-0.45, p > .05$). However, mothers in the intervention group were on average a few weeks further along in their pregnancies. Additionally, twice as many mothers in the comparison group ($n=4$) participated with their own mothers compared to mothers in the intervention group ($n=2$), but the majority of women in both groups participated in the study with the biological father (see Table 2).

Turning to partners, there were no significant baseline differences between partners assigned to the intervention versus the comparison condition in terms of age ($t=0.01, p > .05$), employment status ($t=0.02, p > .05$), previous mental health diagnosis ($t=0.01, p > .05$), baseline depression ($t=0.02, p > .05$) and baseline perceived stress ($t=2.90, p > .05$). There was a marginally significant difference between baseline hair CORT values ($t=3.50, p > .05$), such that mean hair CORT level in the intervention group was higher than baseline hair CORT level in the comparison group.

3.1.3 Session Attendance & Attrition

Table 4 presents average attendance and data collection summary. Mothers attended an average of 4.50 classes and partners attended an average of 4.42 sessions. The majority of couples (63% of mothers and 58% of fathers) attended all sessions or only missed one session. Only 12.5% of mothers and 12.5% of partners attended one or two sessions, and one couple (mother and partner) attended no sessions. Two out of the

four mothers who attended two or fewer sessions had enrolled in the study with their mothers. The third couple only attended one session because the mother was placed on bed rest, and the fourth couple dropped out for unknown reasons. There were only a few cases in which a mother attended a session and the partner did not (partner was ill or had a family obligation). The most common reasons for missed sessions were: illness, family emergencies, family obligations (e.g., baby shower), and travel. Attendance was least consistent during our third intervention group that took place in December-January, likely due to holiday-related travel and family obligations.

Of the four couples who attended 0-2 classes, three couples were no longer enrolled in the study at T2. The one couple who remained enrolled in the study was removed from analyses because they experienced medical complications and only attended one class. Therefore, all couples included in analyses attended at least 50% of the intervention sessions.

About three quarters of mothers (n=36; 78%) completed the Time 2 interview. Of the mothers who did not complete the Time 2 interview, five were in the comparison group and five were in the intervention group. Of the ten mothers who did not complete the Time 2 interview, six were lost to follow-up and four completed a Time 3 post-birth interview. Reasons for missing the Time 2 interview included: family move, relationship instability, premature delivery, and lack of response/unknown reasons. There were a few cases (n=4) of mothers who participated in the Time 2 interview, but partners who did not. Partners who did not complete the Time 2 interview tended to be older than partners who did complete the Time 2 interview. This likely reflects the fact that several of the

partners who did not complete the Time 2 interview were participating with their daughters.

There were no other significant differences in baseline demographics between participants who completed the Time 2 interview and those who did not. Overall, more participants in the comparison group were lost to follow-up than intervention group participants, but the difference was not significant ($t=0.01, p>.05$). Baseline depression and stress scores did not predict study attrition for mothers ($t=0.06, p>.05$; $t=-0.13, p>.05$) or partners ($t=-1.23, p>.05$; $t=-2.02, p>.05$).

In our study, only two intervention couples and three comparison couples were enrolled in home-visiting during the course of the study. Couples tended to feel that home visiting was more useful post-birth, and a significant number of couples in our study reported they would consider home visits after their baby was born, but did not feel this resource would be helpful during pregnancy.

3.1.4 Instructor Training

Members of the research team provided a two-day training with a small group of Healthy Family educators who had been selected by their supervisors to be PREP instructors. This training occurred prior to the first intervention class. While eager and enthusiastic, our instructors also required significant levels of support during the class in order to maintain high program fidelity. Members of the research team met with the male-female instructor pairs each week to prepare for the upcoming class. We also provided didactic instruction on teaching fundamentals (i.e., strategies to increase participation and engagement, utilizing self-disclosure effectively) during these meetings.

A member of the research team attended each class and was available for live consultation if needed. The research team tried to maintain a discreet presence during the class, and trainers rarely required in-the-moment support with curriculum content; however, the research team did provide support with the A/V equipment, class materials, and helped the trainers with time management (for example, adding or subtracting exercises depending on the class pace).

Another instructor challenge pertained to the required time demands. All of our instructors were full-time home visitors at Square One, and participated in this project in addition to their home visiting responsibilities. Understandably, instructors reported that it was difficult to find time to independently review the curriculum outside of weekly supervision. We also struggled with attrition among our young male instructors who commonly reported difficulties balancing full-time home-visiting, leading the weeknight PREP group, and managing their own family responsibilities. Thus, while our female instructor facilitated all three groups, we had to recruit a new male instructor for each iteration. It was also challenging to identify male instructors, given the paucity of male home visitors and agency employees. A key strength of the program, however, was having both a male and female instructor.

3.1.5 Hair Cortisol Collection

At Time 1, 67% (n=31) of pregnant women and 48% of partners (n=22) provided hair samples. Fewer participants provided hair samples at Time 2 (19 mothers; 14 partners). The most common reasons for declining to participate in this aspect of the study were: interview location (several interviews were conducted in a public location,

such as a coffee shop, which prevented hair collection), hair length (e.g., too short) or hair style (e.g., braided). A few couples (n=3) did not participate in the hair collection because they were uncomfortable with the procedure. Follow-up interviews were more frequently conducted in public locations, which contributed to the lower rates of hair collection at Time 2. In these situations, we were unable to collect hair samples due to privacy and sanitary concerns.

3.1.6 Curriculum Fidelity

Research staff completed fidelity checklists while observing each class. Observer ratings indicated that the program was implemented as planned, with an average of 92% of the curriculum content delivered per session. Instructors sometimes asked trainers for content reminders during the sessions, so it is possible that the high degree of fidelity to the curriculum was related to the availability and presence of the research staff.

3.1.7 Intervention Content, Satisfaction and Participant Feedback

Mothers and partners in the intervention group completed satisfaction questionnaires following each class. Satisfaction was extremely high, and there was little variability by class, session, or questionnaire item. Average survey satisfaction score was a 4.6/5 for mothers and a 4.8/5 for fathers. Participants also provided open-ended written feedback following each session and after the six sessions. When asked about overall strengths of the class, the following themes emerged from mothers: meaningful and fun to interact with other new parents, good advice on parenting, enjoyed the focus on couple communication, enjoyed hands-on activities, happy that fathers were involved. Partners

indicated the following strengths: good relationships between parents in the class, enjoyed learning new things, liked learning communication skills, and enjoyed meeting and talking with other expectant dads.

Participants were also asked about areas for improvement for the class. Mothers identified the following improvements: more information about childbirth, more meditation exercises, more time for group discussion with mother- and father-only groups, and more time spent on newborn care. Mothers also requested more information on child development, birth videos, and more “hands on” baby care activities. Partners identified the following areas for improvement: more information about childbirth, increase structure for some activities, and more time for breaks. Partners also indicated that they wished they had learned more about newborn care and breastfeeding.

Both mothers and partners felt that the group dynamic was an important aspect of the experience. When asked about the importance of the group interaction, participants commented that they made friends and bonded with group members, felt that things were brought up in the group that they wouldn’t have thought of alone, learned from others in the group, and felt “less alone” because of the group.

The mindfulness exercises at the end of each class were the one aspect of the curriculum where participant feedback was less consistent. While several participants commented that the relaxation exercises were the most helpful aspect of the class, a few participants indicated that the breathing exercises increased their anxiety and stress. Given how polarized the group was, we allowed participants who did not find the breathing exercises helpful to draw or substitute a different relaxing activity. We also

supplemented with mindfulness activities that were not focused on breathing (e.g., guided gratitude meditation), which tended to be more well-received.

We also received feedback from one mother who attended the class with her mother that it was upsetting for her to be in a room with so many mothers and fathers, because it highlighted the fact that the father of her child was not involved. Indeed, developing activities that were inclusive and relevant for a range of dyads (mother-father, mother-sister, mother-friend, mother-mother) was a challenge.

A final curricular modification we made was to increase the structure of some of the group and couples exercises after we observed a tendency for participants to become sidetracked or end discussions prematurely when provided with a list of open-ended question prompts. This was especially true for our very young couples, who likely had less experience and comfort discussing difficult topics with their partners or asking each other questions to deepen the dialogue. In response, we found that increasing structure and providing more explicit instructions (e.g., *make a list of your top three concerns regarding childbirth* instead of *have an open-ended dialogue about childbirth concerns*) yielded more productive discussions. It is unclear whether this modification would be necessary in groups with more trained and experienced group leaders.

Instructors also completed surveys after each class session and provided written feedback about their experience teaching the class. Instructors commented that they enjoyed having the opportunity to work with mothers and fathers together and valued the focus on communication and building strong relationships. Instructors also shared that they integrated information from the PREP training into their individual home visiting work, and felt that they would have benefited from a similar class when they were new

parents. In terms of challenges, instructors indicated that it was difficult to find time to prepare for teaching given demands at work and home, sometimes felt overwhelmed by the amount of content and information per session, found the curriculum guide difficult to follow, and would prefer more group activities.

3.2 Research Question 2: Results

Repeated measures ANCOVAs were conducted to determine the effect of the intervention on depressive and perceived stress symptoms and hair CORT values controlling for weeks gestation. During an initial examination of the data, CORT values (pg/mg) were found to be positively skewed and were therefore log-transformed. Analyses were conducted with and without statistical outliers, and the pattern and direction of results remained consistent in all cases, thus outliers were retained. ANCOVA results exclude participants with missing data at post-intervention (see Approach to Missing Data section). Data are presented as mean \pm standard deviation.

3.2.1 Potential Confounding Variables

Before conducting primary analyses, we assessed a number of potential confounding variables that might explain some of the variance observed in our outcomes. Gestational age was significantly correlated with depression and perceived stress, marginally different between groups at baseline, and was therefore included in all analyses as a covariate.

3.2.2 Descriptive Data

Intercorrelations among outcome variables are presented in Table 5 and unadjusted mean scores on all outcome variables are provided in Table 6. Baseline depression and perceived stress scores were higher for women than partners. Similarly, 36.2 % (n=17) of women and 19.0% of partners (n=9) of partners reported CES-D scores that fell within the clinically significant range at baseline. This higher rate of paternal depressive symptoms is notable, given that recent prevalence estimates suggest that 8-12% of new fathers experience elevated depressive symptoms during the perinatal period (Goodman, 2003; Paulson et al., 2006; Perren, von Wyl, Burgin, Simoni, & von Klitzing, 2005; Pinheiro et al., 2006).

Baseline depression scores were higher among minority women ($M=16.17$, $SD=9.4$) compared to White women ($M=12.90$, $SD=7.77$). Women's perceived stress scores were similar across racial/ethnic groups at baseline. For partners, baseline depression scores were also higher among minority partners ($M=11.47$, $SD=7.49$) compared to White partners ($M=9.78$, $SD=6.42$), whereas, partners' perceived stress scores were similar across racial/ethnic groups at baseline. Age was unrelated to depressive or perceived stress scores for women and partners. Baseline depressive symptoms were correlated with family income for partners ($r=-.36$, $p<.05$), but not for mothers ($r=-.05$, $p=.74$).

As expected, depression was correlated with perceived stress for mothers and partners at baseline and follow-up. Unexpectedly, hair CORT was not correlated with perceived stress or depression for mothers or partners at baseline. In terms of across participant correlations, women and partner depression and stress scores tended to be

correlated. Mothers' hair CORT and partners' hair CORT were correlated at baseline but not follow-up.

3.2.3 Intervention Effects: Depression, Perceived Stress, and Physiological Stress

Mothers. Results of intervention impact are summarized in Table 6 and baseline and post-test scores for each participant are presented in Figures 3-7. Among mothers, there was no significant main effect of time on depression, $F(1, 31) = 0.55, p = .46$. There was also no significant between-subjects effect of group on depression, $F(1, 31) = 0.87, p = .36$. However, as expected, there was a significant group by time interaction such that depressive symptoms decreased from baseline ($M = 16.3 \pm 11.5$) to post-intervention ($M = 12.9 \pm 10.7$) for mothers in the intervention group, whereas depression increased from baseline ($M = 12.9 \pm 6.9$) to post-intervention (13.2 ± 10.9) for mothers in the comparison group, $F(1, 31) = 4.2, p = .05$. Cohen's d for mothers' depression was .41, which constitutes a medium effect size.

There was no significant main effect of time on perceived stress, $F(1, 31) = 0.89, p = .35$. There was also no between-subjects effect of group on perceived stress, $F(1, 31) = 0.37, p = .55$. Counter to our hypothesis, there was also no significant group by time interactive effect on perceived stress for mothers, $F(1, 31) = 0.65, p = .65$. Descriptively, self-report stress symptoms decreased from baseline (29.5 ± 7.6) to post-intervention (26.0 ± 7.7) for mothers in the intervention group. Self-report stress symptoms also decreased from baseline (28.1 ± 7.1) to post-intervention (25.0 ± 6.8) for mothers in the comparison group.

Partners (Full Sample). See Figure 3 & 5. There was no significant main effect of time on depression, $F(1, 27) = 0.51, p = .48$. There was also no between-subjects effect of group on depression $F(1, 27) = 0.09, p = .76$. Counter to our hypothesis, there was also no significant group by time interactive effect on partners' depression, $F(1, 28) = 1.6, p = .22$. Descriptively, depressive symptoms increased from baseline (8.8 ± 6.5) to post-intervention (12.7 ± 11.4) for partners in the intervention group, whereas symptoms did not change from baseline (11.2 ± 4.6) to post-intervention (11.5 ± 6.4) for partners in the comparison group. However, as noted, this difference was not significant.

