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Social Support Satisfaction as a Protective Factor for Postpartum Maternal Distress

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Abstract

Social support has been identified as a protective factor for postpartum maternal distress, a prevalent women's health issue, and most research focuses on the amount of support women receive. However, research in this area has failed to explore whether increasing satisfaction with social support may be a worthwhile approach to alleviating postpartum maternal distress, beyond increasing amounts. There is also little known regarding specific aspects of support, like satisfaction with emotional and instrumental support, that might lead to differences in postpartum distress outcomes. In this prospective, longitudinal study, we hypothesized that greater social support satisfaction will be associated with less postpartum maternal distress above and beyond social support amount. In addition, we predicted that emotional support satisfaction is associated with postpartum maternal distress above and beyond instrumental support satisfaction. One hundred twenty-seven women completed measures of social support satisfaction, social support amount received, maternal distress symptoms (i.e. anxiety and depression) at 2 and 4 months postpartum. Greater satisfaction with social support was significantly associated with less maternal distress, beyond amount of social support at 2 and 4 months postpartum. Further, greater satisfaction with emotional support was associated with less postpartum maternal distress symptoms, beyond instrumental support satisfaction. Better understanding of the influence of social support on postpartum maternal distress could be used to improve preventions and treatments, thus leading to improved postpartum outcomes for both mothers and children.

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Social support has been identified as a protective factor for postpartum maternal distress, a prevalent women's health issue, and most research focuses on the amount of support women receive. However, research in this area has failed to explore whether increasing satisfaction with social support may be a worthwhile approach to alleviating postpartum maternal distress, beyond increasing amounts. There is also little known regarding specific aspects of support, like satisfaction with emotional and instrumental support, that might lead to differences in postpartum distress outcomes. In this prospective, longitudinal study, we hypothesized that greater social support satisfaction will be associated with less postpartum maternal distress above and beyond social support amount. In addition, we predicted that emotional support satisfaction is associated with postpartum maternal distress above and beyond instrumental support satisfaction. One hundred twenty-seven women completed measures of social support satisfaction, social support amount received, maternal distress symptoms (i.e. anxiety and depression) at 2 and 4 months postpartum. Greater satisfaction with social support was significantly associated with less maternal distress, beyond amount of social support at 2 and 4 months postpartum. Further, greater satisfaction with emotional support was associated with less postpartum maternal distress symptoms, beyond instrumental support satisfaction. Better understanding of the influence of social support on postpartum maternal distress could improve preventions, treatments, and postpartum maternal outcomes.

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Chapter One: Introduction

The postpartum period represents a significant time of change and challenge for women, often carrying consequences for physical and mental health (Grattan, 2011; Moran, Polanin, & Wenzel, 2014). According to the CDC, approximately 25% of women experience postpartum mental health issues, such as anxiety or depression symptoms (Stone, 2008). Considering the risk that poor maternal mental health poses for child development and well-being (Feldman et al., 2009; Grace, Evindar, & Stewart, 2003; Hoffman, Dunn, & Njoroge, 2017; Steadman et al., 2007; Tomlinson, Cooper, & Murray, 2005), it is important to understand the factors that may help women cope with this transition. Social support is broadly thought to influence women's postpartum mental health (Balaji et al., 2007; Cutrona, 1984). Specifically, the support received from social relationships (e.g. partner, family, and friends) may protect against the negative psychological effects of stress (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Hung, Lin, Stocker, & Yu, 2011; Lakey & Orehek, 2011). Although social support has been examined in relation to postpartum maternal anxiety and depression, relatively little is known about whether satisfaction with social support acts as a buffer against the negative effects of stress in the transition to motherhood.

The role of social support has been explored widely in regard to psychological outcomes (see review: Thoits, 2011). Social support is considered a multifaceted

construct with multiple dimensions. Social support has been described as processes aimed at helping an individual by providing affection, recognition, advice, and practical assistance and is often during a time when the individual is coping with stress, such as a major life event (e.g. illness) or transition (e.g. having a baby; Sullivan & Davila, 2010). Seminal research by House (1981) suggests that social support is an interpersonal transaction aimed at providing distinct types of support that will meet the individual's needs. Although there is precedent for the multidimensional nature of social support, much early social support research focused on quantity of support and social network size in relation to psychological outcomes (Balaji et al., 2007; Kawachi & Berkman, 2001; LaRocco, House, & French Jr, 1980; Pössel et al., 2018; Reifman, Biernat, & Lang, 1991; Takizawa et al., 2006; Wandersman, Wandersman, & Kahn, 1980). In particular, there were some early studies which explored postpartum depression and found that social network size was not associated with postpartum depressive symptoms (Fiore, Becker, & Coppel, 1983; Pagel, Erdly, & Becker, 1987). Further, earlier studies focused on postpartum depression and not until recently did studies investigate the effects of social support on postpartum maternal anxiety.

