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Evaluating the Impact of Individual and Couple Relationship Education on Postpartum Depression

Maggie O'Reilly Treter
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Abstract

This dissertation evaluated the impact of relationship education on postpartum depression using data from two randomized controlled trials of relationship education for individuals and couples who were pregnant or recently had a baby. Paper 1 focused on a well-established relationship education program for low-income couples in Oklahoma City, Family Expectations. Key findings from Paper 1 demonstrated that being randomized to Family Expectations was associated with lower odds of experiencing depression in the first 12 months after having a baby among both mothers and fathers, though this effect was only marginally significant, and that the program had the strongest impact among couples who enrolled at 21 weeks gestation or later. Paper 2 examined an individual relationship education program for low-income women in Denver, MotherWise. Key findings from Paper 2 demonstrated that participating in MotherWise was not significantly associated with overall lower odds of experiencing postpartum depression; however, MotherWise was effective at preventing postpartum depression for women without histories of depression, as well as women who identify as Black or African American. Taken together, findings from this dissertation project suggest that relationship education is a viable option for preventing depression during the postpartum period, particularly for certain groups. These studies enhance our understanding of the impact of relationship education programming on mental health in low-income families during a particularly vulnerable time for individuals and couples: having a baby. Capitalizing on relationship education programming could be one way to expand the current options for postpartum depression prevention and combat this major public health issue.

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This dissertation evaluated the impact of relationship education on postpartum depression using data from two randomized controlled trials of relationship education for individuals and couples who were pregnant or recently had a baby. Paper 1 focused on a well-established relationship education program for low-income couples in Oklahoma City, Family Expectations. Key findings from Paper 1 demonstrated that being randomized to Family Expectations was associated with lower odds of experiencing depression in the first 12 months after having a baby among both mothers and fathers, though this effect was only marginally significant, and that the program had the strongest impact among couples who enrolled at 21 weeks gestation or later. Paper 2 examined an individual relationship education program for low-income women in Denver, MotherWise. Key findings from Paper 2 demonstrated that participating in MotherWise was not significantly associated with overall lower odds of experiencing postpartum depression; however, MotherWise was effective at preventing postpartum depression for women without histories of depression, as well as women who identify as Black or African American. Taken together, findings from this dissertation project suggest that relationship education is a viable option for preventing depression during the postpartum period, particularly for certain groups. These studies enhance our understanding of the impact of relationship education programming on mental health in low-income families

during a particularly vulnerable time for individuals and couples: having a baby. Capitalizing on relationship education programming could be one way to expand the current options for postpartum depression prevention and combat this major public health issue.

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General Introduction

Findings from reviews and meta-analyses indicate that engaging in relationship education is associated with small to medium effect size improvements in several indices of relationship and family functioning (e.g., Cowan & Cowan, 2014; Hawkins et al., 2008) but less is known about program impacts on individual mental health. Given the focus of many relationship education programs on the transition to parenthood, a vulnerable period for individuals and couples, one aspect of mental health that requires a closer look is postpartum depression. Postpartum depression occurs in approximately 5-20% of mothers (Ko et al., 2017) and is associated with impairments in romantic relationship and parent-infant relationship quality, parenting practices, and infant development (Letourneau et al., 2012). Further, postpartum depression occurs in 5-10% of fathers, but men have been frequently overlooked in studies of postpartum depression (Eddy et al., 2019).

Studies have demonstrated that relationship distress predicts the onset of major depression (e.g., Whisman, 2001), and that when a mother develops postpartum depression, her partner is 24-50% more likely to also experience depression (Goodman, 2004). These findings suggest that processes in the relationship could lead to elevated postpartum depression rates. If poor relationship quality is associated with developing postpartum depression, receiving relationship education during pregnancy could be one

avenue for preventing the symptoms and impairment associated with this disorder, particularly among low-income populations who are at heightened risk of experiencing both relationship distress (Hawkins & Erickson, 2015) and postpartum depression (Abrams et al., 2009). This dissertation project evaluated the effectiveness of relationship education for preventing postpartum depression among low-income individuals and couples, as well as for whom relationship education has the strongest impact.

For the purposes of the current project, I conceptualized relationship education as programming that provides training in skills and strategies to help individuals or couples increase their chances of having healthy and stable romantic relationships (Markman & Rhoades, 2012). That being said, many relationship education programs during the transition to parenthood also focus on providing co-parenting or prenatal education and skills (see Pinquart & Teubert, 2010). The relationship education programs examined in this project, Family Expectations and MotherWise, also include brief psychoeducation on parenting and individual well-being but primarily focus on the romantic relationship. Further, relationship education programs often include additional services, such as case management; therefore, this dissertation project evaluated the effectiveness of the entire program rather than only focusing on the impact of the group relationship education classes.

Paper 1 examined data from a rigorous, randomized controlled trial of Family Expectations, a 12-week group-based couple relationship education program aimed at providing skills and support to strengthen couples and families. This paper evaluated the impact of Family Expectations on odds for experiencing depression within the first 12

months after having a baby using 1,608 individuals (862 couples) who enrolled in the program during pregnancy. Further, moderators of program effectiveness were tested. Specifically, given that low-income couples at greatest risk of experiencing poor outcomes benefit the most from relationship education (Hawkins & Erickson, 2015; Stanley et al., 2020), sociodemographic risk and relationship satisfaction at enrollment were tested as moderators of program effectiveness. Further, given that individuals who identify has Black/African American or Hispanic/Latino/a are at heightened risk for developing depression in the postpartum period (O'Hara & McCabe, 2013; Pao et al., 2019), race and ethnicity were tested as moderators of program effectiveness. Gestational age at enrollment was also tested as a moderator because timing of relationship education in relation to the birth could also have important implications for program effectiveness. Finally, given that fathers are significantly underrepresented in the postpartum mental health literature, gender was tested as a moderator in order to clarify whether relationship education could be similarly effective in reducing the odds for depression among both men and women.

Paper 2 examined data from a randomized controlled trial of MotherWise, a six-week group-based individual relationship education program specifically designed for women with low-income levels who are pregnant or recently had a baby. This program empowers women to make healthy relationship decisions and effectively communicate and manage conflict in their families (Rhoades & Stanley, 2009, 2011). Paper 2 examined the impact of MotherWise on odds for experiencing postpartum depression using medical chart review data drawn from 430 women who enrolled in the program during pregnancy.

Similarly to Paper 1, moderators of program effectiveness were tested based on research demonstrating that "high-risk" women tend to benefit the most from postpartum depression interventions (Dennis & Dowswell, 2013; O'Hara & McCabe, 2013). As such, identifying as Black/African American or Hispanic/Latina, as well as history of depression, were tested as moderators.

Although both papers examined whether and for whom relationship education has an impact on depression during the postpartum period, Paper 1 tested these questions using a sample of couples in committed, heterosexual relationships, and Paper 2 tested similar questions using a less restrictive sample of women, regardless of relationship status. Together, these studies can inform prevention and intervention efforts aimed at preventing postpartum depression.

Paper 1:

Evaluating the Impact of Family Expectations on Depression After Having a Baby Among Mothers and Fathers

Maggie O'Reilly Treter

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Abstract

Having a baby is associated with declines in relationship quality, as well as increases in mental health problems. Engaging in relationship education is one way to improve romantic relationship functioning during this vulnerable time for couples, but less is known about program impacts on individual mental health. Depression after having a baby is a common and serious mental health problem for both women and men, especially among those with low-income levels; yet it remains significantly undertreated. Using an intent-to-treat randomized controlled trial (RCT), this study evaluated the impact of Family Expectations, a 12-week, group-based couple relationship education program for low-income couples, on odds for experiencing depression within 12 months after having a baby. Further, moderators of program effectiveness were also tested. Participants were 1,608 individuals (862 couples) who enrolled in the program during pregnancy. Results indicated that those enrolled in Family Expectations had 22% lower odds of experiencing depression compared to those in the no-treatment control group, though this effect was only marginally significant. Further, findings were moderated by gestational age at enrollment, such that the impact of Family Expectations on depression was significant only among those who enrolled in the program at approximately 21 weeks gestation or later**.** Race, ethnicity, sociodemographic distress, and relationship satisfaction at enrollment did not moderate program effects. Taken together, these findings demonstrate that Family Expectations is a viable source of depression prevention after having a baby among low-income couples in the second half of pregnancy.

Evaluating the Impact of Family Expectations on Depression After Having a Baby Among Mothers and Fathers

Background

For years, policymakers and researchers have explored relationship education as a way to encourage forming and maintaining healthy relationships (Hawkins et al., 2008; Hawkins & Erickson, 2015), reducing negative effects of relationship distress (Cowan & Cowan, 2014; Hawkins et al., 2008), enhancing co-parenting quality and father involvement (Wood et al., 2014), and increasing child-wellbeing (Cowan & Cowan, 2014). Yet, with over 150 studies on the impacts of relationship education (Cowan & Cowan, 2014), only a small portion have examined relationship education as a predictor of changes in individual mental health, and even fewer have examined mental health during a highly vulnerable period for couples: the transition to parenthood.

The transition to parenthood is an exciting but vulnerable period for couples, as parents are at heightened risk of experiencing negative changes in relationship functioning (Doss & Rhoades, 2017; Kluwer, 2010; O'Reilly Treter et al., 2020), as well as developing a depressive disorder (Davé et al., 2010). Intervening when couples are preparing for a new baby may help to extend the reach of relationship education during a high-risk but potentially fruitful intervention period, as couples are more open to change and able to sustain these changes (Markman & Kadushin, 1986). Indeed, though findings are somewhat mixed (e.g., Trillingsgaard et al., 2012), receiving relationship education

during pregnancy is generally associated with improvements in couple communication and relationship adjustment (Halford et al., 2010; Pinquart & Teubert, 2010). Perhaps capitalizing on parents' drive for change when having a baby could evoke other positive changes that benefit couples and their families, such as improvements in individual mental health. The current study examines the impact of one relationship education program, Family Expectations, on depression among both mothers and fathers having a baby.

The Importance of Preventing Depression in the Postpartum Period

For couples having a baby, one aspect of mental health that has important ramifications is depression. Parents with low-income levels experience higher rates of depression but are less likely to seek treatment compared to middle- and high-income parents (Abrams et al., 2009). Further, depression in the postpartum period in both mothers and fathers is associated with poor caretaking behaviors, and negative mental and physical health consequences for their children (Eddy et al., 2019; Grace et al., 2003; Letourneau et al., 2012; O'Hara, 2009; O'Hara & McCabe, 2013).

These consequences of depression after having a baby have evoked increases in depression screening and treatment in the postpartum period (O'Hara & McCabe, 2013). However, there are still several barriers to accessing and receiving adequate treatment, including stigma around mental health care and logistical hurdles to attending treatment (Abrams et al., 2009; Ko et al., 2012; Werner et al., 2015). Further, research studies evaluating depression in fathers are still lacking compared to studies evaluating depression in mothers (Eddy et al., 2019; Escriba-Aguir & Artazcoz, 2011; Fisher, 2017);

lowering the odds that men with depression who recently had a baby are readily identified and offered treatment. As such, there is a substantial need to shift the focus of applied perinatal depression research from intervention to prevention in order to reduce risk and circumvent barriers to diagnosis and treatment (Werner et al., 2015).

When considering prevention options, having two parents with depression has significantly worse implications for children than having one parent with depression (Cameron et al., 2016), suggesting that depression preventions employed during the perinatal period would benefit from targeting both partners, rather than one. Yet, to our knowledge, no depression preventative interventions employed in the perinatal period currently target both parents, despite lack of social support and poor relationship quality being risk factors for depression after having a baby (Dennis & Dowswell, 2013). Given that poor relationship quality is associated with increases in depressive symptoms (Whitton et al., 2007), perhaps intervening around relationship behaviors during pregnancy (e.g., negative communication) could help to prevent depressive symptoms in the postpartum period.