There was a marginally significant main effect of time on partners' stress ($F(1, 27) = 3.21, p = .08$), such that partners' perceived stress decreased on average from baseline to follow-up. There was no between-subjects effect of group on stress, $F(1, 27) = 0.11, p = .75$. Counter to our hypothesis, there was also no statistically significant difference in post-intervention perceived stress symptoms between the intervention and comparison group for partners ($F(1, 27) = .14, p = .71$). Descriptively, perceived stress symptoms decreased slightly from baseline (23.6 ± 6.9) to post-intervention (22.9 ± 7.6) for partners in the intervention group. Perceived stress symptoms increased slightly from baseline (24.4 ± 6.9) to post-intervention (24.6 ± 3.7) for partners in the comparison group.

Biological Fathers Only. See Figure 4 & 6. When limiting the sample to biological fathers only, there was again no significant main effect of time on depression, $F(1, 23) = 0.12, p = .74$. There was also no between-subjects effect of group on depression, $F(1, 23) = 0.02, p = .90$. Counter to our hypothesis, there was also no statistically significant difference group by time interactive effect on depression, $F(1, 23)$

= .10, $p=.75$. Descriptively, depressive symptoms increased from baseline (9.0 ± 6.7) to post-intervention (10.7 ± 9.8) for fathers in the intervention group. Depressive symptoms also increased slightly from baseline (11.4 ± 5.0) to post-intervention (12.1 ± 6.7) for fathers in the comparison group.

There was no significant main effect of time on perceived stress for fathers, $F(1, 23) = 1.11, p = .30$. There was also no between-subjects effect of group on stress, $F(1, 23) = 0.56, p = .46$. However, as hypothesized, there was a significant group by time interaction such that perceived stress symptoms decreased from baseline (23.7 ± 7.3) to post-intervention (21.6 ± 6.6) for fathers in the intervention group, but increased slightly for fathers from baseline (24.3 ± 2.4) to post-intervention (25.5 ± 3.0) for fathers in the comparison group, $F(1, 23) = 5.3, p=.031$. Cohen's d for fathers' self-report stress was .84, which constitutes a large effect size.

3.2.4 Exploratory Results: Hair Cortisol

See Figure 7. Given our very small sample of parents with data at two timepoints (19 mothers, 13 partners), and the feasibility challenges we encountered when collecting hair samples (hair measurement error, short hair length), hair CORT results should be interpreted with caution. For mothers, there was no significant main effect of time on hair CORT ($F(1, 16) = 1.40, p = .27$). However, there was a significant between-subjects effect of group on hair CORT ($F(1, 23) = 8.27, p = .01$), such that hair CORT values for the intervention group ($.48 \pm .22$) tended to be higher than in the comparison group ($.20 \pm .34$). However, there was no significant group by time interaction, $F(1, 16) = 2.19, p=.16$. Descriptively, Hair CORT values did not change from baseline ($0.50 \pm$

0.27) to post-intervention (0.50 ± 0.19) for mothers in the intervention group. In contrast, hair CORT values decreased from baseline ($.33 \pm .27$) to post-intervention ($.10 \pm .42$) for mothers in the comparison group.

Among partners, there was no significant main effect of time on hair CORT ($F(1, 10) = .45, p = .51$) or between-subjects effect of group on hair CORT ($F(1, 10) = 1.10, p = .32$). There was also no significant group by time interaction difference in post-intervention hair CORT values between the intervention group and comparison group, $F(1, 10) = 0.11, p = .75$. Descriptively, Hair CORT values did not change from baseline (0.60 ± 0.26) to post-intervention (0.62 ± 0.19) for partners in the intervention group. In contrast, hair CORT values increased slightly from baseline ($.44 \pm .22$) to post-intervention ($.50 \pm .24$) for partners in the comparison group. No sub-group analyses could be conducted for biological fathers given the limited sample size.

3.2.5 Follow-Up Analyses: Approach to Missing Data

Follow up analyses were conducted in the Mplus 8.1 program (Muthén & Muthén, 1998-2017) using multilevel modeling (MLM) due to its ability to account for missing data using maximum likelihood estimation. This procedure allowed us to utilize data from participants who completed at least one assessment of the relevant dependent variable (i.e., either at baseline or at post-intervention). Additionally, we used the Bayesian estimator in the Mplus program, because simulation studies suggest that it provides more accurate estimates for smaller cluster sizes (Muthén & Asparouhov, 2012). For our models, we allowed the model to be solely influenced by the data by using non-informative priors, because we are not aware of any previous studies testing a similar

intervention for pregnant women and their partners (Muthén, 2010). Of note, in this approach, p -values have a different interpretation; that is, they indicate the chance that a finding is actually in the opposite direction (Muthén & Asparouhov, 2012). Therefore, a p -value of .05 would indicate that there is a 5% chance that the result is actually in the opposite direction.

Using this approach, we fit simple linear growth models estimating change in the relevant outcome variable from baseline to post-intervention at level 1 and between-person differences at level 2. Given that we had only two measurement occasions for each of the outcome variables, to avoid model identification problems, each outcome variable was split into two parallel subscales at each measurement occasion (Cano, Johansen, & Franz, 2005). More specifically, each item was randomly assigned to subscale A or B in order of their variance, thus ensuring that the two subscales have relatively equal variability (Cano et al., 2005). This approach allowed the model to estimate individual variability around the change estimates.

The pattern and direction of results remained with consistent with the ANCOVA results for mothers' depression ($B = -1.35$, $SD = 1.23$, 95% CI = -4.667, 0.545, $p = .08$), mothers' perceived stress ($B = 0.03$, $SD = .96$, 95% CI = -2.095, 1.884, $p = .49$), fathers' depression ($B = .38$, $SD = 1.39$, 95% CI = -1.899, 3.869, $p = .38$), and fathers' perceived stress ($B = -1.77$, $SE = 0.96$, 95% CI = 3.345, 0.116, $p = .04$). Due to the small sample size and exploratory nature of the cortisol findings, we did not replicate these analyses using MLM. Taken together, these results suggest that the significant intervention effects were not simply due to a greater degree of dropout in the comparison group or another type of non-random missingness (e.g., if intervention participants whose depression/stress

improved were less likely to dropout than those whose depression/stress worsened). However, the MLM results for mothers' depression became marginally significant (i.e., there is roughly an 8% chance that the results are in actually in the opposite direction), suggesting that we cannot rule out the possibility that missing data may have influenced the ANCOVA results.

CHAPTER 4

DISCUSSION

To the best of our knowledge, this is the first partner-inclusive, preventative intervention for depression developed specifically for at-risk, low-income families early in pregnancy. In the following discussion, first, “lessons learned” from this pilot study are addressed, focusing on the implementation of the PREP program and feasibility successes and challenges. Second, preliminary effects of the intervention are summarized and discussed. Finally, limitations, implications and recommendations for future research are presented.

4.1 Feasibility Findings: Challenges and Successes

4.1.1 Recruitment

Our greatest feasibility challenge pertained to recruitment. Despite recruitment difficulties with area OBGYN practices, we were quite successful in using social media to recruit potential participants. In fact, 92% of the couples in our study were recruited via Facebook. Utilizing social media appeared to be an especially good fit for our demographic of young, first-time parents given that many young people actively use social media to obtain information about pregnancy and parenting (Harpel, 2018; Lupton, 2016). Our recruitment process adds to the accumulating evidence for using social media to facilitate study recruitment – especially for hard-to-reach populations (Adam, Manca, & Bell, 2016; Kayrouz, Dear, Karin, & Titov, 2016).

Based on phone screens for study enrollment, it was clear that many low-income, first-time parents were eager to enroll in a preparation for parenthood class. Interestingly, the majority of couples who joined the study were not affiliated with the community agency we partnered with. It is plausible that for some expectant parents, psychoeducational classes may feel less stigmatizing than home-based supports offered through community agencies. Thus, offering pregnancy groups may represent a more appealing option for some parents, while also providing an effective means to facilitate recruitment into other family support services, including home visiting.

4.1.2 Research Design

While we had success utilizing social media for recruitment, our flow of eligible participants was slow. Thus, we were not able to randomly assign couples to the intervention or comparison group or stratify the sample by baseline depression scores. Another significant methodological challenge was hair collection for cortisol analyses. Only about 50% of participants provided hair samples across both time points. In general, the barriers to hair collection tended to be logistical rather than due to participant comfort; only a few participants expressed discomfort with the hair collection protocol. Overall, it would have been easier to complete this component of the study if study interviews were completed in a more private setting, like the UMass Center or in participant homes. In future community-based studies, it may be more practical to assess chronic cortisol levels via nail clippings instead of hair samples, because samples can be collected discretely in public locations, or independently at home.

4.1.3 PREP Intervention

Satisfaction scores across all items were quite high suggesting that participants found the topics interesting and relevant, the exercises and activities useful and engaging, and the group atmosphere warm and welcoming. It was clear from both observations in class and participant feedback that the class helped many participants “feel less alone” and increased their social connectedness. Based on participant feedback, the only component of the curriculum that was less well-received was the mindfulness activities, but this was not unanimous. Presenting a wider range of stress-reduction exercises (e.g., guided meditations, partner massage, yoga) may help a broader range of expectant parents.

Another pedagogical challenge involved integrating traditional childbirth education with psychoeducation about stress and depression. We incorporated newborn care basics and childbirth plans into the curriculum because we wanted to expose participants to this content, especially given that most of the families we worked with were not attending formal classes in a hospital setting. Nonetheless, several participants reported that they would have benefited from more practical content focused on newborn care, childbirth, and breastfeeding. While participants in the study appeared to value and enjoy the co-parenting focused content, a clear takeaway was that they also desired information that would be included within a traditional hospital-based pregnancy class. Integrating couple-focused psychosocial support with traditional prenatal education in hospital settings could be an appealing combination for first-time parents.

A final curricular challenge pertained to our decision to allow mothers to participate with co-parents who were not the baby’s biological father. About 80% of

mothers did participate with fathers; however, a few women attended with their mothers, friends, and sisters. While we endeavored to be as inclusive as possible and focus on the importance of social support and connection during pregnancy, there was an inherent challenge in trying to adapt the curriculum to apply to diverse co-parenting dyads. For example, exercises that focused on maintaining emotional intimacy and understanding common reasons for relationship breakdown were less relevant for mothers participating with non-father co-parents. Additionally, since the majority of women in the class attended with the biological father, it is possible that the class may have felt less welcoming for nonbiological caregivers. Adapting the PREP curriculum and facilitating groups specifically for women who are co-parenting with non-father co-parents could be an interesting next step.

4.1.4 Attendance and Attrition

Compared to other group interventions that targeted low SES participants (Muñoz et al., 2007), our attendance rates and retention of around 75% of participants were very good. Incentives including text reminders from research staff, free dinners, raffles for attendance, and money for transportation, likely contributed to our strong attendance rates. Nonetheless, like all studies focused on pregnancy, factors such as medical complications (bed rest) and premature delivery affected study attrition. Developing strategies to increase engagement using technology (e.g., telehealth or web-based support) may help bolster program accessibility and impact.

4.1.5 Training and Instructors

Overall, training paraprofessionals to deliver a psychoeducational intervention with high fidelity was challenging yet feasible. The family educators we trained had some experience leading groups focused on infant care, but none had previous experience with relationally-focused psychoeducational groups. Fortunately, our trainers were enthusiastic about the curriculum content; they valued the program's emphasis on strengthening co-parenting relationships, and reported enjoying the opportunity to work with expectant parent dyads. While eager and enthusiastic, the instructors also required intensive support in order to maintain high program fidelity, and it is possible that the class would not have functioned as smoothly without this high level of support and supervision. Recruiting and retaining male instructors was another significant feasibility challenge. However, in our view, training male instructors to co-lead the group was key to increasing father engagement.

Taken together, our results support that it is possible to train paraprofessionals to lead effective psychoeducational groups. In fact, we believe trained paraprofessionals may have added significantly to the impact of the intervention. For example, we observed many moments (especially with our male instructors and fathers), during which instructors were able to connect with study participants in powerful ways due to shared life experiences. In our view, the meaningful and authentic connections—both between instructors and participants and among group members—were a critical aspect to the overall group experience.

4.2 Intervention Effects: Depression and Stress

This study was a pilot, pre-post quasi-experimental trial of a co-parenting focused intervention (PREP) with a sample of low-income, first-time parents early in pregnancy. The preliminary results of our brief preventative intervention were mixed. Participation in the PREP program led to greater declines in prenatal depressive symptoms for women (but not partners) from baseline to post-intervention, compared to a usual-care comparison group. Perceived stress declined significantly for fathers (but not mothers) in the intervention group relative to the comparison group.

4.2.1 Mother Depression

The results of this pilot study suggest that our community-based, co-parenting program reduced at-risk women's depressive symptoms during pregnancy. This preliminary finding is meaningful for several reasons: First, many of the existing group-based, preventative interventions targeting maternal depression during the perinatal period have not had an effect on women's depressive symptoms (Buist et al., 1999; Crockett et al., 2008; Daley et al., 2014; Gambrel et al., 2015; Leung et al., 2012; Matthey et al., 2004; Woolhouse et al., 2014). Second, our program specifically targeted low-income and ethnically and racially diverse women, while almost all previous programs that have found significant results have targeted primarily white, middle-class, and married women (Feinberg et al., 2008; Gao et al., 2010; Kozinszky et al., 2012; Shapiro et al., 2005). This distinction is important because decades of research suggest that low SES women are most at-risk for negative mental health outcomes during the perinatal period (Ertel, Rich-Edwards, & Koenen, 2011), yet are also the least likely to receive mental healthcare services (Smith et al., 2009).