From this point, research expanded to include anxiety and depression symptoms in relation to social support during the perinatal period, and an incomplete understanding of social support as a protective factor emerged. Studies examining the effects of social support on postpartum maternal anxiety and depression have been inconsistent in their findings. Notably, studies have examined postpartum anxiety or depression independently, and as a combined measure. Since there is evidence for a strong correlation between anxiety and depression in the postpartum period (Dipietro, Costigan,

& Sipsma, 2008), anxiety and depression outcomes will be referred to as 'maternal distress' or 'postpartum distress' going forward. These studies exploring maternal distress as an outcome, specifically in the perinatal period, have found that more social support reduces maternal distress symptoms (J. R. Britton, 2011; Collins et al., 1993; Feeney & Collins, 2015; Martini et al., 2015; Schwab-Reese, Schafer, & Ashida, 2017; Skipstein, Janson, Kjeldsen, Nilsen, & Mathiesen, 2012). Alternatively, other studies have found no associations between social support and postpartum maternal distress symptoms (Howell, Mora, Horowitz, & Leventhal, 2005; M. Cynthia Logsdon, Hertweck, Ziegler, & Pinto-Foltz, 2008; Loretta Secco et al., 2007; McVey & Tuohy, 2007; Sockol & Battle, 2015; Wynter, Rowe, & Fisher, 2014). However, these studies have mainly explored the amount of social support received by mothers. Although this literature is limited by an unclear picture, this ambiguity could be resolved through an in-depth inspection of multidimensional aspects of social support. For instance, authors suggest that it is the perceived quality or satisfaction with social support that is crucial when considering its effect on postpartum mental health (Collins et al., 1993; Krause, Liang, & Yatomi, 1989; Razurel & Kaiser, 2015). Thus, recent studies have begun to measure social support with a more nuanced approach, examining satisfaction with social support in relation to perinatal maternal distress.

Underlying this shift from a more quantitative to a more perceptual measurement of social support is a theory introduced by Cohen and colleagues (1984) known as the specificity perspective. This theory proposes that if the social support does not meet the recipient's needs, this mismatch can lessen the effectiveness of social support for alleviating psychological distress (Cohen & McKay, 1984). This gradual shift has set the

stage for a new theoretical framework for research into social support satisfaction or perceived helpfulness of support that intends to systematically identify why some social support is perceived as more helpful than others. In spite of this recent shift, there is a paucity of research that carefully investigates how satisfaction with social support is linked to postpartum maternal distress, although a few authors agree that considering the perceptual side of social support may be equal to or greater than just considering quantitative aspects (Cohen & McKay, 1984; Cutrona, Cohen, & Igram, 1990; Feeney & Collins, 2015).

Satisfaction with Social Support and Maternal Distress

Recently, appraisals of social support, such as satisfaction or perceived helpfulness, have been gaining attention as a valid protective factor for perinatal maternal distress (Arora, Finney Rutten, Gustafson, Moser, & Hawkins, 2007; Cutrona et al., 1990; Razurel & Kaiser, 2015; Rini, Schetter, Hobel, Glynn, & Sandman, 2006; Stapleton et al., 2012). This literature has examined social support appraisals, which can be referred to as satisfaction with support or support's perceived helpfulness. Both terms are interchangeable in the literature, but for clarity in this study social support appraisals will be referred to as 'satisfaction with social support' or 'social support satisfaction.'

Theoretical models have been put forward to guide studies of social support to help researchers with stronger designs aimed at investigating satisfaction with support and determining when the support is most beneficial. One model offered is called the "matching hypothesis" (Rini et al., 2006). This theory proposes that support is most beneficial when expectations for coping needs are met, and there is not a mismatch

between support needed and what is offered. A similar theory proposes that negative perceptions of support may arise when support does not meet the recipients needs precisely (Cameron, Wells, Hobfall, 1996). Backing this idea, some research suggests that an individual's social support satisfaction has a measurable impact on their physical and mental health (Arora et al., 2007). These theories were not designed for the postpartum period specifically but can be readily translated to any stressful experience or period.