Relationship Education and Depression in the Postpartum Period

Relationship education programs provide training in skills and strategies to help individuals or couples increase their chances of having healthy and stable romantic relationships (Markman & Rhoades, 2012). Carlson and colleagues (2014) note that relationship education can be a particularly approachable form of support for low-income couples given that interventions are conducted in group formats, are typically facilitated by laypersons, and do not require participants to share personal details. Further, O'Hara

(2009) called for more postpartum depression intervention efforts in community settings that address many of the barriers low-income parents face to seeking treatment (e.g., cost, lack of childcare and transportation). Given that many relationship education programs, including the one evaluated in the current study, employ services that circumvent barriers to treatment, it is possible that relationship education could be a feasible alternative to standard depression prevention and intervention programming for low-income expectant parents.

The limited studies in this area demonstrate the promising impact of relationship education on improvements in individual mental health functioning, including reductions in psychological distress among low-income samples (Braithwaite & Fincham, 2009; Carlson et al., 2017; Lundquist et al., 2014; Roddy et al., 2020). Further, a meta-analysis conducted by Pinquart and Teubert (2010) found that couples participating in relationship education during pregnancy experienced greater psychological well-being postpartum compared to those who did not participate in relationship education during pregnancy. However, the interventions assessed in this meta-analysis ranged from home visitation programs to couple prenatal education classes, with only four programs focusing primarily on relationship education (Pinquart & Teubert, 2010). It is noteworthy that these studies only evaluated general psychological functioning during the transition to parenthood despite the high rates of depression during this vulnerable period for couples (Ko et al., 2017).

Building Strong Families (BSF), a federally funded evaluation of relationship education for unmarried couples having a baby, also evaluated depression among mothers

and fathers who enrolled in the program during pregnancy or within three months postpartum. Results from the Family Expectations site (the program evaluated in the current paper) indicated that mothers assigned to the program group demonstrated fewer depressive symptoms at the 15-month follow-up compared to the non-program control group (Devaney & Dion, 2010).

Further, online relationship education programs have also been shown to be effective in reducing anxiety and depression (Doss et al., 2016; see also Braithwaite & Fincham, 2007), and that psychological improvements are sustained over time (Doss et al., 2019; Lundquist et al., 2014; Roddy et al., 2020), even when relationships are not (Braithwaite & Fincham, 2009). Of particular relevance to the current paper, Braithwaite and Fincham (2007) found that receiving ePREP (computerized relationship education), was associated with similar declines in depression and negative affect as receiving a depression-focused computerized intervention (Cognitive Behavioral Analysis System of Psychotherapy; McCullough & Goldfried, 2001), suggesting that relationship education could have powerful effects on depression in line with targeted mental health interventions. Taken together, the extant literature on relationship education and mental health suggest that relationship education has the potential to impact depression in the postpartum period, but more research is needed to build upon these findings among low-income samples, who are at increased risk of experiencing relationship distress and depression (Abrams et al., 2009; Hawkins & Erickson, 2015).

Moderators of Relationship Education's Impact on Depression

It is important to identify for whom relationship education has the greatest impact on mental health outcomes to help inform efforts where resources are limited. Drawing from the relationship education literature, research among low-income couples demonstrates that those at greatest risk of experiencing poor outcomes stand to benefit the most from relationship education (Hawkins & Erickson, 2015). Specifically, couples with higher sociodemographic risk upon entering such programs tend to benefit more from relationship education (Amato, 2014). Given that many indicators of sociodemographic risk are also associated with depression after having a baby (Dennis & Dowswell, 2013; Fisher et al., 2019; Leung et al., 2017), it is plausible that sociodemographic disadvantage plays a moderating role in the associations between relationship education and depression.

Further, couples who enter relationship education with higher levels of relationship distress tend to benefit more from this type of programming (Hawkins & Erickson, 2015; Williamson et al., 2015). Individuals with poorer relationship functioning likely have the most room to improve their outcomes compared to high-functioning individuals who have less room to improve (i.e., ceiling effects). In addition, poor relationship quality during pregnancy, such as experiencing lower levels of relationship satisfaction, is also a risk factor for developing depression after having a baby among both mothers and fathers (Escriba-Aguir & Artazcoz, 2011).

In contrast to the relationship education literature, few studies of depression interventions employed during the perinatal period have evaluated moderators of program

effectiveness (O'Hara & McCabe, 2013). However, there is some evidence to suggest that interventions aimed at "high-risk" populations show stronger effects (Dennis & Dowswell, 2013; O'Hara & McCabe, 2013). Individuals who identify has Black/African American or Hispanic/Latino/a are at heightened risk for developing depression in the postpartum period (O'Hara & McCabe, 2013; Pao et al., 2019) and are especially burdened by this disorder (Howell et al., 2005). Therefore, it is possible that individuals who identify with either of these racial or ethnic groups would also benefit the most from Family Expectations when it comes to a possible impact on depression.

Further, timing of relationship education in relation to the pregnancy could also have important implications for program effectiveness. Receiving relationship education earlier in pregnancy could provide more time to make positive changes in the relationship and ameliorate some of the relationship-based risk factors of depression. Given that no studies to our knowledge have examined gender differences in the effects of relationship or depression interventions on depression in the postpartum period, we also tested gender as a moderator. It is possible that women will benefit more from the program given their heightened susceptibility to developing depression after having a baby compared to men (Fisher, 2017); however, few have evaluated program effectiveness among fathers (e.g., Devaney & Dion, 2010), making this an important area of further exploration.

The Current Study

The current study evaluated the effectiveness of Family Expectations for preventing depression after having a baby among mothers and fathers using a sample of

low-income couples. In order to examine the impact of Family Expectations on depression, this study sought to address two key hypotheses:

1) Using a randomized controlled trial design, the study examined the impact of relationship education on depression for both mothers and fathers. We hypothesized that those randomly assigned to Family Expectations would demonstrate lower odds of experiencing depression within 12 months after having a baby compared to those assigned to the control group during pregnancy.
2) The study also tested for whom relationship education had the greatest impact on preventing depression using a variety of moderating factors. We hypothesized that individuals endorsing greater distress at enrollment (low relationship satisfaction, high sociodemographic risk), as well as risk factors for depression in the postpartum period (identifying as Black/African American or Hispanic/Latino/a) would benefit more from participating in Family Expectations. Further, we hypothesized that those who enrolled in the program earlier in pregnancy would benefit more from the program.

Method

Participants

In the larger, randomized controlled trial (RCT) of Family Expectations, 2,640 individuals (1,320 heterosexual couples) were randomized to the intervention (60%) or control (40%) conditions (see Rhoades et al., 2020 for information on the parent study). The larger study demonstrated low attrition, with 90% of couples providing 12-month follow-up data. The current study examined a subsample of 1,608 individuals (N = 862

couples) who enrolled in the program during pregnancy and provided depression data within 12 months postpartum. The average age of participants at baseline was 26.22 years (*SD* = 5.75). In terms of race, 38.6% of the sample identified as Non-Hispanic White, 30.8% Black/African American, 12.3% Native American, 2.7% Asian, 1.1% Native Hawaiian or other Pacific Islander, and <1% identified as Other. In terms of ethnicity, 19.7% of the sample identified as Hispanic/Latino/a. Most (74.4%) had a high school diploma, and 44.2% were employed at least 20 hours per week. Over one-third (34.1%) met criteria for prenatal depression at enrollment, and the average gestational age at enrollment was 20.63 weeks (*SD* = 9.03). Half of the sample identified as female (52%).

All couples reported being romantically involved at the time of enrollment, with 32.5% married. Across the entire sample (both unmarried and married), 86.1% of couples were living together and 16.2% already had a child together. The mean relationship length was 37.92 months (*SD* = 34.77). The median combined annual income was in the $25,000-29,999 range.

Procedures

Couples were recruited from radio advertisements, referrals from community organizations, and referrals from previous participants. Although level of socioeconomic disadvantage was not an inclusion criterion for the study, recruitment targeted agencies that provide support to socioeconomically disadvantaged individuals and families. For the larger RCT, couples were eligible for the study if they were (a) both 18 years of age or older, (b) both willing to participate, (c) together in a committed romantic relationship at baseline, and (c) either expecting a baby or had a baby within the past three months,

(d) the biological parents to that baby, and (e) able to participate in English. Couples were not eligible for the study if one or both members of the couple had previously participated in the Family Expectations program.

Couples in the current study were restricted to only those who were pregnant at the time of enrollment (N = 2,258). Attrition rates were low, such that 1,914 of the individuals who enrolled during pregnancy provided follow-up data (85%), and 1,884 (83%) provided follow-up depression data specifically. Further, given that the postpartum period is often defined as up to one year after giving birth in prevention studies (O'Hara & McCabe, 2013), we further limited the sample to only those who provided follow-up data within 12 months postpartum. There was not a significant difference in the average months postpartum based on group assignment (FE M = 6.60, SD = 2.33; Control M = 6.64, SD = 2.24; p = .856). With both restrictions, the current sample makes up 65% of the larger RCT sample while still maintaining the original 60/40 group assignment (see more information below regarding random assignment).

Interested couples were invited to call the program office. During the initial phone call, a staff member collected basic contact information and scheduled an intake appointment for the couple to attend together. At intake, partners were interviewed in offices at Public Strategies together, but were separated while they completed baseline surveys using a tablet to allow each partner the freedom to answer questions independent of their partner's observation. The baseline surveys included items regarding demographic information, relationship quality, parenting, and individual wellbeing. Each participant was paid $50 for completing this baseline survey.

Following the planned random assignment procedures, 60% were assigned to receive the Family Expectations program and 40% were assigned to the control group. Participants were informed which condition to which they were assigned by email or telephone. Couples assigned to the intervention group were scheduled to begin attending Family Expectations workshops according to the couple's availability (see Intervention section below). Couples assigned to the no-treatment control group did not receive any services.

For the 12-month follow-up, participants in both groups were contacted by phone, email, text, and/or social media messages approximately 11 months after enrollment to schedule a follow-up visit. If participants agreed to return to the office where the intake was conducted, the follow-up survey was completed independently by each partner using a tablet. Those who did not attend an in-person visit were invited to complete the survey online using a link sent by email or on a paper copy sent by mail. All electronically collected data was acquired through the use of secure systems for capturing and retaining responses (Qualtrics). Each participant was paid $50 for completing this follow-up survey. For those who did not respond to initial contact attempts, Public Strategies reached out to any collateral contacts that participants provided (e.g., family members, friends). In both study groups, the discontinuation of study participation by one partner (either by not completing the 12-month follow-up survey or by withdrawing from the study altogether) had no bearing on the ability of the other partner to participate in the 12-month follow-up. This study was approved by the Institutional Review Board [blinded for review].

Intervention

Family Expectations is a 12-week program that delivers a 36-hour evidence-based curriculum in workshop-based sessions. The curriculum, The Becoming Parents Program, developed by Aly Frei and Pam Jordan (Jordan et al., 2003), includes content focused on strengthening the couple relationship, stress management, and on caring for a newborn, as well as content adapted from the Prevention and Relationship Education Program (PREP; Markman et al., 2001). Workshop sessions occurred weekly for 12 weeks, with each session lasting three hours. Couples were provided a meal and childcare on-site at no cost. Couples received monetary compensation for attendance at sessions ($50 per individual), as well as transportation and childcare. In addition, Family Expectations includes coaching sessions for couples and group case management/ referral information about local resources. Each couple completes an initial case management assessment, followed by referrals to any needed services, such as employment, substance abuse, mental health, housing, etc. Couples also have the option of additional case management/coaching services during their involvement in Family Expectations.