Our findings also contribute to the broader field of intervention science for low-income, expectant mothers. To date, the limited number of intervention studies that have focused on depression among low SES pregnant women have reported mixed results (Lee et al., 2011; Muñoz et al. 2007; Zlotnick et al., 2006). In light of these findings, the fact that our 6-week program led to significant decreases in prenatal depressive symptoms is especially encouraging and speaks to the potential impact of including and bolstering partner support in preventative programs for maternal depression. Indeed, enhancing partner support may be especially critical for women in less stable partnerships.

Another characteristic that distinguishes PREP from previous programs is the unique structure. Our program was relatively brief (6 sessions during pregnancy) and taught by paraprofessionals. Previous intervention studies that have found positive effects for mothers' depression have tended to be longer in duration and include postnatal booster sessions (Elliott et al., 2000; Feinberg et al., 2008; Lee et al., 2011). Additionally, most successful group interventions cited in the literature have been facilitated by highly trained group leaders, including researchers (Lee et al., 2011) psychologists or psychiatrists with home visitors (Elliott et al., 2000; Kozinszky et al. 2012; Shapiro et al., 2005), midwives or prenatal educators (Feinberg et al., 2008; Gao et al., 2010). Thus, our 6-week program was less resource-intensive and more sustainable than many others. To the best of our knowledge, our program is the first group-based preventive intervention for prenatal depression led exclusively by paraprofessional family educators.

Finally, our program was novel in that we recruited women early in pregnancy. Many of the effective programs reviewed in this paper did not specify the gestational age

of the participants, and those that did tended to enroll mothers in the late second and third trimesters (Kozinszky et al. 2012; Shapiro et al., 2005). While we cannot say for sure whether our program ultimately reduced postnatal depressive symptoms, given the strong association between prenatal and postnatal depression, reducing prenatal depression is a promising finding in its own right. Additionally, given the evidence that prenatal depression adversely affects fetal growth and increases the risk of obstetric complications (DiPietro, 2004; Mulder et al., 2002), our intervention may be protective for maternal and infant health. The fact that our program was also brief and facilitated by paraprofessionals supports PREP as an accessible, community-based program to reduce depressive symptoms in at-risk women during a critical window of pregnancy.

4.2.2 Mother Perceived Stress

Perceived stress decreased from baseline to follow-up for mothers in the intervention and comparison group, but we found no significant Group X Time interaction. Perceived stress scores were quite high at baseline for mothers in both groups, falling within the high stress classification on the Perceived Stress Scale (PSS). At follow-up, average perceived stress scores fell to the moderate range for mothers in both the intervention and comparison groups. While it is encouraging that stress decreased over time among mothers in both groups, it is perplexing that the pattern of results did not mirror our maternal depression findings, especially given that perceived stress and depression tend to be highly correlated (Crockett et al., 2008; Glover, 2014; Schetter & Tanner, 2012). Given that our post-test occurred during pregnancy, it is

possible that any buffering effect of our intervention on mothers' stress could be delayed and emerge when babies are born.

Our findings are consistent with several other group prenatal intervention studies that have also shown no significant effect on mothers' perceived stress (Gambrel et al., 2005; Guardino et al. 2014; Woolhouse et al., 2004). In fact, only one prenatal intervention study reviewed found a significant effect for perceived stress in pregnant women (Leung & Lam, 2012). It should be noted, however, that this was a much larger study conducted in China, and the authors used a 4-item version of the PSS; as such, generalizability is limited. In addition, Guardino and colleagues (2014) conducted a randomized controlled pilot for a 6-week mindfulness-based intervention in a sample of pregnant women experiencing high levels of perceived stress and pregnancy anxiety. While the authors found no between group differences in perceived stress (women in both groups reported decreased perceived stress), women in the mindfulness intervention experienced larger decreases in pregnancy-specific anxiety compared to participants in the comparison group. Therefore, it is possible that in our study, outcome measures that focused more narrowly on pregnancy-specific stress and anxiety would have been more sensitive to detecting intervention effects.

4.2.3 Partner Depression

While our program significantly reduced depressive symptoms for women in the intervention group, the program did not have a significant effect on partners' depressive symptoms. In fact, depression symptoms increased sharply among a few non-father partners in the in the intervention group. When limiting our sample to fathers only,

depression scores increased slightly from baseline to post-intervention in both the intervention and comparison groups. Given how few non-father co-parents completed the follow-up interviews ($n = 4$), we analyzed fathers separately from other partners.

It is unclear why the PREP program reduced mothers' depression but did not appear to affect fathers' depression. Consistent with our results, Feinberg and colleagues (2008) found a significant intervention effect for maternal depression but no significant effect on paternal depression. In fact, the authors reported that the direction of the effect for fathers suggested that their program may have actually slightly increased paternal depression. The authors suspected that their program may have facilitated a "balancing of the burden and strain of early parenthood," and also noted that the levels of paternal depression were much lower than were maternal levels. In our study, it is also possible that fathers had "less room to fall" in terms of depressive symptoms compared to mothers. We also considered whether fathers' participation in the group may have facilitated a balancing of the burden of new parenthood. Indeed, several fathers in the intervention class commented that the class helped them recognize "what they were in for" in terms of new parenthood. Yet, if this were simply the case, we likely would not have concurrently observed a decrease in fathers' self-reported stress in the intervention group.

Another possible explanation for the discrepancy in reduced depressive symptoms between mothers and fathers is that there may be a lag in intervention effects for fathers. Consistent with this, Shapiro et al. (2005) observed evidence of quadratic change, such that mothers and fathers in the intervention group actually appeared "worse" from the baseline-to-three-month interview, but then improved significantly from three months to

one year. Similarly, Daley et al., (2004) reported decreases in men's depression only after babies were born. Thus, it is plausible that the true effect of our intervention for fathers' wellbeing could emerge when "reality hits" and babies are born. Of course, it may simply be that our program was more effective in reducing mother's depressive symptoms than father's. An analysis of father's qualitative feedback post-birth could help shed more light on this discrepancy.

4.2.4 Partner Perceived Stress

To the best of our knowledge, this is the only preventative intervention study in pregnancy to demonstrate positive findings on fathers' perceived stress. Specifically, fathers in the intervention condition reported significant decreases in perceived stress compared to fathers in the comparison condition who reported increased perceived stress. Given that stress levels tend to increase over the course of pregnancy for fathers, this finding is especially notable (Wee, Skouteris, Pier, Richardson, & Milgrom, 2011). We suspect that participation in the group helped empower men and increase their preparedness and confidence in their ability to manage fatherhood, which led to reductions in perceived stress. At the same time, it is curious that intervention group fathers exhibited a decrease in perceived stress but no change in depressive symptoms. Given that perceived stress during pregnancy predicts postpartum depression for men (Underwood et al., 2017), it is possible that decreasing father's stress during pregnancy will have a protective effect on father's postnatal mental health.

4.2.5 Physiological Stress (Hair CORT)

Given the feasibility challenges we encountered collecting hair samples in this community-based study, our ability to interpret the hair CORT results is limited. Participants' hair cortisol levels generally fell within the expected range of values (Einarson, Karaskov, & Koren, 2007). However, in our study, hair CORT levels were not consistently correlated with perceived stress or depression scores for women or partners. We also found no significant Group X Time interactive effects for hair CORT for mothers or partners. However, descriptively, mother's hair CORT values decreased in the comparison group but stayed stable in the intervention group. Hair CORT values essentially stayed flat for partners in both groups. This pattern of results was unexpected, as we expected to observe sharper declines within the intervention group.

While some studies have found a relationship between hair CORT and subjective reports of perceived stress (Einarson et al., 2007), a recent metaanalysis (Stalder et al., 2017) found no consistent associations between self-report measures of perceived stress and hair cortisol concentrations. Instead, results from the meta-analysis suggested that stress-exposed groups (e.g., exposure to a significant trauma, chronic adversity, or natural disaster) tended to exhibit increased hair cortisol concentrations overall. Thus, it is possible that brief interventions like ours may not have the potency to affect hair cortisol concentrations, especially among a population with significant early life adversity.

4.3 Summary, Limitations, and Future Directions

One in five expectant mothers will suffer from depression during the perinatal period (Gavin et al., 2005). Rates are even higher among low-income and ethnic and racial minority women, who face a host of social and economic stressors during the

transition to parenthood (Ertel, Rich-Edwards, & Koenen, 2011). Additionally, there is now increased recognition that fathers are also at risk for mental health problems during pregnancy. In light of the prevalence and negative consequences of prenatal depression and stress for mothers, fathers and infants, we developed a novel, community-based intervention to prevent stress and depression in first-time, low-income parents. Our six-week class, PREParing for Parenthood (PREP) aimed to: 1) strengthen the co-parenting relationship, 2) reduce stress and depression, and 3) increase knowledge and preparation for childbirth. This study presented pilot data on the feasibility and acceptability of the PREP program, and the effect of the intervention on expectant parents' mental health.

In terms of feasibility and acceptability, our program demonstrated notably strong attendance rates, and survey and interview data suggest that the experience for participants was overwhelmingly positive. Nonetheless, some areas for future development emerged. For example, there were indicators that the group felt less relevant and welcoming for mothers participating with non-father co-parents. Given the number of young mothers who live and co-parent with their family of origin, adequately addressing the unique stressors facing intergenerational co-parent dyads is an important future endeavor.

One of our primary feasibility questions at the outset of the study pertained to training paraprofessionals to facilitate the intervention. The PREP program was delivered by paraprofessionals employed as home visitors at a community agency rather than in a highly controlled, university setting. While using paraprofessionals presented some challenges, particularly with respect to retaining male co-leaders and supervision needs, our data suggest that training home visitors to facilitate psychoeducational groups in

pregnancy is possible and may represent a more sustainable and cost-effective way to increase access to services in pregnancy. This finding is particularly promising for communities and agencies with limited resources. Of course, we may have observed stronger effects if the class had been taught by highly trained professionals. Future studies should compare the relative efficacy of interventions taught by paraprofessionals versus highly experienced providers.

As with any community-based study, this project balanced optimal design with feasibility and practical considerations. As previously noted, recruitment in early pregnancy was a major challenge. Logistically, given our recruitment flow, we were not able to randomly assign participants to the intervention or comparison groups. Although we cannot exclude the possibility of selection effects, the fact that women were assigned to either the intervention or comparison group (and did not choose which option was more appealing to them), coupled with the fact that we found no baseline demographic differences between groups adds credibility to our results. Nonetheless, it warrants mentioning that mean baseline maternal depression scores in the intervention group hovered at the clinical cut-off, while mean depression scores in the comparison group fell below the clinical cut-off at baseline. Although baseline depressive symptoms did not impact attendance rates or study attrition, we cannot say with certainty that the imbalance in depressive symptoms at baseline between groups has no bearing on our findings. Partnering with area OBGYN clinics to deliver the intervention or integrating the program into hospital-based offerings may help streamline recruitment processes moving forward and allow for true random assignment.

A final feasibility challenge pertained to hair CORT collection. While participants were comfortable providing hair samples, logistical barriers interfered with this aspect of the study. Future studies in community settings may consider assessing chronic stress levels via finger nail samples. Fingernail cortisol is an emerging chronic stress biomarker with features that may offset some of the challenges we faced by using hair cortisol (Liu & Doan, 2019).

Preliminary results from our study suggest that a prenatal co-parenting-oriented intervention is effective in reducing women's depressive symptoms and men's perceived stress symptoms during pregnancy. Specifically, we found that explicitly targeting co-parenting relationships in the early pregnancy period appears to be an effective method for enhancing mental health during pregnancy, even among unmarried couples. While these preliminary results provide promising signals of program impact, it will be important for future work to examine the long-term effects of our program after childbirth and within larger samples. A larger sample would also allow us to empirically examine the specific mechanisms and processes (e.g., increasing social connectedness, improving effective co-parenting, and enhancing feelings of self-efficacy) that may account for program effects.

Taken together, our results add to the growing literature base on effective prenatal interventions for depression, which have yielded mixed results to date. The present study makes a meaningful contribution to the perinatal intervention literature by developing and pilot testing the first partner-inclusive depression intervention for at-risk families. Results suggest that the PREP program is accessible, feasible, and shows promise for reducing mental health disparities during pregnancy.