In a similar vein to the abovementioned theory, a few studies have investigated satisfaction with social support in relation to perinatal mental health outcomes. From these studies, there is evidence that greater satisfaction with support is associated with both reduced prenatal (Rini et al., 2006; Zhong, Gelaye, VanderWeele, Sanchez, & Williams, 2018) and postnatal maternal distress symptoms (Collins et al., 1993; McVey & Tuohy, 2007; Racine, Plamondon, Hentges, Tough, & Madigan, 2019; Razurel & Kaiser, 2015). These findings support the theory that perceptual aspects of support impact postpartum maternal distress. In fact, some research suggests that greater social support amounts fail to alleviate symptoms in depressed women precisely when the women are less satisfied with the support (McVey & Tuohy, 2007). This study's data implies that mothers may not only need to receive social support but also be satisfied with it, in order to experience reduced postpartum maternal distress. This study points to the importance of considering the appraisal aspects of social support, in addition to amount of support received. As mentioned above, studying amounts of support without including measurement of satisfaction with support, has led to incomplete answers about how

social support may buffer maternal distress. Thus, a clearer picture may be found through investigation of both amount of and satisfaction with social support.

Up until very recently, there were no studies exploring the independent effects of satisfaction with support and amount of social support on maternal distress. One recent study examined this comparison and found differences in the strength of effects of satisfaction with support and amount of support on women's depressive symptoms (Zhong et al., 2018), however this finding was for depression in early pregnancy. This specific comparison between appraisal and quantitative aspects of social support has yet to be investigated with postpartum maternal distress as an outcome. Further, no studies to the author's knowledge have examined satisfaction with social support as a moderator of amount of social support and postpartum distress symptoms. Thus, an important next step is to address both the satisfaction with and amount of social support to elucidate the most effective form of support which may result in mitigation of postpartum maternal distress symptoms. By measuring quantity as well as the perceptions of support received, the present study has the potential to reconcile prior contradictory findings on the role of social support in postpartum maternal distress. Further, specific distinctions of social support will be explored in the current study which may better serve postpartum women.

Emotional and Instrumental Support associated with Maternal Distress

The research effort, as outlined by the aforementioned theories, is moving towards a refined understanding of the types of social support a woman needs in the postpartum period. Alongside this social support conceptual framework, researchers have begun more detailed assessments into support types such as emotional and instrumental

support. Emotional and instrumental support are the two main types of social support that have been characterized in existing literature. Emotional support is the provision of positive affect, reassurance, and comfort to the individual; instrumental support is considered tangible support, such as financial assistance, childcare, or help with household tasks (House, 1981).

In the literature exploring emotional and instrumental support in association with postpartum maternal distress, both types of support have been indicated as influencing postpartum maternal distress (Collins et al., 1993; Cutrona & Russell, 1990; Leahy-Warren, McCarthy, & Corcoran, 2011, 2012; Sampson, Villarreal, & Padilla, 2015). Studies have investigated whether instrumental or emotional support have independent effects on postpartum maternal distress, but the majority of work shows that emotional support is a more important predictor. For example, studies have found that greater emotional support from partners was linked to fewer maternal depressive symptoms in the early postpartum period (Leahy-Warren et al., 2011) and less stress at 12 months postpartum (Sampson et al., 2015). Evidence from these studies points to the consequential nature of emotional support, specifically for mothers experiencing emotional distress. In addition, Hetherington and colleagues (2018), found that emotional support was predictive of postpartum maternal anxiety at 4 months, whereas instrumental support was not. Furthermore, evidence from non-postpartum adult studies suggest that emotional support may be more effective for reducing stress and risk for anxiety and depression (Greene & Burleson, 2003). Instrumental support is also indicated as an important type of support for maternal mental health. Although instrumental support has been found to buffer postpartum distress symptoms (Collins et al., 1993; Cooper, Arber,

Fee, & Ginn, 1999; Dennis & Ross, 2006; Heh, Coombes, & Bartlett, 2004), previous studies have found emotional support to be a stronger (Sampson et al., 2015) and more consistent (Razurel & Kaiser, 2015) predictor of postpartum distress symptoms.

With these findings in mind, it is apparent that more research is needed to tease apart the independent contributions of instrumental versus emotional support on postpartum maternal distress. Thus, exploring type of support will also increase our understanding of which types of support are needed based on which are appraised more satisfactory. Assessing maternal perception of support type is a first step in better understanding the aspects of social support which may be most influential for decreasing postpartum maternal distress symptoms.

Longitudinal Examination of Maternal Distress

An important issue to consider is the timing for assessing the effects of social support on postpartum maternal distress. Many prior studies have been limited to exploring social support and postpartum maternal distress only in the early postpartum period (i.e. birth until two months). Of the studies that have explored beyond 2 months postpartum, evidence has been found for prevalence of maternal distress symptoms throughout the first postpartum year (Racine et al., 2019; Ramakrishna, Cooklin, & Leach, 2019; Sampson et al., 2015). Thus, exploring how social support influences maternal distress past 2 months postpartum could shed light on protective factors further into the postpartum period. In addition, prolonged maternal distress could have negative implications for infant development, especially since infants are rapidly developing social skills across the first year and social interactions with caregivers are their main form of

play (Field, 2010). For example, if a mother is suffering from postpartum maternal distress for an extended period, it may have a more pronounced influence on the infant that is observing faces, interacting socially, and learning more social cues. Therefore, additional information is needed regarding factors which may reduce maternal distress symptoms later in the postpartum period. Such findings could lead to improved psychosocial interventions for mothers and subsequent improvements to the infant's environment during a sensitive stage of development.