Measures

Depression

We utilized 12 items from the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) as the primary measure of depression during pregnancy and postpartum. Each item is rated from 0 *(rarely or none of the time)* to 3 *(most or all of the time)* scale. We multiplied the 12-item CES-D score by 5/3 in order to make it comparable to the full 20-item CES-D (Radloff, 1977). Depression at baseline (i.e.,

during pregnancy) was measured as a continuous covariate (*Range* = 0 – 60, *M* = 13.50, *SD* = 11.76). However, given that depression research and clinical settings often evaluate self-reported depression scores in terms of cutoffs rather than symptoms (Sit & Wisner, 2009), depression after having a baby was measured as a dichotomous outcome (i.e., met criteria for depression or not; CES-D ≥ 16; Radloff, 1977). The 12-item version has been found to have good reliability among a nationally representative sample of married couples (Ross et al., 1983). The Building Strong Families study used the same 12 items from the CES-D when assessing depression and reported good internal consistency for both men (α=.92) and women (α=.89; Wood et al., 2012). The CES-D is one of the most common and reliable self-report measures for evaluating depression (Goodman, 2004) and has good internal consistency (α=.80) and moderate test-retest reliability (.57) in samples looking at postpartum depression specifically (Beeghly et al., 2003). The items in the current study also demonstrated good internal consistency (α=.93)

Moderators

At the individual level (Level 1), we examined gender (1 = women, 0 = men), race (i.e., Black/African American = 1, Not Black/African American = 0), and ethnicity (i.e., Hispanic/Latino/a = 1, Not Hispanic/Latino/a = 0). At the couple level (Level 2), we examined gestational age at enrollment as a moderator of program effectiveness. Gestational age at enrollment was calculated using participants' due date and the date of enrollment.

Relationship Satisfaction. We utilized the following item as the primary measure of relationship satisfaction at baseline: *Taking all things together, on a scale from 0 to 10,*

where 0 is not at all happy and 10 is completely happy, how happy would you say your relationship with [partner] is? You can pick any number from 0 to 10. This item was utilized in the Building Strong Families study as their primary measure of relationship satisfaction (Wood et al., 2014), and a single item to assess relationship satisfaction has been successfully utilized in other studies as well (e.g., Rhoades, Stanley, & Markman, 2012). The average relationship satisfaction score at baseline was 8.08 (*SD* = 1.89, *Range* = 0 – 10). Given that this is a single item, an alpha could not be calculated.

Sociodemographic Disadvantage. We utilized the 11-item disadvantage index from Building Strong Families (Amato, 2014), with minor modifications due to availability of data in the current study. Couples were given one point for each of the following characteristics, measured at baseline: either parent being younger than 20 years old, either parent not having a high school diploma, the father being unemployed, the mother receiving public assistance within the past year, either parent having children from a previous relationship, having no one to care for the baby in an emergency, and having no one to borrow money from in an emergency. The original measure also included whether the father earned less than $10,000 within the past year; however, we used whether the combined household income was less than $20,000 given that both partners reported on income. Scores in the current sample ranged from 0-10, with higher scores indicating greater socioeconomic disadvantage (*M* = 3.57, *SD* = 2.06). Given that the risk index drew from characteristics of both partners, sociodemographic disadvantage was evaluated as a couple-level variable.

Data Analytic Plan

Main Effects

All analyses were conducted using multilevel modeling in Hierarchical Linear Modeling Version 7.0 (HLM 7.0; Raudenbush et al., 2011) in order to account for interdependency of partner data (i.e., individuals nested within couples). Depression was evaluated as a dichotomous outcome (i.e., met criteria for depression or not; CESD ≥ 16; Radloff, 1977; Sit & Wisner, 2009); therefore, a Bernoulli specification was employed in all analyses. Given that depression during pregnancy is considered one of the strongest predictors of depression after birth (O'Hara & McCabe, 2013; Werner et al., 2015), we included baseline depression levels measured during pregnancy as a covariate in all analyses in order to increase the precision of the estimates. In evaluating statistical significance, all analyses use a standard of $p < .05$, two-tailed. We report effect sizes using the Cox index, which is an unbiased estimator of the effect for a dichotomous outcome comparable to estimates of effect sizes for continuous outcomes (e.g., Hedges' g or Cohen's d; Sánchez-Meca et al., 2003; see also, What Works Clearinghouse, 2020).

All analyses of the impact of Family Expectations on depression after baby were intent-to-treat, such that each participant was analyzed based on the group to which they were assigned (Family Expectations or control), regardless of actual services received. The impact of Family Expectations on the dichotomous outcome of depression was evaluated using multilevel logistic regression, with intervention status (Family Expectations vs. control) as the independent variable and depression as the outcome variable.

Level-1 Model:

$$\text{Prob}(\text{Depression}_{ij}) = \beta_{0j} + \beta_{1j}*(\text{Baseline Depression}_{ij})$$

Level-2 Model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(\text{Group}_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

Moderation Effects

For analyses of moderation on the dichotomous outcome of depression, some moderators were individual variables (i.e., potentially different for each partner in a couple) and some were couple-level (i.e., the same for both partners). Couple-level moderators (gestational age at enrollment, sociodemographic disadvantage) were added to the multilevel logistic regression equation at Level 2, along with group assignment. Individual-level moderators (gender, race/ethnicity, relationship satisfaction) were added to the equation at Level 1. All analyses controlled for depression levels during pregnancy at Level 1.

Results

Nearly one-third (30.4%) of fathers and 37.9% of mothers met the clinical cutoff for depression (≥16) within 12 months after having their baby. In line with our hypothesis, controlling for depression during pregnancy, those assigned to Family Expectations had 22% lower odds of meeting criteria for depression at follow-up compared to those assigned to the control group (b = -0.25, SE = .13, OR = 0.78, p = .050, ES = .15; see Table 1). This equates to 32.5% of Family Expectations participants

meeting criteria for depression compared to 37.1% of control group participants, for an unadjusted difference of 4.6 percentage points.

The test for moderation by gestational age at enrollment was significant, though in the opposite direction of our hypotheses, indicating that there was a stronger effect of Family Expectations on depression the later in pregnancy participants were when they enrolled in the program (b = -0.03, SE = 0.01, OR = 0.97, p = .013; see Table 2). We utilized Preacher (2010) regions of significance analyses in order to identify the cutoff points at which the intervention effect became significant. The cut-off score was 20.95 weeks, indicating that the effect of Family Expectations on the odds of experiencing depression after having a baby was significant for those who enrolled in the program at approximately 21 weeks gestational age or later.

Contrary to our hypotheses, the impact of Family Expectations on depression was not significantly moderated by identifying as Black or African American (p = .887) or Hispanic/Latina/o (p = .999). Further, regarding participant distress at enrollment, program impacts were not moderated by relationship satisfaction (p = .222) or sociodemographic disadvantage (p = .474). In addition, gender did not moderate program impacts, suggesting that both mothers and fathers similarly benefitted from participating in Family Expectations (p = .325; see Table 2).

Discussion

Our findings demonstrate several important points that extend prior research on depression interventions employed in the perinatal period, as well as relationship education more generally. First, we found that those who enrolled in Family Expectations

were less likely to experience depression in the year following the birth of their baby compared to those who enrolled in the control group. Though not statistically significant at $p < .05$, two-tailed, this finding demonstrates that, rather than directly targeting depression, programming aimed at addressing risk factors for depression in the perinatal period, such as poor relationship quality and social support, can still have preventive effects among low-income couples. Such knowledge could help modify the way we think about depression prevention for those having a baby. Currently, there are multiple preventative psychoeducational programs that focus on preventing and intervening around depression directly (e.g., Howell et al., 2012; Kao et al., 2015; Zlotnick et al., 2011); however, Family Expectations focuses on the romantic and co-parenting relationship among couples. As such, capitalizing on existing relationship education programming could help to expand the array of depression prevention options during this vulnerable period for couples.

Research on couple therapy points to the mechanistic effects that could explain relationship education's impact on depression after having a baby. Engaging in relationship-focused therapy (as opposed to mental health-focused therapy) improves mental health outcomes via improvements in relationship quality (Atkins et al., 2009; Christensen et al., 2004). As such, one may expect that relationship education may have similar mechanistic effects as couple therapy, given that relationship education is associated with improvements in several domains of relationship quality (Hawkins et al., 2008) and is associated with improved mental health functioning (e.g., Braithwaite & Fincham, 2007; Devaney & Dion, 2010; Doss et al., 2016; Pinquart & Teubert, 2010). In

fact, Braithwaite and Holt-Lunstad (2017) further clarify that improving romantic relationship functioning improves mental health, but the opposite does not bear as much weight, suggesting that romantic relationship improvement is a plausible mechanism by which depression is prevented. Future research could test this mechanism by collecting more relationship and depression data over more time points during the transition to having a baby.

Analyses around our second hypothesis demonstrated that the impact of Family Expectations varied as a function of gestational age at enrollment. Contrary to our hypotheses, however, Family Expectations only had a significant impact on depression among those who enrolled in the program at approximately 21 weeks gestation or later, and the effect was stronger the later in pregnancy couples were at enrollment. Although we expected that receiving relationship education earlier in pregnancy would provide more time to ameliorate some of the risk factors for depression, perhaps enrolling in the program later in pregnancy presents unique benefits. For example, if parents are engaging in Family Expectations closer to the birth of their baby, and workshops occur over the span of 12 weeks, the skills and concepts discussed are more likely to be top of mind. In contrast, couples who enroll early in pregnancy could struggle to retain some of their relationship skills over time, meaning they are less likely to use the skills and knowledge gained at a time when they need them the most (i.e., the birth of their baby). Indeed, many relationship interventions recommend employing "booster sessions" given that relationship gains can attenuate over time (Markman & Rhoades, 2012). Further, given that all workshops were conducted in a group format, there is a higher likelihood that

couples who enroll later in pregnancy will receive support from their cohort and may be more able to celebrate the impending birth of their baby. Given that social support is a protective factor for depression after having a baby (Pao et al., 2019), perhaps receiving support from fellow participants and the Family Expectations program nearer to the birth has particularly salient impacts.

Importantly, gender did not moderate the impact of Family Expectations on depression in the postpartum period. Given that few studies have explored depression prevention options for fathers having a baby, Family Expectations could be a feasible alternative to traditional depression interventions that only include women given its accessibility to both mothers and fathers.

Limitations and Conclusion

Certain limitations should be considered when interpreting the results of the current study. First, given that there weren't restrictions on gestational age at enrollment, there was considerable heterogeneity in how far into the postpartum period couples were at the 12-month follow-up. As a result, it is possible that couples who completed their follow-up earlier in the postpartum period had not yet experienced a depressive episode; limiting our ability to fully capture the impact of Family Expectations on depression. In addition, depression in men has a slightly different course compared to depression in women who recently had a baby: women often experience an onset of symptoms early in the postpartum period and men typically begin to show symptoms of depression later in the postpartum period (Goodman, 2004). This difference in symptom onset could have influenced our ability to detect depression depending on when couples engaged in their

12-month follow-up. Future research on relationship education should consider including more follow-up time points that assess depression in order to capture symptom onset and trajectories more accurately. Finally, given that the RCT for Family Expectations was not designed to specifically assess for depression in the perinatal period, other indicators of risk for depression after having a baby were not available and limited our ability to examine additional moderators of program impacts, such as history of depression.

These limitations should be considered in the context of important strengths of the study. First, although research indicates that relationship education may reduce mental health problems, few have evaluated the impact of relationship education on depression in the postpartum period using a rigorous randomized controlled design and a low-income sample. Our findings highlight that the benefits of relationship education extend beyond improving the romantic relationship to include impacts on depression during a vulnerable time for couples: having a baby. Further, the current study demonstrates the importance of incorporating fathers into depression prevention efforts, rather than solely focusing on the mother's mental health during the transition to parenthood. Given that fathers are still rarely screened and treated for depression when having a baby, our findings demonstrate that relationship education could be a potential prevention option for women and men alike. In sum, Family Expectations is a viable source of depression prevention among low-income couples having a baby, particularly those in the second half of their pregnancy.

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Table 1

Main Effects of Family Expectations on Postpartum Depression

	b	*SE*	*OR*	*95% CI*	*p-value*
Intercept, β_0					
Intercept, γ_{00}	-0.581	0.098	0.559	0.460, 0.681	<.001
Family Expectations, γ_{01}	-0.250	0.128	0.778	0.605, 1.002	.050
Prenatal Depression, β_1					
Intercept, γ_{10}	0.080	0.006	1.084	1.071, 1.096	<.001

Note. Meets criteria for postpartum depression (CESD ≥ 16) = 1, Does Not Meet Criteria = 0.