Table 1. Prep Program Components

Risk Factors	Program Components	Expected Outcomes
Incomplete understanding of stress and depression	<ul style="list-style-type: none"> <input type="checkbox"/> Psychoeducation on the signs and symptoms of depression during the perinatal period <input type="checkbox"/> Information on the relationship between stress wellbeing, and prenatal health <input type="checkbox"/> Treatment resources and community supports 	<ul style="list-style-type: none"> <input type="checkbox"/> Increased understanding of signs, symptoms and effects of depression on children & families <input type="checkbox"/> Greater compassion for self and others <input type="checkbox"/> Decrease stigma and increased likelihood of help-seeking behavior
Incomplete understanding of infant development and newborn care	<ul style="list-style-type: none"> <input type="checkbox"/> Information and exercises on newborn cues, newborn care basics, and responsive parenting <input type="checkbox"/> Information and exercises on infant development and secure attachment 	<ul style="list-style-type: none"> <input type="checkbox"/> Decrease anxiety <input type="checkbox"/> Enhanced confidence, self-efficacy and parenting competence <input type="checkbox"/> Increase father involvement
Unrealistic expectations about pregnancy, childbirth, and parenting	<ul style="list-style-type: none"> <input type="checkbox"/> Psychoeducation on emotional and physical changes during pregnancy <input type="checkbox"/> Development of birth plan <input type="checkbox"/> Information and exercises related to role/identity shifts during transition to parenthood <input type="checkbox"/> Information and exercises related time demands of new parenthood 	<ul style="list-style-type: none"> <input type="checkbox"/> Decrease violated expectations <input type="checkbox"/> Increase pro-active decision making throughout pregnancy
History of adverse life events and trauma	<ul style="list-style-type: none"> <input type="checkbox"/> Exercises and activities to empower couples regarding choices in childbirth <input type="checkbox"/> Information and activities regarding the intergenerational transmission of stress, depression, and trauma <input type="checkbox"/> “Same and different activities” 	<ul style="list-style-type: none"> <input type="checkbox"/> Enhance perceptions of control and agency <input type="checkbox"/> Decrease traumatic birth experiences <input type="checkbox"/> Develop feelings of empowerment
Relationship conflict and dissatisfaction	<ul style="list-style-type: none"> <input type="checkbox"/> Psychoeducation on marital conflict, co-parenting, relationship stressors for new parents <input type="checkbox"/> Activities to enhance communication and problem solving <input type="checkbox"/> Exercises targeting conflict resolution <input type="checkbox"/> Exercises to enhance perspective taking <input type="checkbox"/> Exercises to enhance expressing appreciation 	<ul style="list-style-type: none"> <input type="checkbox"/> More effective communication and problem solving techniques <input type="checkbox"/> Increase relationship satisfaction and sense of connection <input type="checkbox"/> More effective co-parenting <input type="checkbox"/> Development of a shared vision for the family’s future <input type="checkbox"/> Decrease coparental undermining
Stress and daily hassles	<ul style="list-style-type: none"> <input type="checkbox"/> Mindfulness and deep breathing exercises <input type="checkbox"/> Exercises focusing on cumulative effects of daily hassles and stressors on wellbeing <input type="checkbox"/> Coping skills 	<ul style="list-style-type: none"> <input type="checkbox"/> Decreased daily stress <input type="checkbox"/> Development of adaptive coping skills and new stress-relieving techniques <input type="checkbox"/> Increased positive activities and daily interactions
Inadequate social support	<ul style="list-style-type: none"> <input type="checkbox"/> Psychoeducation on the relationships between social support and wellbeing <input type="checkbox"/> Group activities to enhance group cohesion <input type="checkbox"/> Partner-only and mothers-only activities 	<ul style="list-style-type: none"> <input type="checkbox"/> Reduce social isolation <input type="checkbox"/> Increase social connectedness <input type="checkbox"/> Increase positive communication <input type="checkbox"/> Enhance social support

Table 2. Baseline Couple Demographics by Group

	Intervention (n=24)		Comparison (n=22)	
	M	SD	M	SD
Family Income	\$44,282	\$30,906	\$45,031	\$32,293
Gestational Age	21.13	7.27	19.00	5.30
	N	Percentage	N	Percentage
Partner Type				
Bio Dad	20	83.3	17	77.3
Mother	2	8.3	4	18.2
Friend	1	4.2	0	0
Sister	1	4.2	1	4.5
Marital Status				
Cohabiting	18	78.3	15	68.2
Married	8	34.8	4	18.2

Note. Family income is sum of mother and father annual take-home income. Family income only included partner income when partner was the biological father. Gestational age is weeks pregnant. Mean scores on demographic variables displayed in this table did not differ significantly based on group assignment.

Table 3. Baseline Participant Demographics

N=92	Mother (n=46)		Partner (n=46)	
Age (SD)	23.31(3.30)		27.46 (10.70)	
	N	Percentag e	N	Percentag e
Race/Ethnicity				
White	17	37.0	19	41.3
Black	8	17.4	8	17.4
Latino	13	28.2	14	30.4
Multiracial	8	17.4	5	10.9`
Employed	28	60.9	38	82.6
Education				
<Than High School	3	6.5	6	13.0
GED	3	6.5	2	4.3
High School	22	47.8	25	54.0
Associates	3	6.5	3	6.5
College	15	32.6	10	22.2

Note. All descriptive data were measured at baseline. Partners' average age reflects the age of partners who were much older and participated with their daughters. Average age for fathers was 24.59 years. Employment refers to paid full-time or part-time employment.

Table 4. Data Collection Summary

	Time 1		PREP Intervention Session						Time 2	
	Int.	Hair	1	2	3	4	5	6	Int.	Hair
Intervention	100% n=48	65% n=31	90% n=43	81% n=39	77% n=37	73% n=35	67% n=32	71% n=34	77% n=37	50% n=24
Comparison	100% n=42	50% n=22	Treatment as Usual						74% n=31	43% n=18

Note. Attendance rates per session are averages across the three intervention groups. Treatment as usual refers to optional home-visiting for couples in the comparison group. Only three couples in the comparison group enrolled in home-visiting during pregnancy.

Table 5. Interclass Correlations for Dependent Study Variables

Measures	1	2	3	4	5	6	7	8	9	10	11	12
1. M1 Depression	.	.72**	.27	.74**	.64**	.15	.38**	.42**	.14	.69**	.64**	.15
2. M1 Perceived Stress	.72**	.	-.08	.63**	.70**	.02	.36*	.45**	-.15	.47**	.35	.29
3. M1 Hair Cort	.27	-.08	.	.12	-.03	.49*	.05	-.15	.46*	.20	.35	.04
4. M2 Depression	.74	.63**	.12	.	.74**	-.02	.46**	.47**	.23	.50**	.38*	.27
5. M2 Perceived Stress	.64**	.70**	-.03	.74**	.	.09	.30	.46**	.36	.39*	.33	.54*
6. M2 Hair Cort	.15	.02	.49*	-.02	.09	.	-.02	-.20	.39	.14	.10	.21
7. P1 Depression	.38**	.36*	.05	.46**	.30	-.02	.	.68**	.23	.45*	.44*	.27
8. P1 Perceived Stress	.42**	.45**	-.15	.47**	.46**	-.20	.68**	.	-.18	.45*	.53**	.19
9. P1 Hair Cort	.14	-.15	.46*	.23	.36	.39	.23	-.18	.	-.11	.06	.77**
10. P2 Depression	.69**	.47**	.20	.50**	.39*	.14	.45*	.45*	-.11	.	.77	-.08
11. P2 Perceived Stress	.64**	.35	.35	.38*	.33	.10	.44*	.53**	.06	.77**	.	.06
12. P2 Hair Cort	.15	.29	.04	.27	.54*	.21	.27	.19	.77**	-.08	.06	.

Note. *=correlation is significant at the 0.05 level; **=correlation is significant at the 0.01 level. *N* ranges from 13-46 due to missing data.

Table 6. Program Effects for Perceived Stress and Depression

	Intervention					Comparison					ANCOVA		
	Baseline		Posttest		Change	Baseline		Posttest		Change	<i>F</i>	<i>p</i>	<i>d</i>
	M	SD	M	SD		M	SD	M	SD				
Mother (n=35)													
Depression	16.28	11.46	12.89	10.78	-3.39	12.94	6.90	13.18	10.66	.24	4.25	.048	.41
Perceived Stress	29.50	7.51	26.00	6.79	-3.50	28.12	7.10	25.00	6.79	-3.11	0.21	.652	.09
Father (n=27)													
Depression	9.00	6.72	10.73	9.78	1.73	11.39	5.00	12.08	6.75	.69	.10	.750	.08
Perceived Stress	23.73	7.27	21.60	6.63	-2.13	24.33	2.73	25.50	3.00	1.17	5.27	.031	.84
Partner (n=6)													
Depression	7.00	5.65	27.00	16.97		10.00	1.41	8.00	0.00		.	.	.
Perceived Stress	22.50	4.95	33.00	8.48		24.50	6.36	19.00	1.14		.	.	.

Note. Intervention effects on depressive symptoms, self-reported stress and physiological stress were examined by two-way repeated measures ANCOVAs (group \times time (T1 & T2)) controlling for gestational age. Effect sizes were calculated using Cohen's *d*. ANCOVAs were not run for partner sub-group given extremely limited sample size (n=6).

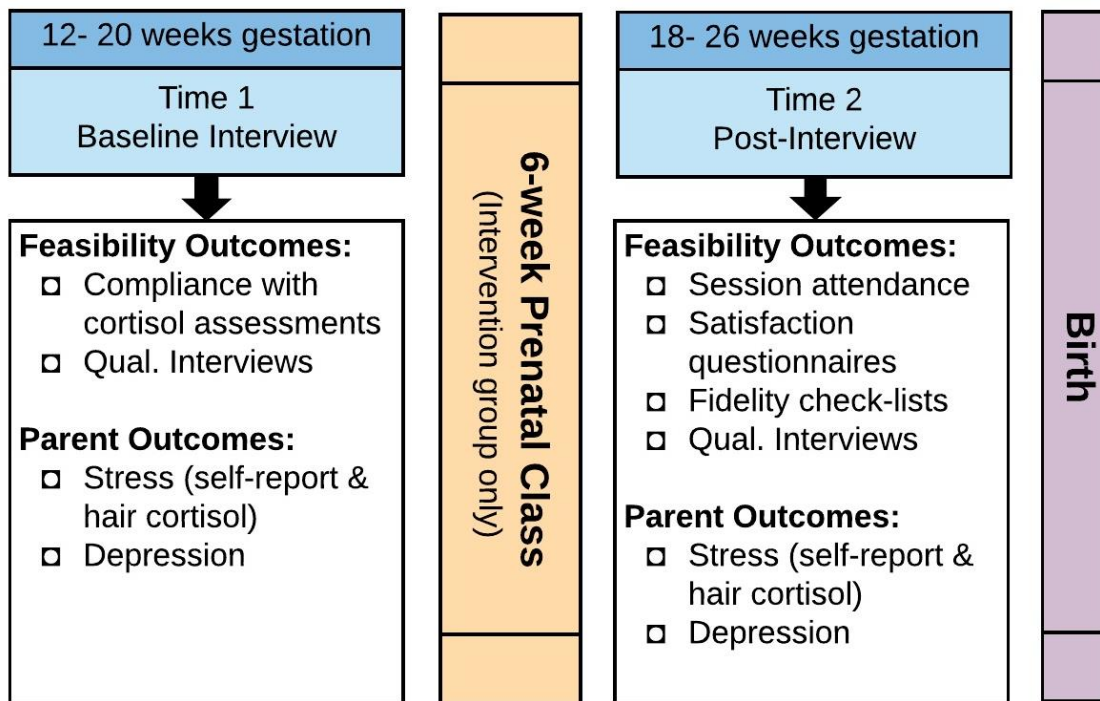


Figure 1. PREP Intervention Timeline and Study Assessments

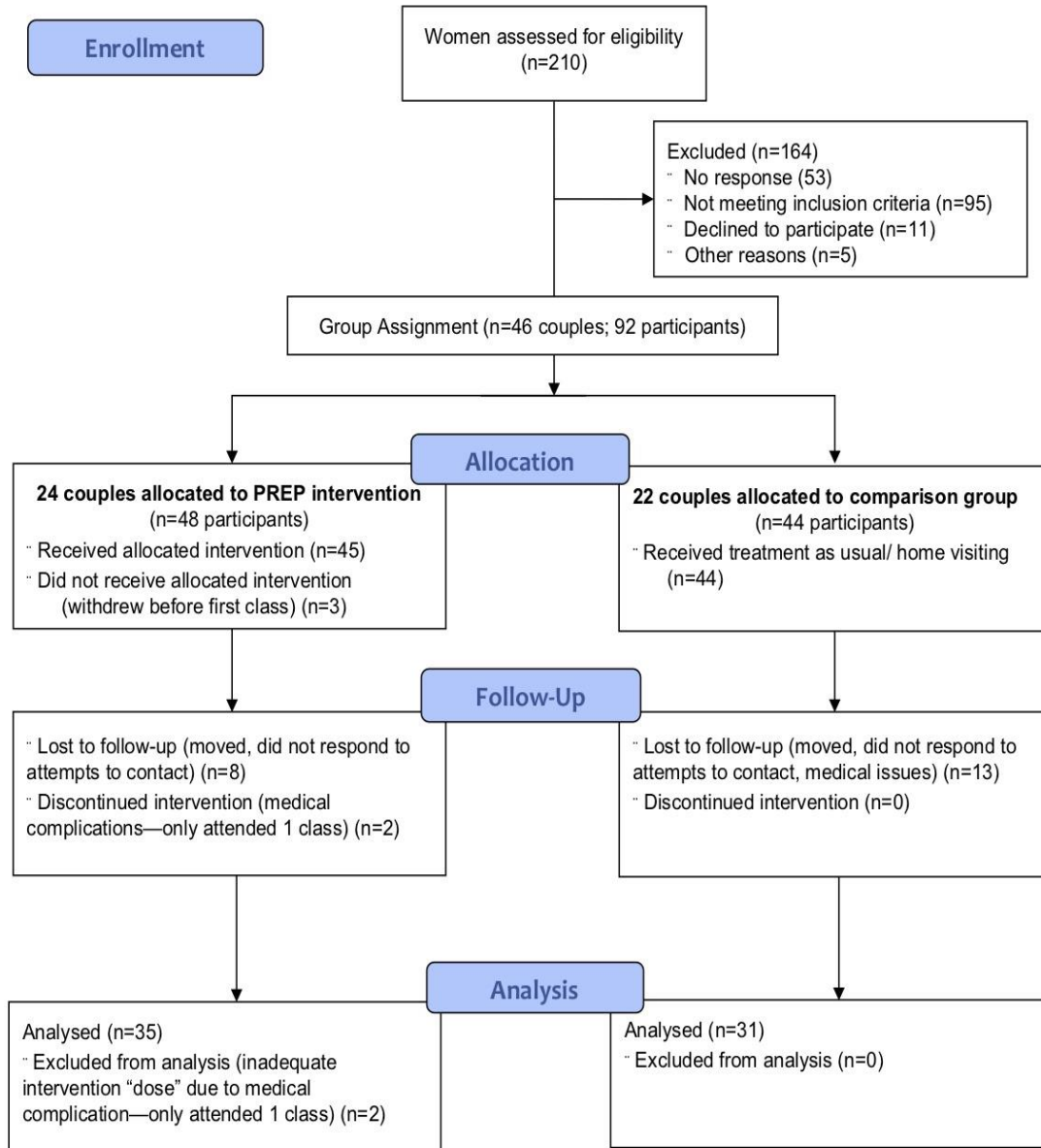


Figure 2. Consort flow diagram

Change in Depression Score

Colored lines and points represent group means. Gray lines represent pre- and post-test scores of each subject with non-missing scores in the study (N = 66).