An important issue which may be addressed through the use of longitudinal design is the potential for women with postpartum distress having negative biases in their report of social support satisfaction. If such an effect is occurring, it can be said that maternal distress may function as a precursor to social support satisfaction in addition to an outcome (Robertson, Grace, Wallington, & Stewart, 2004). As one possibility, mothers may artificially rate support as less helpful because of their postpartum distress. To tackle this issue, a longitudinal study that measures maternal distress at two time points will allow us to distinguish whether this effect is happening or not. Specifically, in the absence of an experimental design, this issue is best addressed by accounting for maternal distress symptoms at first assessment in a longitudinal model exploring social support and changes in mental health symptoms across two assessments.

Additional Factors Influencing Maternal Distress

Prior research has found that in addition to social support, individual differences such as employment status (e.g. paid parental leave; Hewitt, Strazdins, & Martin, 2017), marital status or relationship factors (C. T. Beck, 2001; Figueiredo et al., 2008; Whisman,

Davila, & Goodman, 2011), socioeconomic status (SES; Britton, 2008; O'Hara & Swain, 1996; Wenzel, Haugen, Jackson, & Brendle, 2005), and parity (Figueiredo et al., 2008; Giakoumaki, Vasilaki, Lili, Skouroliakou, & Liosis, 2009; C. Hung, 2004) may impact postpartum maternal distress. Psychosocial factors, such as SES and relationship factors, have shown the most robust association with postpartum maternal distress. Studies have found that lower SES, which can include maternal education level and household income, is associated with more symptoms of maternal distress (J. R. Britton, 2008; Martini et al., 2015; O'Hara & Swain, 1996). Further, poor relationship quality, such as not enough emotional support from a partner, has been associated with higher levels of postpartum maternal distress (C. T. Beck, 2001; Boyce, Hickie, & Gordon, 1991; Figueiredo et al., 2008; Sampson et al., 2015; Whisman et al., 2011).

A small recent literature has explored whether factors such as maternal employment or paid parental leave are associated with risk for maternal distress. This research demonstrates links between reduced risk for postpartum maternal distress and maternal employment (Gjerdingen, McGovern, Attanasio, Johnson, & Kozhimannil, 2014a), greater workplace social support (Schwab-Reese, Ramirez, Ashida, & Peek-Asa, 2017), and paid parental leave (Hewitt et al., 2017). Although studies are limited and have examined varying aspects of the maternal employment experience, these studies indicate maternal employment factors play a role in postpartum maternal distress. Therefore, maternal employment factors should be accounted for in studies exploring risk factors of maternal distress.

Parity has been found to play a role in postpartum maternal psychological symptoms. This literature is mixed with some studies finding higher distress symptoms in

first-time mothers (Giakoumaki, Vasilaki, Lili, Skouroliakou, & Liosis, 2009; Hung, 2004) and some other studies finding higher distress symptoms in experienced mothers (Figueiredo et al., 2008). Despite these mixed findings, research converges on the fact that the experience of being a first-time mother versus an experienced mother may have different effects for women's postpartum distress levels (Bell et al., 2016; Da Costa, Larouche, Dritsa, & Brender, 2000).

Therefore, in the literature exploring risk factors of maternal distress, other than social support, SES and relationship quality are the most prominently studied and likely influential for postpartum maternal distress. These factors should be considered or accounted for in any studies exploring risk factors of postpartum maternal distress. In addition, parity, maternal employment status, and marital status should be considered due to evidence pointing to their association with maternal distress.

Postpartum Specific Anxiety as a Distinct Construct from General Anxiety

Anxiety in postpartum women has garnered less attention as a postpartum mental health concern and is not well characterized in the literature as distinct from general anxiety in non-postpartum adults. Researchers have recently begun to address this gap in the literature, leading to evidence that postpartum anxiety is a prevalent issue and affecting 18% postpartum women (Dennis, Falah-Hassani, & Shiri, 2017). Although there has been more focus on postpartum anxiety in recent years, there is still less impetus to better characterize the symptoms of anxiety in the postpartum period. For example, very little research has explored postpartum anxiety as a distinct entity characterized by the unique struggle's women experience during this life transition. A