Table 2

HLM Results for Moderators of Family Expectations on Postpartum Depression

	b	*SE*	*OR*	*95% CI*
		Gestational Age at Enrollment		
Intercept, β_0				
Intercept, γ_{00}	-1.011***	0.252	0.364	0.222, 0.596
Family Expectations, γ_{01}	0.490	0.321	1.633	0.869, 3.069
Moderator, γ_{02}	0.020+	0.011	1.020	0.999, 1.043
FE x Moderator, γ_{03}	**-0.035***	**0.014**	**0.965**	**0.939, 0.992**
		Relationship Satisfaction		
Intercept, β_0				
Intercept, γ_{00}	0.564	0.438	1.758	0.744, 4.153
Family Expectations, γ_{01}	-0.896	0.549	0.408	0.139, 1.200
Moderator, γ_{02}	-0.143**	0.053	0.867	0.780, 0.962
FE x Moderator, γ_{03}	0.082	0.067	1.085	0.951, 1.238
		Sociodemographic Disadvantage		
Intercept, β_0				
Intercept, γ_{00}	-1.136***	0.212	0.321	0.212, 0.487
Family Expectations, γ_{01}	-0.065	0.269	0.937	0.553, 1.589
Moderator, γ_{02}	0.148**	0.049	1.159	1.053, 1.277
FE x Moderator, γ_{03}	-0.045	0.063	0.956	0.845, 1.081
		Black or African American		
Intercept, β_0				
Intercept, γ_{00}	-0.593***	0.120	0.552	0.437, 0.700
Family Expectations, γ_{01}	-0.236	0.154	0.790	0.584, 1.069
Moderator, γ_{02}	0.035	0.205	1.036	0.693, 1.550
FE x Moderator, γ_{03}	-0.038	0.270	0.962	0.567, 1.620
		Hispanic/Latino/a		
Intercept, β_0				
Intercept, γ_{00}	-0.523***	0.153	0.592	0.438, 0.801
Family Expectations, γ_{01}	-0.174	0.198	0.840	0.569, 1.241
Moderator, γ_{02}	-0.183	0.278	0.833	0.482, 1.439
FE x Moderator, γ_{03}	-0.178	0.358	0.837	0.413, 1.693
		Gender		
Intercept, β_0				
Intercept, γ_{00}	-0.712***	0.141	0.491	0.372, 0.647
Family Expectations, γ_{01}	-0.123	0.182	0.884	0.619, 1.264
Moderator, γ_{02}	0.241	0.183	1.272	0.888, 1.824

FE x Moderator, γ_{03}	-0.234	0.237	0.792	0.497, 1.261

Note. All analyses control for continuous levels of prenatal depression. Meets criteria for postpartum depression (CESD ≥ 16) = 1, Does Not Meet Criteria = 0.
*p < .05; ** p = < .01; ***p = <.001.

Paper 2:

Individual Relationship Education and Postpartum Depression: The Impact of MotherWise

Maggie O'Reilly Treter

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Sara E. Mazzoni

Abstract

Postpartum depression is the most common complication of childbearing, particularly among low-income women, and has serious negative impacts on both women and their children. Yet, many women do not engage in postpartum depression treatment due to barriers such as stigma around mental health care, as well as transportation and cost limitations. As a result, scholars have called for a shift in applied postpartum depression research from intervention to prevention in order to evade the negative consequences and barriers to treatment of this major public health issue. MotherWise is a community-based program for women who are pregnant or who have just had a baby that combines an evidence-based curriculum developed for individuals (Within My Reach) with case management and information on infant care and parenting. The current study evaluated the impact of MotherWise on postpartum depression, as well as history of depression and race/ethnicity as moderators of these effects. The study sample included 430 women who enrolled in a larger randomized controlled trial of MotherWise during pregnancy. Results indicated that the MotherWise program did not significantly impact postpartum depression overall; however, findings revealed that the program leads to significantly lower odds of postpartum depression among women without histories of depression, as well as women who identify as Black or African American. Thus, the current project demonstrates the potential for individual relationship education programming to prevent postpartum depression among certain groups.

Individual Relationship Education and Postpartum Depression: The Impact of MotherWise

Background

Postpartum depression is the most common complication of childbearing, affecting approximately 20% of women in the United States (Werner et al., 2015), which far exceeds the rates of other serious perinatal complications, including gestational diabetes (CDC, 2017), hypertensive disorders (CDC, 2021), and preterm birth (Ferré et al., 2016). The risk for developing postpartum depression is even higher among low-income women (Abrams et al., 2009; Chaudron et al., 2010).

Although depression of any kind can have serious negative impacts on women, postpartum depression inherently includes caring for a young infant while experiencing depressive symptoms, potentially setting the mother up for increased stress and poor caretaking behaviors. Women experiencing depressive symptoms are more likely to neglect and abuse their children, and are less likely to attend well-child visits, complete their children's immunizations, use home safety devices, correctly use car seats, set safe water heater temperatures, and place infants in the recommended sleeping position (O'Hara & McCabe, 2013). Beyond infancy, maternal postpartum depression is associated with a host of behavioral, cognitive, mental and physical health-related consequences for the child (Grace et al., 2003; O'Hara, 2009; O'Hara & McCabe, 2013). Postpartum depression may persist over a long period of time and increase the likelihood

of experiencing future depressive episodes (O'Hara & McCabe, 2013); potentially prolonging these risks to the mother and her children.

Despite the important consequences of postpartum depression, only 50% of women experiencing postpartum depression actually engage in treatment (Ko et al., 2012). These rates are likely due to barriers to treatment, such as stigma surrounding mental health care, opposition to treatment, and shame around experiencing depressive symptoms during a time that is meant to be joyful (Abrams et al., 2009; Ko et al., 2012; Werner et al., 2015). There are also logistical barriers to treatment, such as concern around taking psychotropic medications while breastfeeding (O'Hara & McCabe, 2013; Werner et al., 2015) and transportation or cost limitations (Ko et al., 2012). Given these difficulties in engaging women in postpartum depression treatment, scholars have called for a shift in applied postpartum depression research from intervention to prevention (Werner et al., 2015).

Poor relationship quality is associated with more depressive symptoms (Whitton et al., 2007); therefore, perhaps intervening around dysfunctional relationship behaviors during pregnancy, and the stress associated with it, could help to prevent depressive symptoms in the postpartum period. Relationship education, which provides training in skills and strategies to help individuals and couples increase their chances of having healthy and stable relationships (Markman & Rhoades, 2012), could be one such type of prevention, as it targets risk factors for developing postpartum depression (e.g., interpersonal conflict, low support). Further, relationship education is associated with improvements in several indices of individual mental health functioning in general

(Braithwaite & Fincham, 2007; Carlson et al., 2014; Doss et al., 2016). However, given the particular risks for poor mental health outcomes when having a baby (Howard et al., 2014), it is important to further examine the impact of relationship education on individual mental health during the perinatal period specifically.

Indeed, previous studies have demonstrated that participating in relationship education during pregnancy is associated with greater psychological wellbeing postpartum (Pinquart & Teubert, 2010). Further, a relationship education for unmarried couples having a baby, Family Expectations, ∂found that mothers assigned to the program group demonstrated fewer depressive symptoms at the 15-month follow-up compared to the no-treatment control group (Devaney & Dion, 2010). These findings suggest that relationship education targeting perinatal populations has the potential to reduce risk for developing depression, but more research is needed to clarify whether these effects exist within the postpartum period specifically, as the onset of depression after birth sets the stage for future depressive episodes and poor caretaking behaviors (O'Hara & McCabe, 2013). Although depressive episodes that occur within 12 months after giving birth are considered postpartum depression, it is particularly important to identify postpartum depression early-on in order to circumvent the many individual, social, and parenting issues associated with this illness (Sit & Wisner, 2009). Thus, the current study focuses on depression that is assessed during mothers' postpartum hospital visit 6-12 weeks after the birth of a baby, when providers are most likely to identify and support women at-risk for developing postpartum depression.

Beyond understanding whether relationship education is effective in preventing postpartum depression, it is also necessary to understand for whom this type of programming is most effective. Previous studies of relationship education suggest that populations most at-risk tend to benefit the most from relationship programming (Stanley et al., 2020). Women of color, particularly women who identify as Black/African American and Hispanic/Latina, experience postpartum depression at disproportionately higher rates compared to white women (O'Hara & McCabe, 2013; Pao et al., 2019). Further, even when experiencing depressive symptoms, half as many Black and Hispanic/Latina women seek treatment compared to white women, and the treatment they receive can be suboptimal (e.g., lack of continued care; Kozhimannil, 2011). These realities underscore the importance of understanding whether prevention options such as relationship education are a feasible alternative for combatting postpartum depression among groups least likely to seek treatment. Further, there are also strong associations between experiencing past depressive episodes and risk for developing postpartum depression (O'Hara & McCabe, 2013). Thus, perhaps women who are most at-risk of developing postpartum depression may also benefit more from relationship education, particularly women of color and women with histories of depression.

The Current Study

The current study evaluated the impact of MotherWise, a 6-week relationship education program for women who are pregnant or recently had a baby, on postpartum depression. We hypothesized that those randomly assigned to participate in MotherWise during pregnancy would have lower odds of experiencing postpartum depression

compared to those in the no-treatment control group. Further, we tested race/ethnicity and history of depression as moderators of program effectiveness.

Method

Participants

Participants included a subset of 430 women who enrolled in a larger randomized controlled trial (RCT) regarding the effectiveness of the MotherWise program (N = 953). We focused on those who enrolled during pregnancy and delivered at the local county hospital (45% of the larger sample) where medical chart data were available. Mothers in the current sample primarily identified as Hispanic or Latina (68.6%) followed by Non-Hispanic White (14.9%), Non-Hispanic Black or African American (11.4%), and Other (4.4%). Less than 1% of mothers reported their race/ethnicity as "unknown" (0.7%). At enrollment, mothers ranged from ages 18 to 43 years old with a mean age of 28.53 years old (SD = 5.92). The majority of mothers had earned the equivalent of a high school degree (e.g., GED) or higher at the time of enrollment (73.7%), with 9.8% earning their bachelor's degree or higher. Employment status varied, with the majority unemployed at enrollment (58.3%), and the remaining working full-time (11.0%), part-time (12.6%), or temporarily/ seasonally (18.2%). Although not a requirement to participate in MotherWise, the majority of mothers had low-income levels, earning an average of $14,798 per year ($SD$ = 12,965) at the time of enrollment, and 72.1% receiving some form public assistance in the past month (e.g., TANF, SNAP).

The majority of mothers (55.4%) were in a steady relationship with a partner at the time of enrollment, 17.2% were in an on-again and off-again relationship, and 27.5%

did not have a partner. Of mothers in relationships at enrollment, 83.9% were living with their partner at least part-time. One third (33%) of mothers had a history of depression and 40% were pregnant with their first child at the time of enrollment. The average gestational age at enrollment was 23.68 weeks (*SD* = 8.45).

Procedures

Women were recruited from exam rooms in obstetrics and gynecology clinics and pediatrics clinics, flyers, referrals from the clinic or agency staff members, and radio, television, and social media advertising. For in-person recruitment (e.g., in exam rooms), project staff described the MotherWise program and associated study to the patient and, if she was interested in participating, staff scheduled her for an intake appointment. Women were eligible for enrollment into the RCT if they were pregnant or delivered a baby within the past three months, were age 18 or older, and were English or Spanish speaking. Inclusion in the current study was further restricted to only women who were pregnant at enrollment, delivered at the local county hospital, and attended a postpartum or well-baby visit following delivery (i.e., they provided postpartum data; see more information below regarding medical chart review). Women did not need to be in a romantic relationship to participate. All services were offered in both English and Spanish.

At intake, mothers met with an intake specialist at MotherWise in order to learn more about the study and MotherWise program. Verbal consent was then obtained over the phone by the organization conducted the larger RCT, Mathematica Policy Research, before study measures were collected. At the end of the appointment, mothers were

randomly assigned to the program (55%) or no-treatment control condition (45%) by Mathematica using computer-generated randomization software. Randomization was initially 3:2 in order to create adequate class sizes in the program group, then changed to 1:1 when recruitment was deemed sufficient (after seven months). All participants received $30 in gift cards for completing the intake appointment, regardless of program assignment.