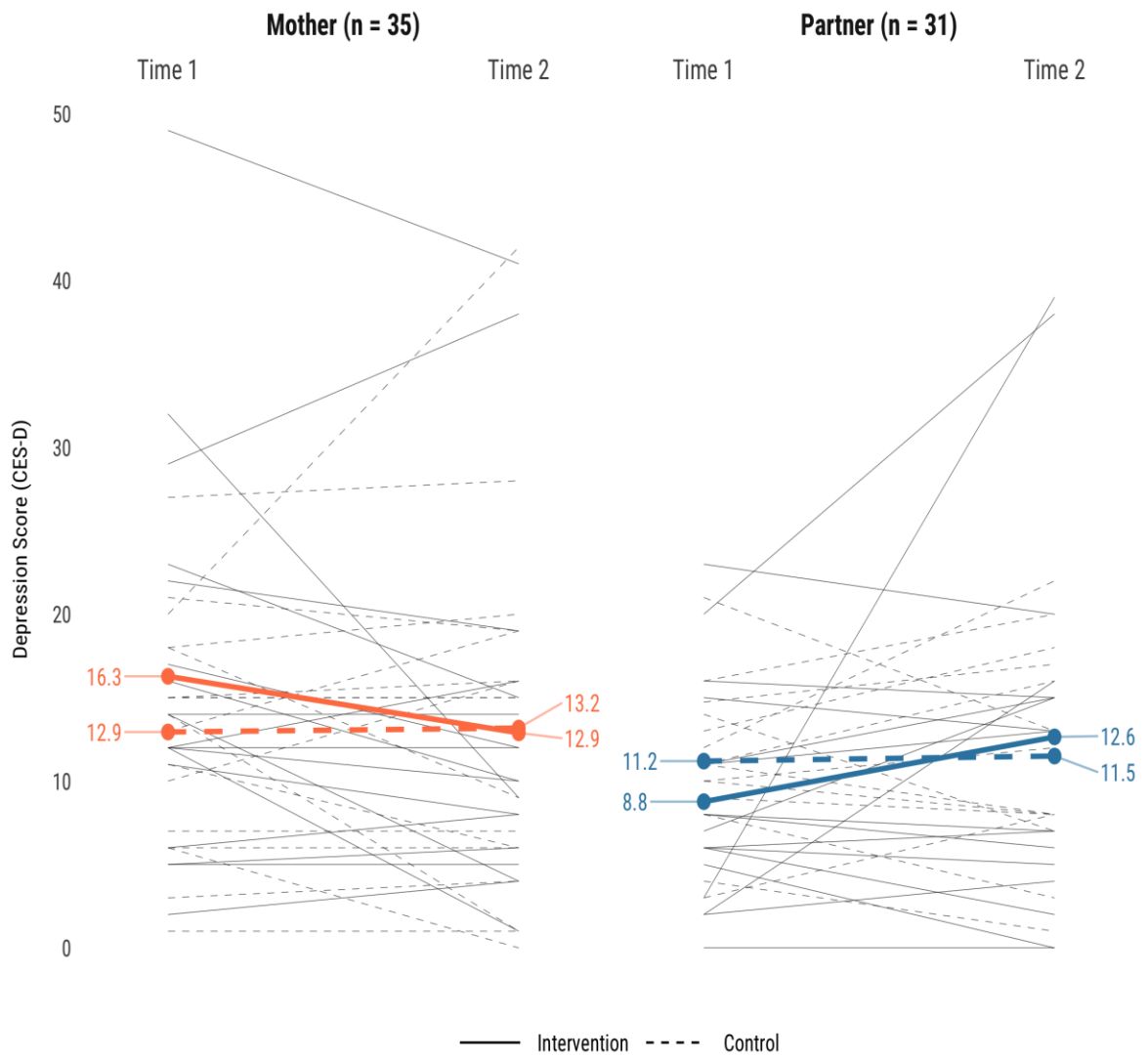


Figure 3. Change in Depression Score for Mothers and All Partners

Change in Depression Score

Colored lines and points represent group means. Gray lines represent pre- and post-test scores of each subject with non-missing scores in the study (N = 62). Excludes non-father partners.

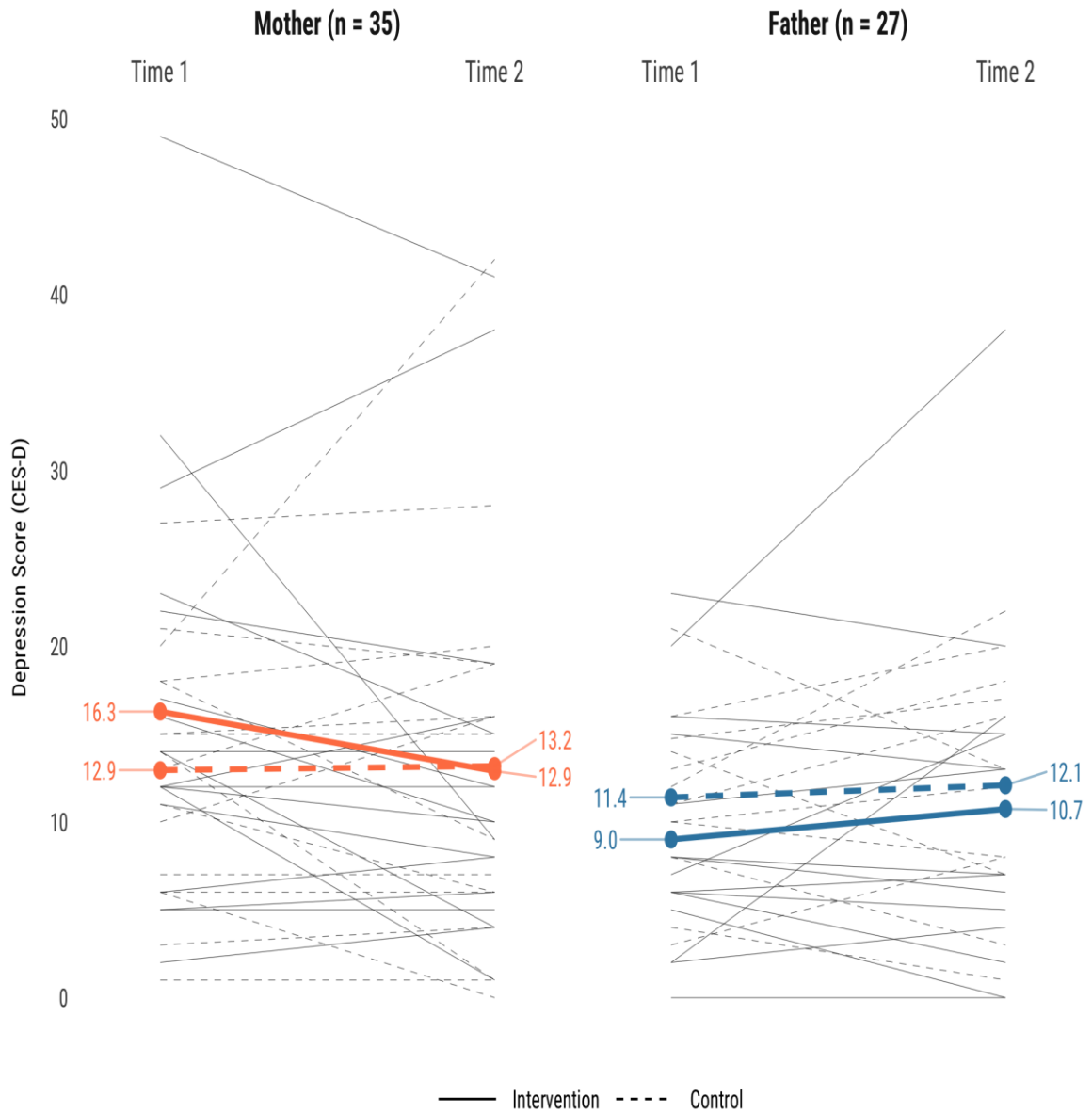


Figure 4. Change in Depression Score for Mothers and Biological Fathers Only

Change in Stress Score

Colored lines and points represent group means. Gray lines represent pre- and post-test scores of each subject with non-missing scores in the study (N = 66).

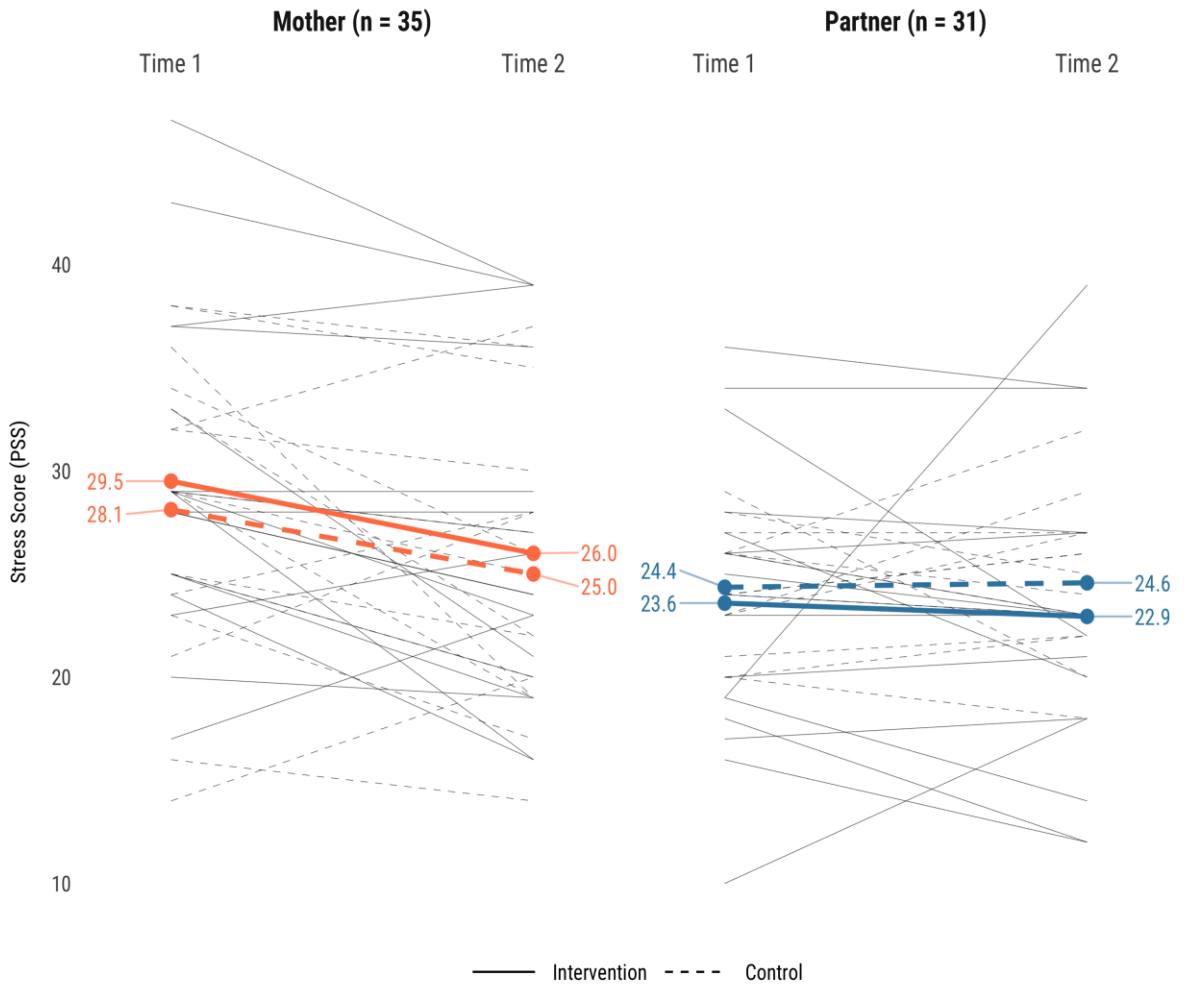


Figure 5. Change in Perceived Stress Score for Mothers and All Partners

Change in Stress Score

Colored lines and points represent group means. Gray lines represent pre- and post-test scores of each subject with non-missing scores in the study (N = 62). Excludes non-father partners.