few recent studies have created scales aimed at measuring the worries and anxieties unique to the postpartum period (Fallon, Halford, Bennett, & Harrold, 2016; Moran et al., 2014). One such study found positive correlations between their postpartum specific measure and general anxiety (Fallon et al., 2016). The authors used this correlation to display their measure was valid in assessing anxiety, however, this study did not delve into the issue of postpartum anxiety being distinct from general anxiety. Thus, leaving a gap in literature related to this question. Comparatively, prior studies have explored pregnancy specific anxiety in comparison with general anxiety, and authors have determined that pregnancy specific anxiety and general anxiety may be regarded as distinct entities (Blair, Glynn, Sandman, & Davis, 2011; Buss, Davis, Hobel, & Sandman, 2011; Dunkel Schetter & Tanner, 2012). In addition, these studies revealed that pregnancy specific anxiety is a more effective predictor of birth, infant, and child outcome. This evidence from the prenatal period provides groundwork for similar exploration during the postpartum period. Considering the paucity of research exploring the characteristics of anxiety specific to the postpartum period, research is needed to elucidate whether anxiety in the postpartum is distinct from general anxiety in non-postpartum adults. If this is the case, new screening tools will be needed to assess this newly categorized postpartum specific anxiety.

The Current Study

Prior work has suggested that social support is a promising protective factor of postpartum maternal distress. The prevailing conclusion of most of this work is women with poor social support are at greater risk for postpartum maternal distress. However,

there are conflicting findings in the research exploring associations between social support and postpartum maternal distress, with some studies not finding associations (Howell et al., 2005; Logsdon et al., 2008; Loretta Secco et al., 2007; McVey & Tuohy, 2007; Sockol & Battle, 2015; Wynter et al., 2014). In addition, it is unclear why some researchers find negative associations between social support and postpartum maternal distress sometimes, while others do not. Research design issues could potentially explain the mixed results. For example, many studies have failed to measure satisfaction with support or types of support, and whether differences in maternal distress outcomes emerge from varying satisfaction with or types of support (Leahy-Warren et al., 2011; Razurel & Kaiser, 2015; Sampson et al., 2015). Additionally, much of the research has focused on postpartum depression and has left out measurement of postpartum anxiety. Finally, the use of cross-sectional designs in prior work has precluded making causal inferences about the impact of social support on postpartum maternal distress.

The current study addresses these limitations by investigating how satisfaction with support and type (emotional versus instrumental) of support, as well as amounts of social support, are related to maternal distress symptoms across two postpartum assessments. Scant prior research has examined both amount of and satisfaction with social support. Thus, the present study aims to analyze the role of social support satisfaction and social support amount on postpartum maternal distress. Specifically, the key research question investigates whether greater satisfaction with social support is associated with less postpartum maternal distress above and beyond amount of social support. In addition, we tested whether women's amount of and satisfaction with social support interact such that women with greater satisfaction with support and receiving

higher amounts will have less postpartum maternal distress symptoms. Considering that research on amount of support has not demonstrated consistent positive effects on maternal distress, an examination including satisfaction with social support is warranted. Research is thus needed employing a multidimensional framework of social support which investigates how appraisals and amounts of support might differentially impact mother's needs for coping, and subsequent psychological outcomes.

In order to refine our understanding of which types of support may be more predictive of maternal distress, a secondary aim of this study is to explore whether satisfaction with emotional support is associated with postpartum maternal distress above and beyond instrumental support. These categories of social support were selected given prior research that has identified them as the major types of social support needed during times of stress (Cohen, 2004). Stronger associations between emotional support and maternal distress symptoms are expected because prior evidence has shown that greater emotional support is associated with less postpartum maternal distress symptoms (Leahy-Warren et al., 2011; Sampson et al., 2015) and that emotional support may be a stronger (Sampson et al., 2015) and more consistent (Razurel & Kaiser, 2015) predictor of postpartum maternal distress.

The current study utilizes a longitudinal design and measures social support and postpartum maternal distress at two assessments: 2 months (T_1) and 4 (T_2) months. A longitudinal design increases ability to establish causal relationships and provides more insight into specific effects of social support. Within studies using longitudinal design, social support and postpartum maternal distress have been tested with varying durations between measurements. Studies have found changes in postpartum maternal distress

symptoms with as little as three weeks and as much as six months between measuring times (Dennis et al., 2017; Dennis, Falah-Hassani, Brown, & Vigod, 2016; Schwab-Reese et al., 2017). Based on this literature, there is potential to find effects of social support on postpartum maternal distress symptoms with two months between assessments.

Hypothesis 1a

Both amount and satisfaction with social support will be associated with maternal distress. However, greater maternal satisfaction with social support will be associated with less postpartum distress symptoms, above and beyond the association with amount of social support. Such that the more satisfied mothers are with social support, in addition to their amounts of support, the less distressed the women will be. This prediction will be tested concurrently at each time point and with changes in maternal distress symptoms across T_1 and T_2 (see Figure 1).