Participants assigned to the MotherWise program attended six weekly group-based workshops with the addition of up to four case management sessions. Participants assigned to the no-treatment control group did not receive any services as part of this study. Women randomized to MotherWise, participants received compensation in the form of gift cards for participating in the program: $10 for each session attended, $100 for attending at least 5 of 6 sessions, and $10 per meeting with their case manager (up to 4 sessions).

All participants in the current study (MotherWise n = 237 and no-treatment control n = 193) also consented to medical chart review that extracts infant and mother health data from participant hospital records, including gestational complications, birth outcomes, and mental health concerns. Trained research assistants extracted data from participants' medical records via the county hospital electronic medical record system. Reliability checks were conducted every 4-6 weeks in order to ensure that all research assistants were correctly following the data extraction protocol.

Intervention

MotherWise is designed to support women in making wise decisions for themselves and their children by learning about healthy relationship patterns, new skills, and self-awareness through participation in group-based workshops. The six-week program (24 hours) utilized the evidence-based curriculum for individuals, Within My Reach (Pearson et al., 2005), which addresses research-supported ways to choose a partner, communicate effectively in close relationships, solve problems, manage conflict in their families, co-parent, address aggression and violence, and exit unhealthy relationships safely (Rhoades & Stanley, 2009; 2011). The program also includes brief, supplemental information about caring for and connecting with a newborn, engaging in self-care, and recognizing postpartum depression. In addition to these workshops, each MotherWise participant has a dedicated case manager with whom she works individually to apply skills learned in the workshops to her own life and to connect her with other community resources (e.g., food assistance, housing, and employment services). All services were offered in English and Spanish. Most participants remained with their same cohort throughout the program; however, they were able to participate in classes with different cohorts in order to make up missed classes.

Measures

Postpartum Depression

Postpartum depression in mothers was collected via medical chart review of their postpartum or well-baby visit, when postpartum depression is typically assessed (range = 0 – 12 weeks, M = 6.83 weeks, SD = 2.09). The county hospital from which mothers

were recruited and received prenatal care utilizes the 10-item Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) as their primary measure of depression during the perinatal period. It is widely used in the postpartum literature and has shown good reliability with a split-half reliability and convergent validity with clinical diagnoses of depression (Cox et al., 1987). Participants reported on the frequency of experiences over the past 7 days such as, "I have felt sad or miserable," and "I have been so unhappy that I have been crying." Items were scored on a 0 to 3 scale and summed such that higher scores were indicative of higher levels of postpartum depression (range = 0-29, $M = 5.27$, $SD = 5.80$, $\alpha = .91$). For the current study, scores were dichotomized based on receiving a score ≥ 10, indicating risk that depression is present (Earls, 2010).

Moderators and Covariates

History of depression and prenatal depression were gathered via medical chart review. History of depression referred to any self-reported or diagnosed depression prior to pregnancy. The EPDS (Cox et al., 1987) was also used to assess for prenatal depression during each trimester of pregnancy. In the current study, prenatal depression was measured using the average EPDS score across all trimesters of pregnancy where data were available. Participant race and ethnicity were gathered as part of Mathematica's baseline phone survey. We were particularly interested in examining women who identified as Black/African American or Hispanic/Latina; therefore, these variables were dichotomized into Black/African American (1) vs. Not Black/African American (0) and Hispanic/Latina (1) vs. Not Hispanic/Latina (0).

Data Analytic Plan

All analyses were intent-to-treat, such that each participant was analyzed based on the group to which they were assigned (MotherWise or control), regardless of actual services received. In evaluating statistical significance, all analyses used two-tailed tests and a standard of $p < .05$ for main effects and $p < .10$ for moderators (see discussion by McClelland & Judd, 1993 and Whisman & McClelland, 2005 for using $p < .10$ for interaction tests, which tend to be significantly underpowered). We report effect sizes using the Cox index, which is an unbiased estimator of the effect for a dichotomous outcome comparable to estimates of effect sizes for continuous outcomes (e.g., Hedges' g or Cohen's d; Sánchez-Meca et al., 2003; see also, What Works Clearinghouse, 2020).

The impact of MotherWise on the dichotomous outcome of postpartum depression (i.e., met criteria for postpartum depression or not) was evaluated using Binary Logistic Regression, with intervention status (MotherWise vs. control) as the independent variable and postpartum depression as the outcome variable. Given that prenatal depression is the most robust predictor of postpartum depression (O'Hara & McCabe, 2013), we included prenatal depression levels as a covariate in all analyses.

Results

Although those in the MotherWise group were less likely to screen positive for postpartum depression (17%) compared to the control group (21%) overall, controlling for prenatal depression scores, this difference was not statistically significant (b = -.35, OR = .71, p = .21, ES = .21; see Table 1).

In line with our hypotheses, the test for moderation based on whether participants identified as Black or African American was significant (b = -1.84, OR = 0.16, p = .027; see Table 1). Over one-third (39%) of Black or African American control participants reported postpartum depression compared to only 14% of Black or African American MotherWise participants (controlling for prenatal depression: b = -2.65 p = .014, ES = 1.58). Those who did not identify as Black or African American did not significantly differ in their postpartum depression based on group assignment (p = .89).

Further, history of depression also moderated program effects (b = 1.07, OR = 2.91, p = .059, ES = .65; see Table 1) such that program effects were significant only for participants without a history of depression. Nineteen percent (19%) of control participants without a history of depression experienced postpartum depression compared to only 10% of MotherWise participants without a history of depression (controlling for prenatal depression: b = -.71, p = .04, ES = .26). Those with a history of depression did not significantly differ in their postpartum depression based on group assignment (p = .53).

Contrary to our hypotheses, the test for moderation of program effects based on whether participants identified as Hispanic/Latina or not Hispanic/Latina was not significant (p = .80).

Discussion

The findings in the current study indicated that the MotherWise program did not significantly impact postpartum depression overall; however, the program did prevent postpartum depression for women without histories of depression, as well as women who

identify as Black or African American. Thus, the current project demonstrates the potential for individual relationship education programming to prevent postpartum depression among certain groups.

It makes sense that individual relationship education may not have a universal impact on postpartum depression, as the program does not target postpartum depression specifically. Rather, through the many facets of the program, MotherWise targets barriers to treatment and risk factors for depression that could ultimately lead to lower risk for postpartum depression among many. One such barrier to postpartum depression treatment is stigma around mental illness and mental health care (Abrams et al., 2009). In particular, women who identify as racial or ethnic minorities are among those least likely to seek mental health services for postpartum depression (Abrams et al., 2009; Kozhimannil, 2011), which could help explain why program effects in the current sample are found among women who identify as Black or African American. Black and African American women experience several barriers to accessing treatment, including stigma around mental illness, distrust of the health care system, lack of insurance, and lack of culturally competent providers (APA, 2017a). As a result, they are more likely to rely on non-clinical forms of coping with depression, such as religion (Ward et al., 2009, 2013). Perhaps relationship education like MotherWise is a less stigmatizing entry point to services that helps to prevent postpartum depression, which extends the reach to populations who may not engage in mental healthcare otherwise, such as Black or African American women. In comparison, individuals who identify as white tend to be more open to receiving mental health services (Kozhimannil, 2011). It is possible that

women who are more likely to engage in mental health treatment do not experience additional benefits of MotherWise in preventing their postpartum depression, as they are more likely to have other clinical supports or resources already in place.

Studies have also shown that experiencing stress during pregnancy is a risk factor for developing postpartum depression (O'Hara & McCabe, 2013; Werner et al., 2015). Compared to white women, women who identify as Black or African American are disproportionately more likely to experience chronic stress (Jackson et al., 2010), including higher levels of stress and fewer buffers of stress during pregnancy (Borders et al., 2015). Perhaps program impacts among this group stem from MotherWise providing services that combat stress in myriad ways. First, MotherWise teaches women healthy relationship skills that improve romantic and parent-child relationships (Antle et al., 2013; Antle et al., 2011; Sterrett-Hong et al., 2018; Visvanathan et al., 2015). By providing information and skills to reduce interpersonal distress, women likely also experience improvements in their individual wellbeing, as relationship and individual functioning are highly correlated (Whisman & Baucom, 2012). Further, social support is an important protective factor against postpartum depression, though this has been shown regardless of race (Pao et al., 2019). Perhaps group relationship education presents a unique form of support that has not been comprehensively examined among perinatal women. Indeed, other forms of group support currently gaining traction, such as group prenatal care, demonstrate that women engaging in group prenatal care with higher levels of stress or lower levels of social support experience greater improvements in individual mental health compared to those who engage in individual care (Heberlein et al., 2016;

Ickovics et al., 2011). Ickovics and colleagues (2011) posit that women with fewer resources experience greater benefit from group prenatal interventions, as group interventions are more multi-faceted than individual and offer more resources to combat stress and provide support for women who need it the most. Finally, MotherWise offers case management that provides important resources that could address sources of stress and wellbeing, such as lack of housing and baby items. Taken together, this combination of resources, education, and social support offered at MotherWise could be especially relevant and helpful for targeting the chronic stress that Black and African American women face.

Results also demonstrated that MotherWise may prevent new instances of postpartum depression but not recurrences among those with a history of depression. This makes sense given that the program is focused on implementing healthy relationship skills and recognizing signs of individual distress, rather than treating depression itself. Similarly to women who identify as Black or African American, perhaps social support and reduced maternal stress through participating in MotherWise help to prevent first-time occurrences of postpartum depression rather than recurrences. Indeed, one of the most prominent and effective postpartum depression prevention programs, ROSE (Reach Out, Stand strong, Essentials for new mothers), addresses similar risk factors for postpartum depression as MotherWise, such as social support, role transitions, and life stressors (Zlotnick et al., 2011, 2016). However, ROSE addresses these risk factors directly using an interpersonal therapy framework (Zlotnick et al., 2016), whereas MotherWise addresses them indirectly through group participation in relationship

education (with an emphasis on interpersonal skills acquisition) and individual case management. Further, women were excluded from randomized controlled trials of ROSE based on prenatal depression or other psychiatric disorders at enrollment, but there were no indications that history of depression was an exclusion criterion (Zlotnick et al., 2011, 2016). These distinctions in programming suggest that perhaps indirect postpartum depression prevention such as MotherWise is particularly helpful for mothers without a history of depression, whereas programs that directly target postpartum depression risk factors, such as ROSE, are effective regardless of history of depression.

It is important to acknowledge that the effects of MotherWise on postpartum depression were not moderated by identifying as Hispanic/Latina, despite this group facing similar barriers to mental health treatment and risk factors for postpartum depression as Black and African American women (APA, 2017b; Borders et al., 2015; Kozhimannil, 2011). Perhaps these groups of women differed in their social support or stress upon entering the program, which led to differences in program impact. Further, many participants who identified as Hispanic/Latina were also undocumented (though we did not collect data on exact numbers), which likely impeded their ability to receive similar services to women who hold documentation status. As a result, they were not able to fully benefit from MotherWise in the same way as Black or African American women.

Limitations

Despite the promising findings in the current study regarding the potential for individual relationship education programming to prevent postpartum depression among certain groups, several limitations should be noted. First, our data collection was limited

to medical chart review data extraction and a standard set of items provided by Mathematica Policy Research and required by the funding agency. Thus, we were limited in our ability to test the mechanisms by which MotherWise was associated with lower odds of experiencing postpartum depression among women who identify as Black or African American and women without a history of depression. However, the mixed-methods data collection of this study can also be viewed as a strength, providing a more comprehensive overview of participants' individual wellbeing compared to self-report via study survey alone. Further, although certainly a positive aspect of the program, MotherWise offers several services to support pregnant and postpartum women (e.g., relationship education, case management, community referrals), which limits our ability to pinpoint which aspects of MotherWise are particularly impactful for preventing postpartum depression among the women they serve. However, this combination of services is similar to other relationship education programs (e.g., Family Expectations in Oklahoma City; Devaney & Dion, 2010), allowing for easier comparison and generalization across sites.