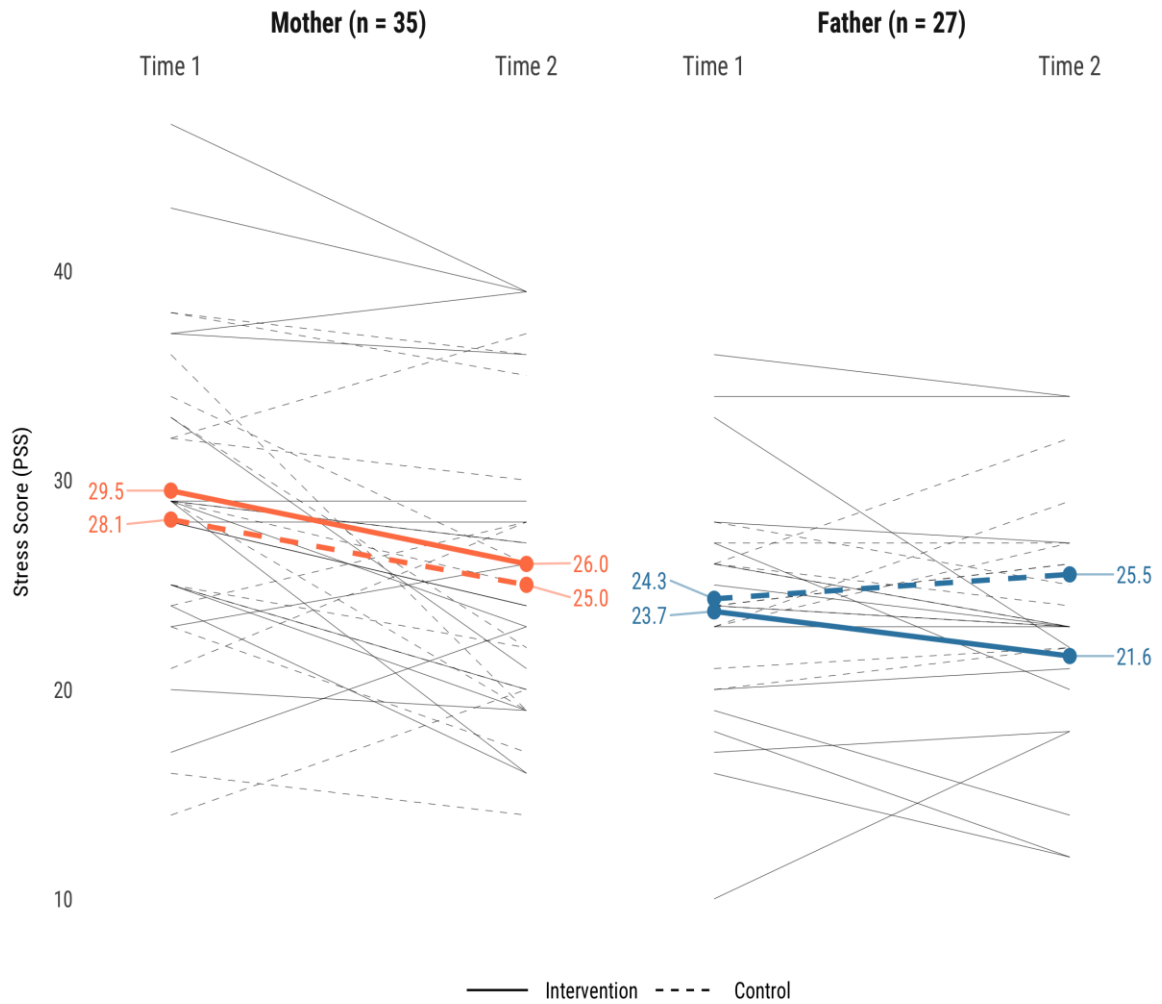


Figure 6. Change in Perceived Stress Score for Mothers and Biological Fathers

Change in Hair Cortisol Level

Colored lines and points represent group means. Gray lines represent pre- and post-test cortisol levels of each subject with non-missing levels in the study (N = 32).

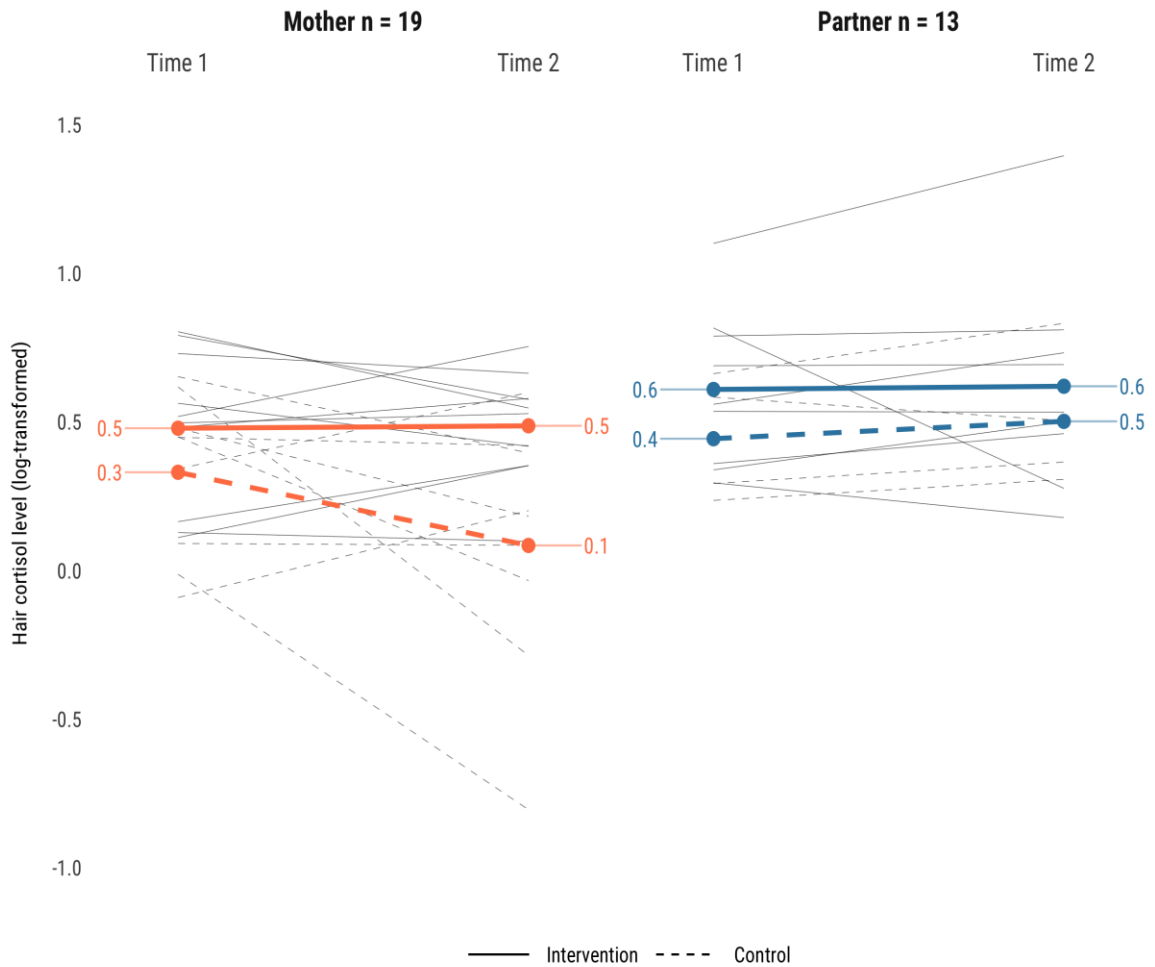


Figure 7. Change in Hair CORT level for Mothers and All Partners

APPENDIX A
PRENATAL GROUP-BASED INTERVENTIONS FOR DEPRESSION

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Vieten et al. 2008 (US)	Mindful Motherhood intervention Mind-Body Intervention Aims: Reduce stress and improve mood	8 classes x 2 h (16 h total) Group size: 12-20	Clinical psychologist	No	31 women, with “mood concerns” mean age 33.9 years, 100% partnered, medium-high socio-economic status, 74% white Mean gestational age: 25 weeks	Perceived stress (PSS), Positive/negative affect (PANAS), Depressive symptoms (CES-D), Anxiety (STAI), Affect regulation (ARM), Mindfulness (MAAS)	Pilot RCT Control: wait-list Screening: History of mood concerns/tx Time Points: pre-and post-intervention, 3 months post-intervention	Significantly reduced state anxiety and negative affect post-intervention compared to control. Effects not sustained 3 months post-intervention. No sig. effects for depression or stress.
Woolhuse et al. 2014 (Australia)	MindBabyBody Program Mind-Body Intervention Aims: Reduce PND, anxiety and stress	6 classes x 2 h (12 h total) Group size: No information	Clinical psychologist or psychiatrist	No	47 women Mean age 33, majority first baby, majority with higher education, 90% employed, 65% married Mean gestational age: Majority in first or second trimester	Depression (DASS; CES-D), Anxiety (STAI), Stress (PSS), Mindfulness (FFMQ)	Pilot RCT Control: Usual care Screening: none Time points: pre-and post-intervention,	Significant within-group improvements for anxiety and mindfulness, but not depression or stress. No significant effects compared to control group.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Gambrel et al., 2015 (US)	Mindful Transition to Parenthood Program Aim: Enhance mood and relationship satisfaction Family/Mind-Body	4 classes x 2 h (8 h total) Group size: 3-5 couples	Clinical psychologist	Partners attended class and curriculum targeted transition to parenthood for couples	66 couples Mean age 31.7, 76% married, 63% planned pregnancies, 90% Caucasian, 75% college or graduate school degree Mean gestational age: 21 weeks	Couple satisfaction Index (CSI/DAS), Mindfulness (FFMQ), Empathy (IRI/SDPTS), Mood (DAASS, PANAS)	RCT Control: Waitlist control Time points: Pre- and post-intervention	Women had nonsignificant results for all outcomes, including stress and mood. Men in treatment group showed greater relationship satisfaction and mindfulness and decline in negative affect compared to control.
Guardino et al. 2014 (US)	Mindful Awareness Practices (MAPS) Mind-Body Intervention Aim: Reduce stress and anxiety	6 classes x 2 h (12 h total) Group size: no information	No information	No	47 women with increased stress and/or anxiety Mean age 33.1 years, 93.5% partnered, medium/high socio-economic status; 66% white; 78% first child Gestational age range: 10–25 weeks	Perceived stress (PSS), Pregnancy-specific anxiety (PSA), Pregnancy-related anxiety (PRA), Anxiety (STAI), Mindfulness (FFMQ)	Pilot RCT Control: informational book on pregnancy Screening: PSS > 34, PSA > 11 Time points: pre- and post-intervention; 6 weeks after intervention	Significant decreases in pregnancy-specific anxiety pre- to post- for intervention group, but effects not sustained at 6-weeks post-intervention. No between group differences for depression or stress.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Bittner et al. 2014 (Germany)/ Richter et al. 2012 (Germany)	“LOS—Lebensfroh and optimistisch durch die Schwangerschaft“ CBT-based Aim: Prevent PND, enhance relationship	8 classes x 90 min (12 h total) Group size: 4–6	Clinical psychologist	No	160 women with elevated depressive/anxiety symptoms mean age 29.5 years, 100% partnered, medium/high socio-economic status, 64.9% first child Mean gestational age: 16.4 weeks	Depression (EPDS), Anxiety (STAI), Dysfunctional attitudes (DAS), Anxiety sensitivity (ASI), Social support (SOZU), Quality of relationship (PFB), Fear of childbirth (GAS)	RCT Control: Usual care Screening: PDQ > 14, STAI > 36, BDI > 20 Time points: pre- and post-intervention; 3 months postnatal	No intervention effect on anxiety or depression (other than postnatally for women with high depressive symptoms at baseline). Positive short-term effect on quality of relationship.
Austin et al. 2008 (Australia)	Brief Cognitive Behavior Therapy Group CBT-Based Aim: Prevent PND, stress, and anxiety	6 classes x 2h (12 h total) Group size: No information	Clinical psychologist and midwife	No	277 women with elevated depression/anxiety symptoms or at risk of depression/anxiety mean age 31 years, 97.8% partnered, 9.7% low income, 88.1% English speaking, 65.3% first child Mean gestational age: 25.7 weeks	Depression (MINI, EPDS), Anxiety (STAI, MINI)	RCT Control: Information Booklet Screening: EPDS > 10 or history of depression Time points: pre- and post-intervention, 2 and 4 months postnatal	No significant difference between groups. Trend towards greater reduction in anxiety for intervention.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Le et al. 2011 (US)	Mothers and Babies Course CBT and Stress Management Aim: Preventing PND	8 classes x 2 h (16 h total) 3 individual PN booster sessions Group size: no information	Researcher	No	217 low-income women at risk of depression mean age 25 years, 57.1% partnered; mostly low-income, majority Central and South American immigrants, 38.4% first child Mean gestational age: ≤ 24 weeks	Depressive symptoms (BDI-II), Major depressive episodes (MS)	RCT Control: usual care Screening: CES-D ≥ 16 / self-reported personal or family history Time points: pre- and post-intervention, 6 weeks, 4 and 12 months PN	Significantly fewer depressive symptoms post-intervention. Stronger effects when women attended more session, but no differences postnatally. No difference in cumulative incidence of major depressive episodes PN.
Muñoz et al. 2007 (US)	Mothers and Babies Course CBT and Stress Management Aim: Prevent PND	12 classes x 2 h (16 h total) 4 booster sessions PN Group size: 4-8 women	Faculty and advanced doctoral graduate students in clinical psychology.	No	41 women at-risk of depression Mean age 25.4 years, 72% partnered; Mostly low-income; 75% born in Mexico and Central America; Mostly second child Mean gestational age: 16–17 weeks	Depressive symptoms (CES-D/EPDS)	RCT Control: usual care Screening: CES-D ≥ 16 / past history of depressive episode Time points: baseline; 1, 3, 6, 12 months PN	Differences in terms of depression symptom levels or incidence of MDEs between the two groups did not reach statistical significance.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Elliott et al. 2000 (UK)	Preparation for Parenthood/Surviving Parenthood CBT/Psychoeducation Aim: Psychosocial intervention to prevent PND	5 antenatal sessions; 6 postnatal sessions (no length information) Groups size: no information	Psychologist and Health Visitor	Fathers were invited to attend one session	99 First and second time mothers in relationships. Detailed sample characteristic not provided.	Depression (EPDS, CCEI)	RCT Control: Usual care Screening: Marital difficulties, psychiatric history, lacking a confidante, high antenatal anxiety Time points: Pre-intervention, 3 & 12 months PN	Significantly lower depression scores 12 months PN, but only for first-time mothers
Ortiz et al., 2014 (Spain and France)	Humanistic and CBT Aim: Decrease PND risk and Improve childbirth outcomes	10 classes x 75 min (12.5 h) Group size: 6-8 couples	Nurse-midwife	Partners attended group	127 Low-income women and men at risk for PND 29.3 average age, 14% attended college, 62% first baby, majority low-income, 43% immigrants	Depressive symptoms (EPDS), Social support (FSSQ), Couple relationship (DAS)	RCT Control: usual care/standard antenatal education Time points: Pre-Intervention and 12 weeks PN	Trend decrease of PND between intervention and control group. Lower rates of premature birth and higher birth weight in intervention group. No differences in social support