Hypothesis 1b

Maternal satisfaction with social support will interact with the amount of social support received such that women with greater satisfaction with support and receiving higher amounts of support will have less postpartum maternal distress symptoms at T_1 and T_2 (see Figure 1).

Hypothesis 2

Both emotional and instrumental support satisfaction will be associated with less maternal distress. However, greater maternal satisfaction with emotional support will be associated with less maternal distress symptoms above and beyond the association with

instrumental support satisfaction. This prediction will be tested concurrently at each time point and with changes in maternal distress symptoms across T_1 and T_2 (see Figure 2).

Exploratory Research Aim

An additional question was explored to compare postpartum specific worry to general anxiety in postpartum women. The Postpartum Worry Scale – Revised (PWS-R) was used to measure worries that mothers may have specific to the challenges of the postpartum period (Moran et al., 2014). It is argued that general anxiety measures such as the State Anxiety Inventory (STAI-S), which are designed for use in general populations, may not capture some of the specific types of anxiety experienced in postpartum. Since there is little known about whether anxiety in the postpartum is distinct from anxiety experienced in non-postpartum adults, the PWS-R will be submitted to an exploratory correlational analysis to explore associations between symptoms of postpartum specific worry to symptoms of general state anxiety. Due to the insufficient research into this topic, there was not enough prior evidence on this specific comparison to propose specific hypotheses for this research aim.

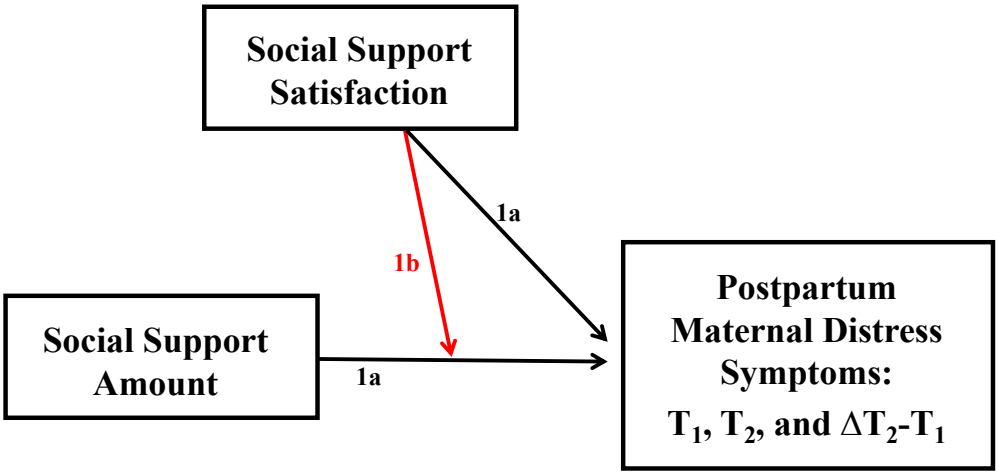

Figure 1. Proposed theoretical model for hypothesis 1a and 1b.

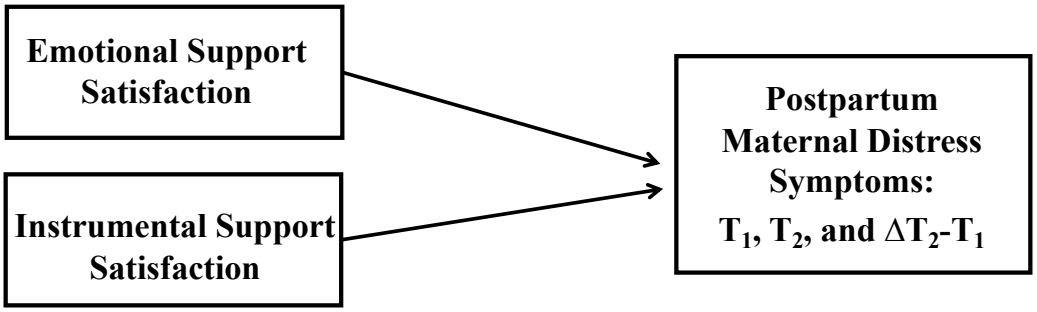

Figure 2. Proposed theoretical model for hypothesis 2

Chapter Two: Method

Participants

One hundred and twenty-seven women were recruited when their infants were between 2 to 3 months postpartum using the University of Denver psychology department subject pool, study ads on Facebook mother group pages, and study flyers posted around the Denver area. Selection criteria included: (a) age range between 18 and 45 years; (b) able to read and understand English; (c) married or in a stable relationship; (d) full term, singleton pregnancy without medical complications; (e) did not report use of illicit drugs during pregnancy or postpartum; (d) income to needs ratio of 1.5 - 10. Additionally, mothers were only recruited if available to complete a follow up assessment at 4 to 5 months postpartum. Of these participants, 4 women failed to complete the survey at the second assessment point. Chi-square tests and independent t-tests were used to determine that women who missed T_2 assessment did not differ on socio-demographic factors from the women who completed both assessments (*ps* < .10). See table 1 for all sample characteristics. Power analysis for a multiple linear regression with up to 5 predictors (4 main and 1 interaction effect) with a medium effect size and a power value that is considered desirable (f^2= .15, Alpha = 0.05, power = .90) indicated a sample of at least 116 was needed. Thus, the sample size of 127 is sufficient to address study