Future Directions and Conclusion

The current study lays the groundwork for exploring unique avenues for preventing postpartum depression. In particular, the current study demonstrates that MotherWise, an individual relationship education program designed to support women in making wise decisions for themselves and their children, is effective at preventing postpartum depression among mothers who identify as Black or African American and mothers without a history of depression. It is less clear why MotherWise has an impact

on postpartum depression among particular groups. We hypothesize that increased access to social support and healthy relationship skills that help to reduce stress could be potential mediators of program effectiveness. In addition, it is possible that the experience of participating in group relationship education classes requires greater reflection that promotes self-awareness and overall wellbeing or openness to seeking help. Thus, further exploration of the mechanisms by which MotherWise prevents postpartum depression is important.

Although MotherWise may not be feasible as a universal postpartum depression prevention program, given the low rates of postpartum depression treatment engagement and increased need for more prevention options (O'Hara & McCabe, 2013; Werner et al., 2015), MotherWise and other relationship education programs could be a viable way to expand current postpartum depression prevention efforts. Further, MotherWise may also strengthen women's awareness of postpartum depression and ways to access services, creating an approachable entry point for pursuing important mental and physical health services. It is pertinent to evaluate how the effects of MotherWise compare to other forms of relationship education, such as those serving pregnant and postpartum couples (e.g., Family Expectations; Devaney & Dion, 2010) or those providing online services (OurRelationship; Doss et al., 2016). Such knowledge would help to further clarify whether our findings are limited to MotherWise or generalizable to other relationship education programming that could further expand the reach of postpartum depression prevention.

Taken together, our study demonstrates the viability of programs like MotherWise as an alternative form of postpartum depression prevention that provides unique benefits over other types of preventions, such as engaging individuals without the stigma surrounding mental health and health care, reducing barriers to treatment (e.g., providing transportation, childcare, services in English and Spanish), and providing relationship education that is generalizable to multiple facets of life (romantic relationships, parent-child relationships). When considering this major public health issue, it is necessary to consider multiple prevention and treatment options in order to expand the reach of services and mitigate the deleterious effects of postpartum depression on women and their families. MotherWise prevents postpartum depression among women who identify as Black or African American and women without a history of depression, thus demonstrating a unique path forward in combatting postpartum depression.

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Table 1

Binary Logistic Regression Models of Main Effects and Moderation of MotherWise on Postpartum Depression

	b	*SE*	*Odds Ratio*	*(95% CI)*
Main Effects				
MotherWise	-0.35	0.28	0.71	0.41 – 1.22
Constant	-2.83***	0.32	0.06	
Black or African American				
MotherWise	-0.05	0.31	0.95	0.52 – 1.75
Moderator	1.27**	0.49	3.55	1.37 – 9.19
MotherWise x Moderator	-1.83*	0.83	0.16	0.03 – 0.81
Constant	-3.10***	0.35	0.05	
Hispanic or Latina				
MotherWise	-1.25	0.72	0.29	0.07 – 1.18
Moderator	0.38	0.61	1.46	0.45 – 4.81
MotherWise x Moderator	0.22	0.86	1.24	0.23 – 6.73
Constant	-8.80	1.11	0.00	
History of Depression				
MotherWise	-0.81*	0.38	0.44	0.21 – 0.94
Moderator	-0.28	0.41	0.76	0.34 – 1.70
MotherWise x Moderator	1.07+	0.57	2.91	0.96 – 8.83
Constant	-2.64***	0.33	0.07	

Note. All analyses control for levels of prenatal depression. Positive screen for postpartum depression (EPDS ≥ 10) = 1, Does Not Meet Criteria = 0. Black/AA = 1, Not Black/AA= 0. Hispanic/Latina = 1, Not Hispanic/Latina = 0. History of Depression = 1, No History = 0.

+ = p = <.10; *p = <.05; ** p = < .01; ***p = <.001

General Discussion

These two papers evaluated the impact of two different relationship education programs on postpartum depression. Together, these studies inform postpartum depression prevention efforts by demonstrating that psychoeducational programming aimed at improving romantic relationships and promoting healthy communications skills is associated with lower odds of experiencing postpartum depression, particularly among certain groups.

A strength of this dissertation project includes the analysis of two different relationship education programs, providing the opportunity to compare and contrast the effectiveness of these types of programs for preventing postpartum depression. Paper 1 demonstrated that participating in couple-focused relationship education (Family Expectations) reduces the odds of experiencing postpartum depression, and this effect was not modulated by gender, sociodemographic or relationship distress, or race/ethnicity. However, this study suggests that couple relationship education may be most effective in preventing postpartum depression when it targets couples who are in the second half of pregnancy, potentially as a way for couples to solidify and utilize relationship skills closer to the birth of their baby. In contrast, Paper 2 did not find evidence that individual relationship education programming (MotherWise) has an overall impact on odds of postpartum depression. However, significant program effects

were found among women who identified as Black/African American, as well as those who did not have a history of depression.

Taken together, these papers suggest that Family Expectations and MotherWise could be viable options for postpartum depression prevention, but each type of program may be more beneficial for certain groups than others. Perhaps couple-focused relationship education programming promotes overall impacts on postpartum depression because it simultaneously targets women and men in a relationship, thus improving the romantic relationship and reducing the odds that either or both partners develop postpartum depression. On the other hand, individually-focused relationship education programming could be more connected to increased general social support and reductions in stress, which could have particularly salient impacts on certain groups experiencing distress in those areas, such as women of color.

This dissertation identifies important future directions for the fields of both relationship science and perinatal mental health. First, randomized controlled trials of relationship education employed during the transition to parenthood would benefit from incorporating more measures of perinatal mental health over several time points in order to further clarify the impact of relationship education on perinatal mood and anxiety disorders, as well as mechanisms of this impact. Second, given that many different types of relationship education programming already exist, it would be useful to examine whether these programs have similar impacts on postpartum depression as Family Expectations and MotherWise, further expanding potential prevention options using existing programming. Third, perinatal mental health efforts should continue to increase

the role of fathers in screening and interventions. As demonstrated in Paper 1, gender did not moderate the impact of Family Expectations on odds of experiencing postpartum depression, suggesting that mothers and fathers similarly benefit from such programming, despite fathers rarely being targeted for postpartum depression screening and treatment. Though relationship education could be a viable option for postpartum depression prevention among men, more research is needed to clarify the unique experiences of postpartum depression among fathers, as well as treatment options that cater to both men and women. Lastly, more research bridging the gap between relationship functioning and perinatal mental health is needed given the bidirectional influence of these two areas.

Overall, these papers help expand the working knowledge of the benefits of relationship education. In addition to improving romantic relationships and general mental health, relationship education employed during the prenatal period is effective in preventing postpartum depression as well. Further, relationship education is a less stigmatizing source of support compared to traditional therapy or other interventions focused exclusively on mental health, potentially expanding the reach of postpartum depression prevention to those who wouldn't otherwise receive it. Given that postpartum depression is a major public health issue that is significantly undertreated, it is important to consider other, non-traditional interventions in order to expand the availability and reach of prevention options and mitigate the negative effects of this disorder on individuals, couples, and children. This dissertation project highlights relationship education as a unique avenue for preventing postpartum depression.

Appendix A – Additional Analyses

Although not part of my core dissertation project, I wanted to present basic science analyses from the Family Expectations data that complement Paper 1. I plan to submit these results as a third publication on the relations between relationship quality during pregnancy and postpartum depression.

Research examining depression and romantic relationships outside of the transition to parenthood suggests that relationship distress and depression are associated, both at clinical and subclinical levels of depressive symptoms. Domestic violence and low emotional support (Akincigil et al., 2010), poor social support (O'Hara, 2009), low relationship satisfaction (Escriba-Aguir & Artazcoz, 2011; Letourneau et al., 2012), low relationship adjustment (Whisman et al., 2011), and high rates of interpersonal conflict (Werner et al., 2015) are all risk factors for postpartum depression. Yet, no studies to date have comprehensively examined multiple relationship-based predictors of postpartum depression together in the same sample in order to comprehensively understand the contribution of relationship quality to the development of postpartum depression.

The impacts of postpartum depression also extend to the romantic relationship, such that when a mother develops postpartum depression, her partner is 24-50% more likely to also experience depression (Goodman, 2004), and this comorbidity increases over the first year postpartum (Matthey et al., 2000). In fact, maternal postpartum

depression is the strongest correlate of paternal postpartum depression (Cameron et al., 2016; Goodman, 2004). Yet, we have little understanding of how and why postpartum depression co-occurs in couples. Matthey and colleagues (2000) suggest that with the adjustment to a new baby, partner support and relationship quality have an increasingly bigger impact on mood, contributing to the comorbidity of postpartum depression in couples. However, given that relationship quality during pregnancy is predictive of relationship quality after the baby is born (Doss & Rhoades, 2017), is it possible that examining the relationship during pregnancy could help predict the development of postpartum depression?

This study aimed to clarify the relationship-based predictors of postpartum depression (commitment, satisfaction, constructive communication, destructive conflict, and perceived partner support). We hypothesized that having poorer relationship quality during pregnancy would be associated with greater odds of experiencing postpartum depression in both mothers and fathers.

Method

Participants

The current study examined a subsample of 1,608 individuals (N = 862 couples) who enrolled in Family Expectations during pregnancy and provided depression data within 12 months postpartum. See Paper 1 for information on demographic characteristics of the sample.

Procedures

See Paper 1.

Measures

Postpartum Depression

We utilized 12 items from the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) as the primary measure of prenatal depression (at baseline) and postpartum depression (at follow-up). See Paper 1 for more information on this measure.

Relationship Quality During Pregnancy

Commitment. We utilized the Revised Commitment Inventory (Owen et al., 2011; Stanley & Markman, 1992) to assess commitment to the relationship at baseline. The dedication subscale includes 8 self-report items that address personal commitment to one's relationship such as, "My relationship with my partner is clearly part of my life plans," and "I like to think of my partner and me more in terms of 'us' and 'we' than 'me' and 'him/her.'" Each item is rated on a 1 (*strongly disagree*) to 7 (*strongly agree*) scale. A mean score for commitment was used, with higher scores indicating greater partner commitment in the current relationship (*Range* = 1 – 7, *M* = 6.38, *SD* = 0.90). This subscale has demonstrated good internal consistency in previous studies for both men (α=.81) and women (α=.86; Owen et al., 2011), as well as in the current sample (α=.79).

Relationship Satisfaction. We utilized the following item as the primary measure of relationship satisfaction at baseline: *Taking all things together, on a scale from 0 to 10, where 0 is not at all happy and 10 is completely happy, how happy would you say your relationship with [partner] is? You can pick any number from 0 to 10.* This item was

utilized in the Building Strong Families study as their primary measure of relationship satisfaction (Wood et al., 2014) and using a single item to assess relationship satisfaction has been successfully utilized in other studies as well (e.g., Rhoades, Stanley, & Markman, 2012b). The average relationship satisfaction score at baseline was 8.08 (*SD* = 1.89, *Range* = 0 – 10). Given that this is a single item, an alpha could not be calculated.

Constructive Communication. We utilized the 8-item communication scale drawn from the Building Strong Families study (Wood et al., 2012) as a measure of how frequently couples use specific constructive behaviors for managing conflict. Example items include, "Even when arguing, we can keep a sense of humor" and "My partner is good at calming me when I get upset." Each item is rated from 0 *(never)* to 3 *(often)* scale. A mean score for constructive communication was used, with higher scores indicating more constructive communication in the relationship (*Range* = 0 – 3, *M* = 2.18, *SD* = 0.67). When this measure was utilized in the Building Strong Families study, they reported good internal consistency (α=.88; Wood et al., 2014). The items in the current sample also demonstrate good internal consistency (α=.92).