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Brugha et al. 2000 (UK)	Preparing for Parenthood CBT elements and psychoeducation Aim: Prevent PND	6 classes x 2 h (12 h total) Group size: 8-16	Nurses & Occupational therapists	One class (2 hrs) with partners present	209 women at risk of PND Median age 19 years, 75% European, 100% first child, No information on income Gestational age: >28 weeks	Depression (SCAN, GHQ-D/modified EPDS)	RCT Control: Usual care Screening: "Pregnancy and You" PND risk questionnaire Time points: pre-and post-intervention; 3 months postnatal	No intervention effect on levels of postnatal depression.
Gao et al. 2010 (China)	Interpersonal - psychotherapy (IPT)/prenatal education Aim: Decrease PND, enhance wellbeing	2 classes x 2 h (4 h total) one follow up phone call PN Group size: No more than 10 participants	Midwife	No	194 first-time mothers All women were younger than 35, married and living with husbands, middle class Gestational Age: >28 weeks	Depression (EPDS), Psychological well-being (GHQ), Relationship Support (SWIRS/DAS)	RCT Control: Usual care Time points: Pre- and post-intervention, 6 weeks PN	6 weeks PN, significant reduction in depressive symptoms in intervention group and higher well-being. No difference in relationship satisfaction between groups.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Crockett et al. 2008 (US)	“Reach Out, Stand Strong: Essentials for New Moms” IPT-Based Aim: Prevent PND	4 classes x 90 min (6 h total) Individual PN booster session Group size: no information	Counselors (no training information)	No	36 low-income African-American women at risk of PND Mean age 23.4 years, 13.9% partnered, rural & low-income; 100% African American; 61% first child Gestational age range: 24–31 weeks	Depressive symptoms (EPDS), Postnatal adjustment (PPAQ), Parenting stress (PSI)	Pilot RCT; Control: Usual care Screening: CSQ \geq 27 Time points: pre- and post-intervention, 3 weeks and 3 months postnatally	Significant increase in postnatal adjustment for intervention, but no difference in EPDS scores or parenting stress.
Kozinsky et al. 2012 (Hungary)	CBT-/IPT-Based Psychoeducation, stress management, social support Aims: Prevent PND through, decrease stress, improve social support	4 classes x 3 h (12 h total) Group size: <15	Psychiatrists and Health Visitors	Fathers were invited to attend sessions (no information on rate)	1719 women mean age 27 years, 66% partnered; 14% low-income; 61% first child Gestational age: >25 weeks	Depressive symptoms (LQ), Questionnaire on various risk factors of PND	RCT control: routine antenatal course Screening: none	Significantly reduced risk of PND and depressive symptoms in intervention group. Intervention significantly higher perceived partner support.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Leung & Lam 2012 (China, Hong Kong)	Brief IPT-Based Intervention Aims: reducing stress and depressive symptoms, enhance conflict management skills, improve self-efficacy	4 classes x 90 min (6 h total) Group size: no information	No information	No	156 women Mean age 31.2 years; 91.8% partnered; 73.5% first child Mean gestational age: 20 weeks	Stress (PSS), Depressive symptoms (EPDS), Happiness (SHS), Self-efficacy in managing conflict (REM),	RCT Control: Standard Care Screening: none Time points: pre- and post-intervention; 6–8 weeks postnatal	No difference in depressive symptoms between groups. Significantly lower perceived stress and smaller decrease in happiness post-intervention, but effects not sustained postnatally. Increased relationship self-efficacy.
Zlotnick et al. 2001 (US)	“Survival Skills for New Moms“ IPT-based Aims: Prevent PND	4 classes x 1 hr (4 h total) Group size: no information	No information	No	37 women on public assistance at risk of PND Mean age 23.4 years; 23% partnered; low-income; 45% Caucasian Gestational age: 20–32 weeks	Depressive symptoms (BDI), depression (SCID)	Pilot RCT Control: Usual care Screening: at least 1 predictor for risk factors for PND Time points: pre- and post-intervention; 3 months postnatal	Women in intervention group were significantly less likely to develop PND

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Zlotnick et al. 2006 (US)	“Reach Out, Stand Strong: Essentials for New Moms“ (ROSE) Program IPT-based Aims: Prevent PND	4 classes x 1 hr (4 h total) Group Size: 3–5 Individual PN booster	Nurses	No	99 women at risk of PND Mean age 22.4 years; 33.3% partnered; low-income; 44% Hispanic Gestational age: 23–32 weeks	Depressive symptoms (BDI), Depression (LIFE depression module), Social adjustment (RIFT)	RCT Control: Usual care Screening: CSQ \geq 27 Time points: pre- and post-intervention, 3 months postnatal	3 months PN: fewer women in intervention with PND than in control but no significant difference between groups for depression severity (BDI) or social adjustment at 3 months PN.
Buist et al. 1999 (Australia)	Intervention Aims: preventing PND Family-Based	6 classes (no information on length) Group size: no more than 7 couples	Midwife & psychologist	Yes (partners or support persons attended) One session focused on the partner’s role in postnatal depression	44 women at risk of PND mean age 28.2, majority married, no income information provided Gestational age: 12-24 weeks	Depressive symptoms (BDI/EPDS), Anxiety (STAI), Social Support (SSS), Adjustment (SDA)	Pilot RCT Control: usual care/standard antenatal classes Screening: Score $>$ 8 risk factors for PND Time points: pre-and post-intervention; post-childbirth, 6 months postnatal	No intervention effects on PND. Trait anxiety decreased in intervention group, At 6 months PN, control group reported significantly lower social support than intervention group.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Matthey et al. 2004 (Australia)	Preparation for Parenthood Aim: Prevent PND, Enhance psychosocial adjustment Family-Based	7 classes x 2 h (14 h total)* Group size: no information * Intervention added additional session (2 h) on postpartum psychosocial issues to standard 6-session antenatal class	Psychologist and Social Worker	Yes (partners or support persons attended)	202 couples expecting first baby. Mean age for the women was 27.1 years and for men 29.0. For women, 48.7% had 11 years of education, 100% first baby. Weeks gestation: late second or early third trimester	Depressive symptoms (EPDS POMS, CES-D, DIS), Self-esteem (CSEI), Social support (SOS), Parenting (PSOC), Partner Awareness Scale	RCT Control: Usual care/ standard antenatal class Time points: Pre-intervention, 6-weeks postpartum, 6 months postpartum	No intervention effects on rates of depression or anxiety for men or women. At 6 weeks PN, women with low self-esteem in the intervention group showed improved mood and sense of competence. No group differences at 6 months PN
Feinberg et al. 2008 (US)	Family foundations Aim: Enhance co-parenting relationship and parental mental health Family-Based	4 classes x 3 h 4 antenatal classes x 2 h (20 h) Group size: 6-10 couples	No information	Partners attended class and curriculum targeted transition to parenthood for couples	169 couples Mean age 29 years, 100% of couples lived together, 82% married, 100% expecting first baby, middle-upper class, 90% White Average weeks gestation = 22.9	Depression (CES-D), Anxiety (TMAS), Parenting Distress (PSI), Infant regulation (IBQ)	RCT: Control: No treatment (brochure) Time points: Pre- and post-intervention, 6 months PN	Maternal depression was significantly reduced post-intervention, but no effect on fathers' depression. Greater positive impact of the program was found for lower educated parents.

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
Shapiro et al., 2005 (US)	Bringing Home Baby Study Aims: Enhance marital quality Psycho-communicative-educational intervention Family-Based	2 day workshop	Clinical psychologists	Couple-focused intervention	32 expectant couples, 6 couples with new babies All married, mean age 33, predominately white, middle class, high education, majority first baby Weeks gestation: in 2 nd or 3 rd trimester, 6 couples with babies < 1 months	Marital quality (MAT), Depression (SCL-9-), hostile affect (SACS)	RCT Control group: waitlist control Time points: First interview pre-intervention, 3 months PN, 18 months PN,	Relationship quality stayed stable in workshop group, but declined significantly in control group for men and women. Couples PND significantly lower in intervention 1 year PN, Hostile affect significantly lower in intervention group for both partners (quadratic pattern)

Citation	Intervention	Intervention Model and duration	Facilitator	Partner ?	Sample Characteristics	Outcomes Measured	Methods	Findings
DaleyMcCoy et al., 2014 (UK)	Brief psychoeducational intervention Aim: Decrease PND and enhance relationship functioning Family-Based	1 class x 2 h* (2 h total) 5 standard antenatal classes with one additional 2 h session for intervention group. Group size: Around 6-8 participants per class	Midwife	Couple-focused intervention	47 women and their partners expecting first baby. Mean age 31, high SES, majority married, majority planned pregnancy. Weeks gestation: No information	Relationship (CSS), Depression (EPDS)	Pilot RCT Control: Usual care Time points: Pre-intervention, 6-weeks postnatal	Women who received the intervention reported significantly less deterioration in relationship satisfaction compared with controls, but no sig. decrease in depression compared to control women. Men in the intervention reported significantly less deterioration in couple communication and significant improvement in depression PN.

APPENDIX B

SESSION-BY-SESSION CURRICULUM

Session 1				
Topic	Format	Time	Focus & Intent	Materials
Welcome/Intro	Instructor	10 min	<ul style="list-style-type: none"> ▪ Build rapport and ▪ Normalize/welcome range of co-parenting arrangements 	
Becoming a Parent	Activity # 1: Pregnancy video & group discussion	10 min	Prenatal Education <ul style="list-style-type: none"> ▪ Make fetus “real” so that group members recognize that they are parenting (and co-parenting) already and buy into early intervention timing 	2 nd Trimester Pregnancy Video
Group Overview, Structure and Guidelines	Instructor	10 min	Prenatal Education <ul style="list-style-type: none"> ▪ Increase buy-in around the three primary intervention targets: early prenatal education, stress/wellbeing, & co-parenting ▪ Present rationale/intent for group guidelines 	
Identifying New Roles	Activity #2: The Pie (modified SFI)	30 min	Strengthen Co-Parent Relationship & Prenatal Education <ul style="list-style-type: none"> ▪ Help couples understand their current roles and how adding on parenthood will force them to restructure those roles as individuals and co-parents 	“The Pie” Handout
Making Space for Parenthood	Activity # 3: Time for Care of Newborn Baby (modified 3CP)	15 min	Prenatal Education & Strengthen Co-Parent Relationship <ul style="list-style-type: none"> ▪ Help couples understand what the parenting role entails day-to-day & increase motivation to start preparing for this change together early in pregnancy 	Flip Chart

Balancing New Roles & Coping With Changes	Instructor teaching segment	10 min	Stress & Wellbeing <ul style="list-style-type: none"> Normalize that role and identity changes can be stressful and increase anxiety, but there are effective strategies to manage this stress as co-parents and individually Help group members understand the connection between their own stress their partner's stress and the baby's wellbeing 	Parenting & Stress Video
	Activity # 4: Video and group discussion	10 min		
Stress Management Strategies for Parents	Activity #5: App. demonstration & group discussion	15 min	Stress & Wellbeing <ul style="list-style-type: none"> Introduce relaxation techniques, including mindfulness and breathing exercises, and solicit group feedback Connect to breathing and relaxation techniques that can be used during labor 	Stop, Breathe and Think demonstration
Wrap-Up/HW	Instructor	10 min	<ul style="list-style-type: none"> Encourage group members to practice a stress reduction exercise for homework 	

Session 2				
Topic	Format	Time	Focus & Intent	Materials
Welcome/Intro	Instructor	10 min		
Learning About Pregnancy	Activity # 1: Pregnancy Myths and Facts Quiz	15 min	Prenatal Education <ul style="list-style-type: none"> Quiz will address current pregnancy concerns and myths and facts about co-parenting, stress and fetal development 	Pregnancy Myths and Facts Quiz
	Instructor teaching segment	10 min	Prenatal Education <ul style="list-style-type: none"> Increase knowledge and understanding around physical and emotional changes that individuals and couples experience when they become parents 	