questions. All study procedures were approved by the Institutional Review Board for protection of human subjects, and each participant provided informed consent.

Table 1. Summary of Participant Characteristics

Sample Characteristics	
Maternal age (M ± SD, Range)	33.04 ± 4.14, 22 - 43
T_1 Infant age in months (M ± SD, Range)	2.53 ± 0.36, 1.5 – 3.4
T_2 Infant age in months (M ± SD, Range)	4.48 ± 0.46, 3.3 – 5.7
Socioeconomic Status	
Years of education (M ± SD, Range)	17 ± 1.82, 12 - 20
Household income (%)	
$0-$30,000	3.9
$30,001-$60,000	6.3
$60,001-$100,000	23.4
Over $100,000	65.6
Duration between assessments (M ± SD, Range)	58.86 ± 5.95, 42 - 79
Infant Sex (%)	
Male	46.5
Female	54.0
Marital Status [a] (%)	
Married	94.5
Divorced	0.8
Cohabitating	4.7
Parity (%)	
Primparous	47.2
Multiparous	53.2
Race/ethnicity (%)	
Non-Hispanic White	85.0
Hispanic	10.2
Other (Asian, multi-race)	4.7
Education (%)	
High school only	1.6
Some college or Associates	10.2
College Degree	40.9
Graduate degree	47.2
T_1 Employment Status (%)	
On parental leave	44.9
Not employed	23.6
Currently employed	31.5
T_2 Employment Status (%)	
On parental leave	5.7
Not employed	22.8
Currently employed	71.5
Mental Health History (%)	
Depression	24.4
Anxiety	23.6

Note: [a] There was no change in participants' marital status from T_1 to T_2

Procedure

Prior to being selected for the study, the prescreening consent form was used to introduce the participants to our eligibility screening and ensure they were comfortable answering questions which are de-identified and confidential. Women who met the selection criteria and were interested in participating were recruited into the study. Nineteen women did not pass the initial screening and were excluded from participating. Participants were emailed links to self-report questionnaires through an online Qualtrics survey which addresses questions about demographics (e.g. age, ethnicity/race, marital status, income, employment), mental health history, anxiety and depressive symptoms, social support amount, and social support satisfaction. This is a longitudinal study was conducted during the postpartum period and the first assessment occurred at 2 to 3 months (M = 2.53, SD = .36, range: 1.5-3.4) and the second assessment at 4 to 5 months (M = 4.48, SD = .46, range: 3.3-5.7). This allowed for a repeated measures approach to investigate the associations between social support and maternal distress past the early postpartum period. From here forward when referencing the postpartum time since birth for each assessment, 2 months and 4 months will be used respectively, as these were averages for postpartum time points.

Measures

Demographics

A questionnaire was administered that obtained information about the participant's demographics such as marital and cohabitation status, household income, education level, race, and ethnicity. This questionnaire also included questions about the

participant's psychiatric history, employment status (e.g. parental leave), and number of children. This questionnaire was used to characterize the sample on important demographics and to obtain information on factors potentially associated with predictor or outcome variables. Maternal age, marital status, SES, race/ethnicity, parity, and employment status were explored in analyses as possible covariates (see preliminary analysis). This questionnaire was administered at T_1 and an abridged version with only the following questions was asked at T_2: relationship status (i.e. married, cohabitating), employment status (i.e. parental leave), and psychiatric history.

Social Support Satisfaction

The Scale of Satisfaction with Social Support in the Perinatal Period (Razurel & Kaiser, 2015) is a 20-item scale used to measure participant's satisfaction with each type of support received from people in their social network such as partners, mothers, family, friends, and parent-in-laws. Two types of support were assessed using this questionnaire: emotional and instrumental. There are some questions that could be categorized as informational support; however, these fall under the broader category of instrumental or emotional support respectively. Respondents were asked to rate their satisfaction with each type of support on a Likert scale, from 1 (very dissatisfied) to 5 (very satisfied). Considering the questionnaire assessed satisfaction with support participants actually received, participants were allowed to select "Not Available" if certain sources of support were not available to provide a certain type of support (i.e. deceased mother or family lives in another country). Thus, mean scores of this measure were used in subsequent analyses to ensure accurate measurement of their satisfaction with available support was

captured. This measure was chosen because it asks specifically about satisfaction with the support women are receiving and is designed for use in the perinatal period. In addition, this measure was optimal because it captured both instrumental and emotional support. This measure was administered at both assessments. Emotional and instrumental support satisfaction variables were calculated by computing sum scores for the questions related to emotional and instrumental support, respectively.