Destructive Conflict. We utilized the 9-item destructive conflict scale drawn from the Building Strong Families study (Wood et al., 2012) as a measure of how frequently couples engage in destructive conflict management behaviors. Example items include, "When we argue, one of us withdraws and refuses to talk about it anymore" and "When we argue, I feel personally attacked by my partner." Each item is rated from 0 *(never)* to 3 *(often)* scale. A mean score for destructive communication was used, with higher scores indicating more destructive conflict in the relationship (*Range* = 0 – 3, *M* =

1.20, *SD* = 0.79). When this measure was utilized in the Building Strong Families study, they reported good internal consistency (α =.87; Wood et al., 2014). The items in the current sample also demonstrate good internal consistency (α=.93).

Partner Support. We utilized the 12-item partner support scale drawn from the Building Strong Families study (Wood et al., 2012) as a measure of warmth and support in the relationship at baseline. Example items include, "My partner shows love and affection for me" and "My partner respects me." Each item is rated from 1 *(strongly disagree)* to 4 *(strongly agree)* scale. A mean score for partner support was used, with higher scores indicating greater perceived support in the relationship (*Range* = 1 – 4, *M* = 3.52, *SD* = 0.50). When this measure was utilized in the Building Strong Families study, they reported good internal consistency (α =.94; Wood et al., 2014). The items in the current sample also demonstrate good internal consistency (α=.93).

Data Analytic Plan

All analyses were conducted using multilevel modeling in Hierarchical Linear Modeling Version 7.0 (HLM 7.0; Raudenbush et al., 2011) in order to account for interdependency of partner data (i.e., individuals nested within couples). Postpartum depression was evaluated as a dichotomous outcome (i.e., met criteria for postpartum depression or not; CESD ≥ 16; Radloff, 1977; Sit & Wisner, 2009); therefore, a Bernoulli specification was employed in all analyses. Given that prenatal depression is considered one of the strongest predictors of postpartum depression (O'Hara & McCabe, 2013; Werner et al., 2015), we included prenatal depression levels as a covariate in all analyses in order to increase the precision of the estimates. We report effect sizes using the Cox

index. Relationship quality during pregnancy and prenatal depression were assessed at enrollment (Time 1), and postpartum depression was assessed at the 12-month follow-up (Time 2).

Level-1 Model:

$$\text{Prob}(\text{PostpartumDepression}_{ij}) = \beta_{0j} + \beta_{1j}*(\text{PrenatalDepression}_{ij}) + \beta_{2j}*(\text{Relationship Quality at T1}_{ij})$$

Level-2 Model:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

Results

When analyzed separately, each aspect of relationship quality during pregnancy significantly predicted postpartum depression, controlling for prenatal depression levels. Specifically, lower relationship commitment (b = -0.16, SE = 0.07, OR = 0.85, p = .018, ES = .10), lower perceived support (b = -0.30, SE = 0.13, OR = 0.74, p = .018, ES = .18), lower relationship satisfaction (b = -0.09, SE = 0.03, OR = 0.91, p = .006, ES = .06), lower constructive communication (b = -0.41, SE = 0.10, OR = 0.66, p < .001, ES = .25), and higher levels of destructive conflict (b = 0.27, SE = 0.08, OR = 1.31, p = .001, ES = .16) during pregnancy were associated with greater odds of experiencing postpartum depression. Further, when all aspects of relationship quality during pregnancy were entered into the same model, only constructive communication (b = 0.07, SE = 0.15, OR

= 0.66, $p < .001$, ES = .25) remained a significant predictor of postpartum depression (see Table A1).

To see if the associations between relationship quality during pregnancy and postpartum depression were similar across mothers and fathers, we tested gender as a moderator. Parent gender did not significantly moderate the relations between any aspect of relationship quality and postpartum depression ($ps > .05$), suggesting that relationship quality during pregnancy similarly predicts mothers' and fathers' postpartum depression.

Table A.1

Relationship Quality During Pregnancy Predicting Postpartum Depression in the Same Multilevel Model

Relationship Variable	***B***	***SE***	***OR (95% CI)***
Intercept, γ_{00}	-0.14	0.67	0.87 (0.24, 3.21)
Constructive Comm, γ_{20}	-0.41**	0.15	0.66 (0.50, 0.89)
Destructive Comm, γ_{30}	0.08	0.11	1.08 (0.86, 1.35)
Perceived Support, γ_{40}	0.24	0.21	1.27 (0.85, 1.91)
Commitment, γ_{50}	-0.09	0.08	0.91 (0.77, 1.07)
Satisfaction, γ_{60}	-0.01	0.05	0.99 (0.90, 1.10)

Note. All analyses control for levels of prenatal depression. Meets criteria for postpartum depression (CESD ≥ 16) = 1.

*p = <.05; ** p = < .01; ***p = <.001.

Appendix B – Additional Tables

Table B.1

Family Expectations Demographic Characteristics at Enrollment by Group

Individuals	**Control (n = 630)**	**Family Expectations (n = 977)**	
	***M*(*SD*) or %**	***M*(*SD*) or %**	***p-value***
Age (years)	25.67 (5.68)	26.57 (5.79)	**.002**
% Female	52%	52%	.974
% Black or African American	33%	29%	.129
% Hispanic/Latino/a	19%	20%	.667
% High School Degree	76%	73%	.173
% Employed >20 hours	45%	44%	.576
% Prenatal Depression (CESD ≥ 16)	33%	35%	.659
Couples	**Control (n = 336)**	**Family Expectations (n = 526)**	
	***M*(*SD*), Mdn, or %**	***M*(*SD*), Mdn, or %**	***p-value***
Combined Income	$25,000-29,999	$25,000-29,999	.506
Sociodemographic Risk Score (0-11)	2.07 (0.11)	2.09 (0.09)	.248
% Married	45%	47%	.159
% Cohabiting	85%	86%	.863
% Child Together (not current pregnancy)	13%	18%	**.042**
Relationship length (months)	35.80 (32.10)	38.40 (35.77)	.269
Gestational Age (weeks)	20.80 (9.03)	20.56 (9.10)	.711

*p<.05, **p<.01, ***p<.001.

Figure B.1

Family Expectations CONSORT diagram

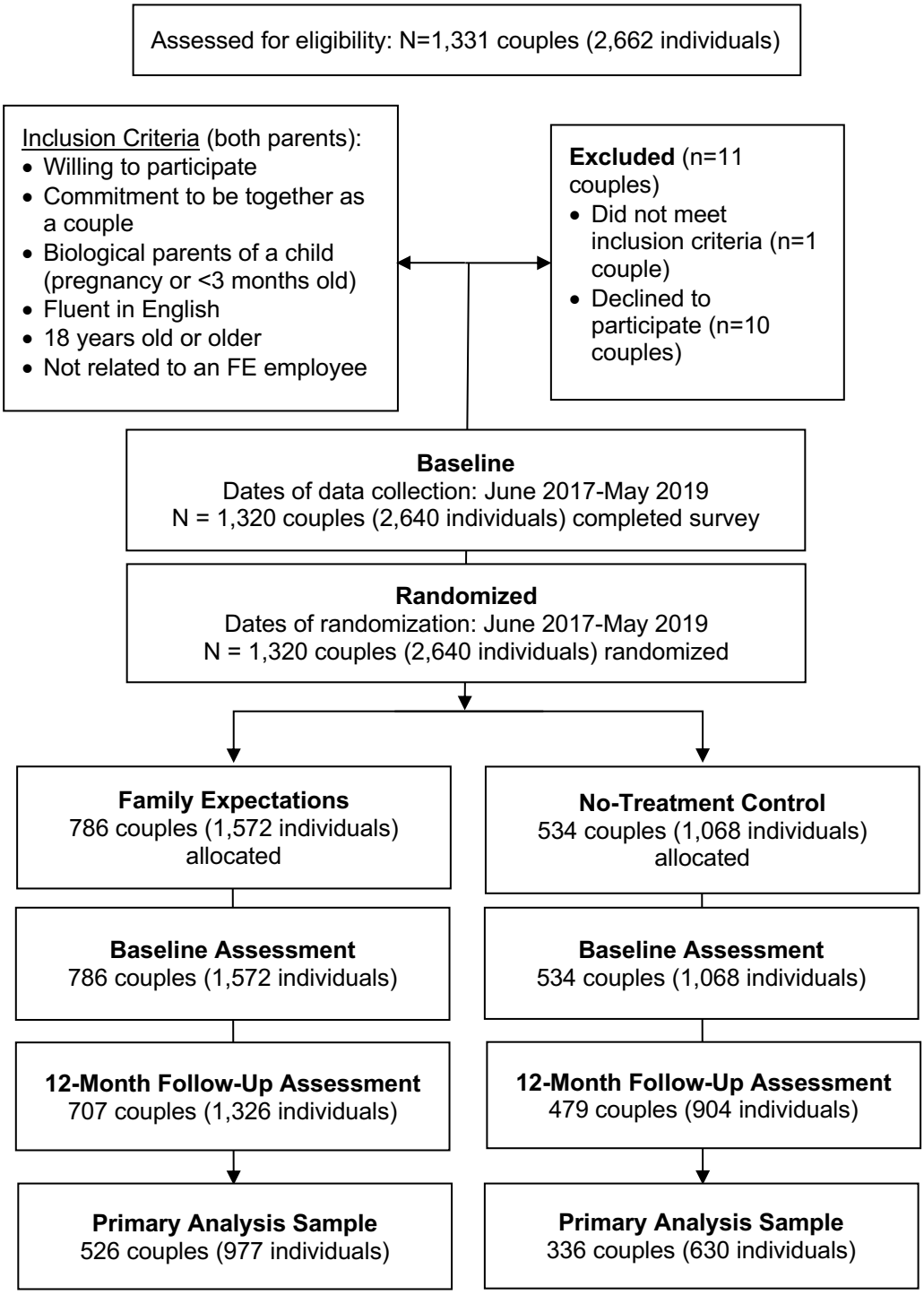

Table B.2

Additional Tested Moderators of the Impact of Family Expectations on Postpartum Depression

	b	***SE***	***OR***	***95% CI***	***p-value***
		Marital Status			
		(Unmarried = 0, Married = 1)			
Intercept, β_0					
Intercept, γ_{00}	-0.616	0.117	0.540	0.430, 0.679	<.001
Family Expectations, γ_{01}	-0.096	0.152	0.908	0.674, 1.225	.528
Moderator, γ_{02}	0.122	0.216	1.130	0.739, 1.727	.572
FE x Moderator, γ_{03}	-0.491	0.278	0.612	0.355, 1.727	**.078**
		Pregnancy Wantedness (0-3 scale)			
Intercept, β_0					
Intercept, γ_{00}	-0.040	0.362	0.961	0.472, 1.957	.913
Family Expectations, γ_{01}	-0.562	0.458	0.570	0.232, 1.400	.220
Moderator, γ_{02}	-0.210	0.137	0.811	0.620, 1.061	.126
FE x Moderator, γ_{03}	0.118	.173	1.125	0.801, 1.580	.496
		Pregnancy Planning			
		(Unplanned = 0, Planned = 1)			
Intercept, β_0					
Intercept, γ_{00}	-0.545	0.115	0.580	0.463, 0.727	<.001
Family Expectations, γ_{01}	-0.257	0.149	0.773	0.577, 1.036	.085
Moderator, γ_{02}	-0.167	0.225	0.847	0.544, 1.318	.461
FE x Moderator, γ_{03}	0.044	0.289	1.045	0.592, 1.844	.879
		First-Time Pregnancy			
		(No = 0, Yes = 1)			
Intercept, β_0					
Intercept, γ_{00}	-0.468	0.168	0.626	0.450, 0.871	.005
Family Expectations, γ_{01}	-0.366	0.212	0.693	0.458, 1.051	.084
Moderator, γ_{02}	-0.173	0.204	0.841	0.563, 1.257	.397
FE x Moderator, γ_{03}	0.181	0.261	1.198	0.717, 2.002	.490

Note. All analyses control for continuous levels of prenatal depression. Meets criteria for postpartum depression (CESD ≥ 16) = 1, Does Not Meet Criteria = 0.

+ = $p < .10$; *$p < .05$; ** p = < .01; ***p = <.001.