	Activity #2: How Are We Changing (3CP/SFI)	15 min	Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Couple activity to build emotional connection between co-parents and establish co-parenting team; couples reflect on how they are changing together 	
Choices in Childbirth	Instructor teaching segment	5 min	Prenatal Education <ul style="list-style-type: none"> Increase knowledge around choices during pregnancy and childbirth with sensitivity to issues of re-traumatization Present rationale for thinking about labor and delivery early in pregnancy 	Birth plan template
	Activity # 3: Birth Expectations & Plans (modified 3CP)	15 min	Strengthen Co-parent Relationship <ul style="list-style-type: none"> Help group members begin thinking about labor and delivery preferences as a co-parenting team; encourage future completion of birth plan 	Birth plan template
Caring for Each Other	Activity #4: Filling The Glass (modified SFI)	30 min	Stress, Wellbeing & Strengthen Co-parent Relationship <ul style="list-style-type: none"> Combined individual/group activity about stress, and the connection between daily hassles and wellbeing 	
Caring For Yourself	Instructor and group exercise	10 min	Stress, Wellbeing & Prenatal Education <ul style="list-style-type: none"> Psychoed. on self-care, mind-body connection, & relaxation/breathing exercises that can be used now and during childbirth Group breathing exercise 	Stop, Breathe & Think Website
Wrap-Up/HW	Instructor	10 min	<ul style="list-style-type: none"> HW: Schedule an enjoyable activity with your partner and/or time for self-care; note how it affects your mood 	

Session 3				
Topic	Format	Time	Focus & Intent	Materials

Welcome/Intro	Instructor	10 min		
Your Emotional Home (3CP)	Instructor teaching segment (3CP)	10 min	Strengthen Co-parenting Relationship & Prenatal Education <ul style="list-style-type: none"> Teaching segment on building an emotional home for baby through strengthening connection between co-parents Increase awareness around common sources of relationship strain and reasons for decline in relationship satisfaction during pregnancy 	Flip Chart
	Group Discussion	5 min		
Communication & Increasing Connection	Activity # 1: Communication Role Play (Modified 3CP/SFI)	15 min	Strengthen Co-parenting Relationship <ul style="list-style-type: none"> Teaching segment on ways to increase emotional connection between partners Instructor role play closed and open-ended questions using parenting statements 	
	Activity # 2: Partner Open-Ended Questions (Modified 3CP)	25 min	Strengthen Co-parenting Relationship <ul style="list-style-type: none"> Couple activity to practice asking open-ended questions while discussing parenting preferences and values 10-minute group activity to share questions and process experience 	
Looking Back, Looking Forward	Activity # 3: Who do you, I want to be as parents (SFI/3CP)	30 min	Strengthen Co-parenting Relationship <ul style="list-style-type: none"> Couple activity to facilitate self-reflection and sharing on how the way they were raised affects how they would like to parent their children 	

			<ul style="list-style-type: none"> 5-minute group share at end of couple activity Teaching segment to introduce idea that exposure to parents with different life experiences and parenting skill sets is good for babies 	
Managing Stress	Activity # 4: Appreciation for Family	15 min	Stress & Wellbeing & Strengthen Co-Parenting Relationship <ul style="list-style-type: none"> Guided meditation on appreciation and gratitude Couple and group exercise on appreciation for family of origin and present partner 	
Wrap Up/HW		10 min	<ul style="list-style-type: none"> HW: Commit to doing one thing to nurture your relationship this week (SFI) 	

Session 4				
Topic	Format	Time	Focus & Intent	Materials
Intro/Welcome	Instructor	5 min		
Why Conflict Matters	Instructor Teaching Segment	5 min	Strengthen Co-parent Relationship, Prenatal Education, & Stress & Wellbeing <ul style="list-style-type: none"> Instructor teaching segment on how conflict impacts families 	
	Activity # 1: Conflict And Kids Video	10 min	Strengthen Co-parent Relationship <ul style="list-style-type: none"> Video and discussion to increase motivation around developing conflict management skills 	Video TBD
Managing Conflict	Activity # 2: What Do Couples Fight About?	10 min	Prenatal Education & Strengthen Co-parent Relationship <ul style="list-style-type: none"> Group activity to identify and increase 	Flip Chart

			knowledge around common sources of conflict among couples, including sex, money and division of labor	
	Activity # 3: How Do Couples Fight?	10 min	Strengthen Co-parent Relationship <ul style="list-style-type: none"> Participants complete conflict questionnaire to increase awareness of range of different conflict management styles 	Questionnaire
	Instructor Teaching Segment (modified SFI)	15 min	Strengthen Co-parent Relationship <ul style="list-style-type: none"> Teaching segment and activity (bean bag toss; SFI) to increase understanding that conflict between partners is normal; the key issue is how conflict is managed (attack, avoid, share) 	
	Activity # 4: Practicing “I” Statements (SFI)	15 min	Strengthen Co-Parenting Relationship <ul style="list-style-type: none"> Group activity to introduce and practice conflict management skill—“I” statements 	
	Activity # 5: Communicating Well (Modified SFI/3CP)	15 min	Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Couples practice using “I” statements & open-ended questions to discuss common conflict areas with partner 	
What Happens When Conflict Escalates	Instructor Teaching Segment	10 min	Strengthen Co-Parent Relationship and Stress <ul style="list-style-type: none"> Increase knowledge on how conflict affects the body and brain Discuss warning signs of an abusive relationship 	

Deescalating Conflict	Activity # 6: Taking a Time Out (3CP)	10 min	Strengthen Co-Parent Relationship, Stress & Wellbeing <ul style="list-style-type: none"> Instructor teaching segment on the use of time-outs to deescalate conflict and short couple exercise to plan time-outs 	
	Activity # 7: Calming the Body & Brain	10 min	Stress & Wellbeing, Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Introduce self-regulation techniques that can be used to maintain balance and positive emotions during or after conflict; repair after conflict (SFI) 	
Wrap Up/HW		5 min		

Session 5				
Topic	Format	Time	Focus & Intent	Materials
Intro	Instructor	5 min		
Newborn Care and Parenting	Activity # 1: “Here Is Your Newborn” video and group discussion (3CP)	20 min	Prenatal Education <ul style="list-style-type: none"> Increase knowledge around labor, delivery, hospital procedures and newborn needs 	InJoy Understanding Newborns Video
	Instructor teaching segment	15 min	Prenatal Education, Strengthen Co-parent Relationship <ul style="list-style-type: none"> Instructor teaching segment on attachment and infant socio-emotional development, fathering and gatekeeping 	
	Activity # 2: Sensitive Parenting	10 min	Prenatal Education <ul style="list-style-type: none"> TBD: Activity/video to illustrate sensitive parenting 	

Challenges to Being the Parent You Want To Be	Instructor teaching segment	5 min	Stress & Wellbeing, Prenatal Education, Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Instructor teaching segment on factors that interfere with sensitive caregiving (e.g., stress, beliefs, and mental health) 	
	Activity # 3: Spoiling Beliefs Quiz	20 min	Prenatal Education <ul style="list-style-type: none"> Quiz activity to increase awareness of beliefs & myths (spoiling, attributions, gendered parenting myths) that can interfere with sensitive parenting 	Beliefs Quiz
	Instructor teaching segment and video	10 min	Stress & Wellbeing <ul style="list-style-type: none"> Review symptoms of depression and potential resources for families Teaching segment and still face video on depression and its impact on parenting and babies 	Still Face Video
Being Me At My Best, Being Us at Our Best	Instructor teaching segment and group discussion	15 min	Stress & Wellbeing <ul style="list-style-type: none"> Instructor teaching segment and group discussion on connection between attributions/beliefs, mood and parenting behaviors 	
	Activity # 4: Being Me at My Best, Being Us at Our Best (modified SFI)	15 min	Stress & Wellbeing & Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Group members reflect on and visualize themselves as “the parents they want to be” and share their vision with partner, specifying how they would be feeling, thinking and acting as individuals, co-parents and/or partners 	
Wrap-Up		5 min		

Session 6				
Topic	Format	Time	Focus & Intent	Materials
Intro	Instructor	5 min		

What to Expect in The Third Trimester	Instructor teaching segment	10 min	Prenatal Education <ul style="list-style-type: none"> Increase knowledge around emotional and physical changes in third trimester, including sex What to expect now, as parents enter third trimester 	3 rd Trimester Video
	Instructor teaching segment	10 min	Prenatal Education <ul style="list-style-type: none"> Teaching segment and group discussion of practical considerations, stressors and decisions (parental leave, work, childcare) 	
	Activity # 1: External Stressors & Problem Solving (Modified SFI)	15 min	Stress & Wellbeing & Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Couples identify an external stressor or practical concern and practice structured problem solving 	
Building Your Family's Future	Activity # 2: Family Circles (SFI)	20 min	Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Group members reflect on the most important people to them when they were growing up and consider what family patterns they want to continue or change for their own children 	
	Activity # 3: Write your partner a letter (modified SFI)	20 min	Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Partners write each other letters about the positive changes they've noticed in each other and share with one another 	
	Activity # 4: Hopes and dreams for the future (3CP/SFI)	20 min	Strengthen Co-Parent Relationship <ul style="list-style-type: none"> Couples share a hope/dream they have for their family and baby. Partners practice asking each other open-ended questions about their hopes and dreams for their family Five minute group share 	
Wrap Up	Group Wrap-Up Activities	20 min	<ul style="list-style-type: none"> Group wrap-up activity/game TBD Goodbyes & Celebration Evaluations 	

Strengthen Co-Parent Relationship: Exercises and information to increase couple emotional connection, co-parenting, couple communication, and problem solving

Stress & Wellbeing: Information on stress management, self-care, and healthy coping

Prenatal Education: Information about pregnancy, childbirth, parenting, infant development, and newborn care

APPENDIX C

FEELINGS INVENTORY

(CES-D; Radloff, 1975)

Below is a list of the ways you might have felt or behaved recently. Please circle the number that indicates how often you have felt this way during the PAST WEEK.

	Rarely or none of the time (< 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that don't usually bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends.	0	1	2	3
4. I felt that I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3

18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get “going.”	0	1	2	3

**APPENDIX D
HASSLES SCALE**

(Perceived Stress Scale; Cohen, Kamarck, & Mermelstein, 1983)

We would like to know how you are feeling. Please **CIRCLE** the answer which comes closest to how you have felt **IN THE PAST MONTH**, not just how you feel today.

	Never	Almost never	Some times	Often	Very often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	1	2	3	4	5
2. How often have you felt that you were unable to control the important things in your life?	1	2	3	4	5
3. How often have you felt nervous and “stressed”?	1	2	3	4	5
4. How often have you felt confident about your ability to handle your personal problems?	1	2	3	4	5
5. In the last month, how often have you felt that things were going your way?	1	2	3	4	5
6. How often have you found that you could not cope with all the things that you had to do?	1	2	3	4	5
7. How often have you been able to control irritations in your life?	1	2	3	4	5
8. How often have you felt that you were on top of things?	1	2	3	4	5
9. How often have you been angered because of things that were outside of your control?	1	2	3	4	5
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	1	2	3	4	5

APPENDIX E

INTERVIEW SCRIPTS

TIME 2 (Post-Intervention)

We're so glad you've decided to participate in this project. I'm going to be asking you a lot of questions, but before I get started I would like to spend some time talking to you about your experience in the group. The first questions will be about the logistics of the group followed by questions about your experience.

Is it okay during this part of the interview if I record it?

1. We are curious about what makes parents participate in the first place.
What spurred you to contact us? What might attract other parents?

2. We are curious about the other ways parents prepare for their first baby. Are you participating in home visiting?
No ____
Yes ____

- 2b. If you chose not to participate in home visiting can you tell us why?

3. Are you currently receiving any prenatal support?
(i.e. doula, midwife, education/ birthing classes)
No ____
Yes ____

- 3a. If so, please describe

QUALITATIVE INTERVIEW

LOGISTICS

Intervention Group Only

1. How many classes did you attend? (1) (2)
(3) (4)
(5) (6)
2. We are trying to understand the challenges that families faced in attending classes. If you missed classes, what were the barriers to the classes you missed? (There are a lot of reasons that might have created a barrier, some examples could be work, transportation, time, topic – i.e. not interested)
- 2a. Were there any logistical challenges with work? Work schedules? No

Yes

- If so, please explain
- 2b. Were there any transportation problems or barriers? No

Yes

- If so, please explain
- 2c. Were there any unexpected family events? Or barriers? No

Yes

- If so, please explain
- 2d. Were there any unexpected illness or health issues? No 1
_____))
Yes

If so, please explain

- 2e. Was there a lack of interest in the class or topic? No

Yes

If so, please explain

QUALITY OF EXPERIENCE
Intervention Group Only

Now we would like to get an idea about your experience in the group.

1. What were the basic strengths of the class (i.e. What about the group went well or was fun) example?

2. We want to make the class as great as it can be. We would love to get your feedback on how we could improve the class. Are there things you would change? Example?

3. Was there one thing you wish was covered in greater detail or was there a topic we didn't cover at all that you wanted to hear more about?

4. Do you think it was worth while learning about this topic with other expectant parents? For example did the group interaction help? Or did you learn anything from the other parents in the class?

APPENDIX F SATISFACTION SURVEY

YOUR IDEAS AND FEEDBACK ARE VERY IMPORTANT TO US!

Please complete this **anonymous** survey to help us make these classes the best they can be.

Please Circle: Mother Partner

Based on TODAY'S group, please indicate how much you agree or disagree with each statement:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Some what agree	Strongly agree
The topics covered were relevant to me	1	2	3	4	5
The information presented was easy for me to understand	1	2	3	4	5
The visual aids and/or videos were useful and engaging	1	2	3	4	5
The exercises and activities were useful and engaging	1	2	3	4	5
The class was well organized	1	2	3	4	5
The group leaders were well prepared and knowledgeable	1	2	3	4	5
The group leaders covered the material clearly	1	2	3	4	5
The group leaders were engaging and held my interest	1	2	3	4	5
The group leaders were warm and welcoming	1	2	3	4	5
Overall, I'm glad I attended today's group	1	2	3	4	5

1. What I liked about today's group:
2. What I disliked about today's group:
3. What was the MOST useful activity/exercise today:
4. What was the LEAST useful activity/exercise today:
5. Additional comments or suggestions:

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