Table B.3

Main Effects of Family Expectations on Continuous Levels of Postpartum Depression

	b	*SE*	*p-value*
Intercept, β_0			
Intercept, γ_{00}	13.971	0.550	<.001
Family Expectations, γ_{01}	-0.847	0.705	.230
Prenatal Depression, β_1			
Intercept, γ_{10}	0.519	0.027	<.001

Table B.4

HLM Results for Moderators of Family Expectations on Continuous Levels of Postpartum Depression

	b	*SE*	*p-value*
	Gestational Age at Enrollment		
Intercept, β_0			
Intercept, γ_{00}	11.152	1.383	<.001
Family Expectations, γ_{01}	3.412	1.762	.053
Moderator, γ_{02}	0.134	0.061	.028
FE x Moderator, γ_{03}	**-0.202**	**0.078**	**.010**
	Relationship Satisfaction		
Intercept, β_0			
Intercept, γ_{00}	19.436	2.257	<.001
Family Expectations, γ_{01}	-4.343	2.820	.124
Moderator, γ_{02}	-0.681	0.272	.012
FE x Moderator, γ_{03}	0.437	0.339	.197
	Sociodemographic Disadvantage		
Intercept, β_0			
Intercept, γ_{00}	11.317	1.120	<.001
Family Expectations, γ_{01}	0.011	1.141	.994
Moderator, γ_{02}	0.724	0.267	.007
FE x Moderator, γ_{03}	-0.212	0.339	.532
	Black or African American		
Intercept, β_0			
Intercept, γ_{00}	13.790	0.662	<.001
Family Expectations, γ_{01}	-0.679	0.839	.419
Moderator, γ_{02}	0.546	1.110	.623
FE x Moderator, γ_{03}	-0.443	1.434	.757
	Hispanic/Latino/a		
Intercept, β_0			
Intercept, γ_{00}	14.105	0.603	<.001
Family Expectations, γ_{01}	-0.780	0.774	.314
Moderator, γ_{02}	-0.696	1.288	.589
FE x Moderator, γ_{03}	-0.220	1.636	.893
	Gender		
Intercept, β_0			
Intercept, γ_{00}	13.156	0.708	<.001
Family Expectations, γ_{01}	-0.308	0.906	.734
Moderator, γ_{02}	1.551	0.847	.068
FE x Moderator, γ_{03}	-1.025	1.081	.343

Note. All analyses control for continuous levels of prenatal depression.

Table B.5

Descriptive Summary of Depression During Pregnancy and Postpartum by Gender (Family Expectations)

	Overall (*n* = 1,608)				**Men (*n* = 770)**				**Women (*n* = 838)**			
	Control		**FE**		**Control**		**FE**		**Control**		**FE**	
Depression	***M* (*SD*)**	***%***	***M* (*SD*)**	***%***	***M* (*SD*)**	***%***	***M* (*SD*)**	***%***	***M* (*SD*)**	***%***	***M* (*SD*)**	***%***
Prenatal Depression	13.42 (11.18)	34	13.56 (11.18)	35	11.58 (10.72)	27	11.67 (10.67)	28	15.14 (11.34)	40	15.29 (11.36)	40
Postpartum Depression	13.89 (13.62)	**37**	13.12 (13.68)	**33**+	12.16 (12.68)	32	11.85 (12.85)	30	15.48 (14.27)	**42**	14.28 (14.32)	**35***

Note. "%" refers to the percent of participants who reported CESD levels ≥ 16.
+ $p<.10$, *$p<.05$, **$p<.01$, ***$p<.001$. Refers to the difference between Family Expectations and Control groups on postpartum depression impacts.

Table B.6

Correlation Between Prenatal and Postpartum Depression Symptoms (Family Expectations)

	Range	***M***	***SD***	**r**
1. Prenatal Depression	0 – 60.00	13.50	11.18	
2. Postpartum Depression	0 – 60.00	13.42	13.66	.43***

Table B.7

MotherWise Demographic Characteristics at Enrollment by Group (N=430)

	Control (n = 193)	**MotherWise (n = 237)**	
Demographics	***M*(*SD*) or %**	***M*(*SD*) or %**	***p-value***
Age (years)	28.16 (6.09)	28.82 (5.77)	.246
% Black or African American	15%	12%	.398
% Hispanic/Latina	64%	73%	**.041**
% High School Degree/GED	69%	77%	.075
% Unemployed	56%	60%	.496
Income	$15,219 (15,120)	$14,437 (12,966)	.711
% Receiving Public Assistance	75%	70%	.292
% Not in a Relationship	29%	26%	.651
% Cohabiting	44%	49%	.556
Gestational Age (weeks)	24.31 (8.55)	23.17 (8.36)	.166
% History of Depression	35%	31%	.390
% Prenatal Depression (EPDS ≥ 10)	29%	25%	.379
First-time parent	42%	38%	.343

*p<.05, **p<.01, ***p<.001.

Figure B.2

MotherWise Chart Review CONSORT Diagram

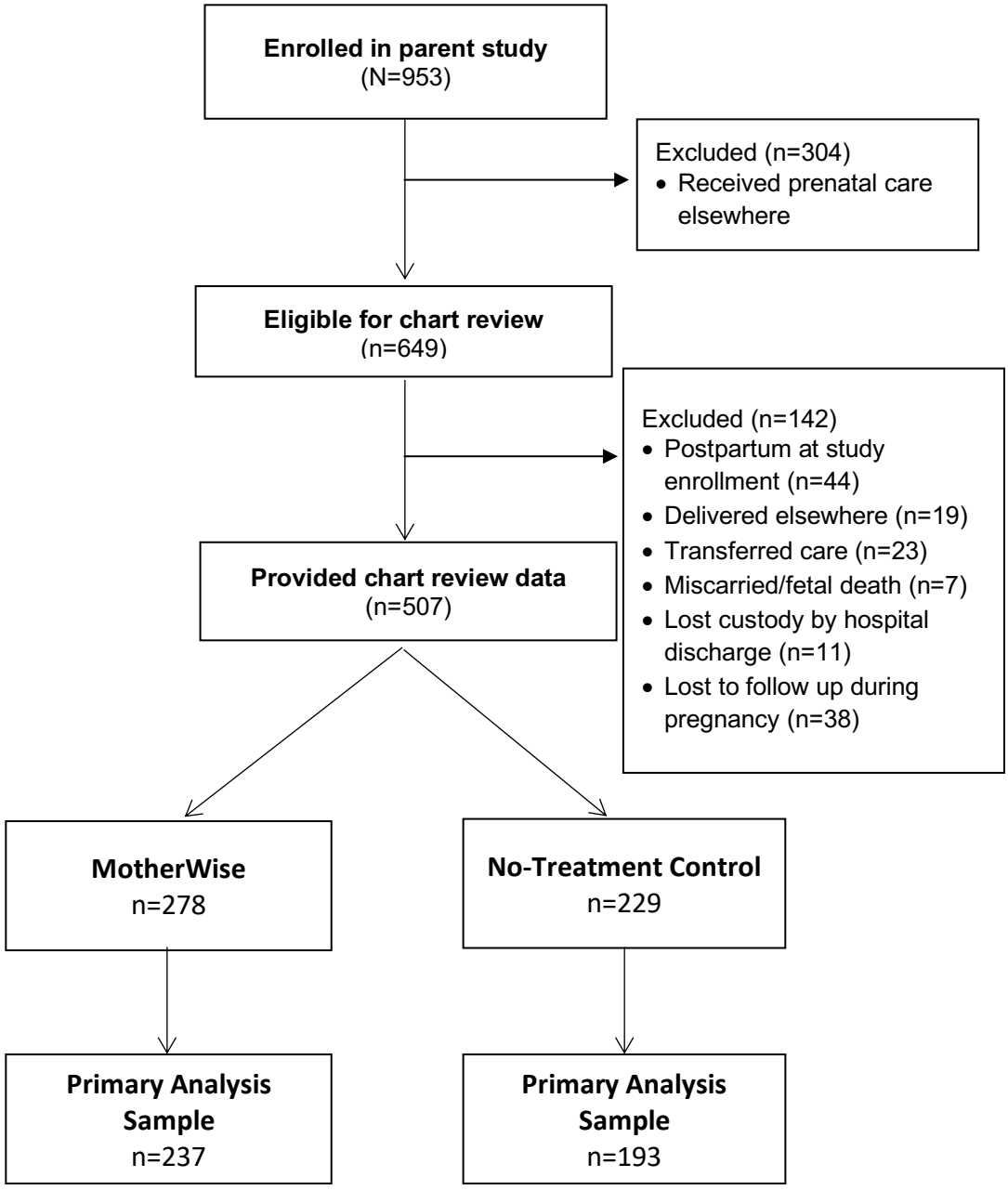

Table B.8

Additional Tested Moderators of the Impact of MotherWise on Postpartum Depression

	b	***SE***	***Odds Ratio***	***(95% CI)***	***p-value***
			First-Time Parent		
MotherWise	-0.526	0.351	0.591	0.297, 1.175	.133
Moderator	-0.440	0.417	0.644	0.284, 1.459	.292
MotherWise x Moderator	0.475	0.578	1.608	0.518, 4.994	.411
Constant	-2.644	0.361	0.071		<.001
			Gestational Age at Enrollment		
MotherWise	-0.570	0.814	0.566	0.115, 2.789	.484
Moderator	-0.015	0.024	0.986	0.941, 1.032	.538
MotherWise x Moderator	0.009	0.033	1.009	0.947, 1.076	.776
Constant	-2.483	0.646	0.083		
			Relationship Status		
MotherWise	-0.008	0.455	0.992	0.407, 2.420	.987
Moderator	0.297	0.564	1.345	0.446, 4.061	.599
MotherWise x Moderator	-0.747	0.863	0.474	0.087, 2.571	.387
Constant	-2.805	0.472	0.061		

Note. All analyses control for levels of prenatal depression. Positive screen for postpartum depression (EPDS ≥ 10) = 1, Does Not Meet Criteria = 0. First-time parent= 1, Not first child = 0. In a steady relationship = 1, Not in a steady relationship = 0.

Table B.9

Summary of Main Effects and Moderation of Impact of MotherWise on Continuous Levels of Postpartum Depression

	Control	**MotherWise (MW)**		
	M(SD)	*M(SD)*	*t or F*	*p-value*
Main Effects	5.39(5.68)	5.17(5.90)	0.400	.689
MotherWise x Black/AA[a]	-	-	3.415	.065
MotherWise x Hisp/Latina[a]	-	-	0.133	.716
MotherWise x Hx Depression[a]	-	-	2.570	.110

Note. All analyses control for levels of prenatal depression.

[a]See below tables for means and standard deviations of simple effects from interaction analyses.

	Control	**MW**
	M(SD)	*M(SD)*
Black or AA	6.86(6.19)	5.04(6.46)
Not Black or AA	5.17(5.57)	5.19(5.84)

	Control	**MW**
	M(SD)	*M(SD)*
Hisp/ Latina	5.19(5.67)	4.91(5.95)
Not Hisp/ Latina	5.76(5.71)	5.88(5.77)

	Control	**MW**
	M(SD)	*M(SD)*
History of Depression	6.84(5.99)	7.84(7.09)
No History of Depression	4.63(5.37)	3.98(4.86)

Table B.10

Descriptive Summary of Depression During Pregnancy and Postpartum (MotherWise)

	Control		MotherWise			
Depression	***M* (*SD*)**	***%***	***M* (*SD*)**	***%***	***p*-value (means)**	***p*-value (%)**
Prenatal Depression	6.41 (4.76)	29%	6.59 (4.77)	25%	.712	.347
Postpartum Depression	5.39 (5.68)	21%	5.17 (5.90)	17%	.689	.210

Note. "%" refers to the percent of participants who reported EPDS levels ≥ 10.

Table B.11

Correlation Between Prenatal and Postpartum Depression Symptoms (MotherWise)

	Range	***M***	***SD***	**r**
1. Prenatal Depression	0 – 26.50	6.51	4.76	
2. Postpartum Depression	0 – 29.00	5.27	5.80	.51***