Social Support Received Prior to 2 Months Postpartum

In order to assess the social support that mothers were receiving prior to 2 months postpartum, women were asked one retrospective qualitative question about their satisfaction with support they received from birth until 2 months postpartum. We assessed whether the support they received in this early period was more, less, or equally helpful to what they were currently receiving. This measure was used to assess if there were any changes in social support from before 2 months postpartum to after 2 months. This was only asked at T_1 to obtain history of social support satisfaction before 2 months (See Appendix A for supplemental analyses and results related to this measure).

Social Support Amount

The Postpartum Social Support Questionnaire (PSSQ; Hopkins & Campbell, 2008) was administered to measure emotional and instrumental social support from various members of the mother's social network (i.e. partner, parents, parents in law, family, and friends). Each item assessed the frequency of occurrence of a specific socially supportive behavior using a 7-point Likert scale, where 1 is ''almost never'' and 7 is ''very often.'' The aim of this measure was to capture the amount of social support

the mother is receiving from various people in her life. This measure was selected because it is specific to the postpartum period. For example, it includes questions like "How often does your partner watch the baby so you can go out?" This questionnaire was administered at both assessments. It was used as a main predictor variable in the regression analyses. This measure was slightly modified from the original measure published by Hopkins & Campbell (2008). Two general support questions were removed, and friend support questions were separated from family. Thus, questions were asked separately for friends and family as sources, considering there may be more obligation with family than friends. The version used in this study had 55 items due to these modifications (original PSSQ has 50 items). At T_1, 8 participants were missing data and at T_2, 8 participants were missing data (less than 5% of the scale for each participant). Mean imputation was used to replace item data with the mean of the available cases.

Postpartum Maternal Distress

The Edinburgh Perinatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) is a 10-item questionnaire that is sensitive to changes in severity of depression. The EPDS has been used in many studies examining postpartum depression and has good internal consistency, reliability and validity. This postpartum depression measure is the standard assessment used in research and by clinicians to assess postpartum depression (Eberhard-Gran Malin, Eskild Anne, Tambs Kristian, Opjordsmoen Stein, & Ove Samuelsen Sven, 008; Venkatesh, Zlotnick, Triche, Ware, & Phipps, 2014). This measure used a 4-point Likert-type scale ranging from 0 to 3. A higher score indicates more severe

depression. The EPDS was administered at both assessments. At T_1 and T_2, 1 participant was missing data for one item and this item was mean imputed.

The 20-item State Anxiety Inventory (STAI-S; Spielberger, Gorsuch, & Lushene, 1970) was used to measure state anxiety. The STAI-S assesses current degree of anxiety-related symptoms or emotions. This scale has been used in numerous studies and has good internal consistency and reliability in adult populations (Barnes, Harp, & Jung, 2002). The STAI-S has been selected to measure anxiety in postpartum women because it is a reliable measure of anxiety and the majority of studies that have explored postpartum anxiety have used this measure. There also is evidence that anxiety in the postpartum period has symptoms or characteristics similar to anxiety in general adult populations (Cunningham, Brown, Brooks, & Page, 2013) and studies have found that maternal anxiety, as measured by the STAI-S, is linked to less sensitive parenting and lower developmental outcomes in children (Beebe et al., 2011; Feldman et al., 2009; Paul, Downs, Schaefer, Beiler, & Weisman, 2013). Responses were made using a 4-point Likert scale ranging from 1 (not at all/almost never) to 4 (very much/almost always) and scores could range from a minimum of 10 to a maximum of 40. The cut off score generally agreed upon in literature is 39-40 for detecting clinically significant state anxiety (Julian, 2011). For the STAI-S, missing data was mean imputed for 3 participants at T_1 and 2 participants at T_2. All subsequent regression analyses were performed using the postpartum maternal distress composite variable as the dependent variable. The maternal distress composite was calculated for T_1 and T_2 by summing the standardized values of maternal depression and anxiety at each assessment.

Postpartum Specific Worry

The Postpartum Worry Scale-Revised (PWS-R; Moran, Polanin, & Wenzel, 2014) is a 20-item questionnaire that measures postpartum women's worry in multiple domains such as child care, finances, infant development and relationship with infant. All items were rated on a five-point likert scale (0= not at all/0-10% of the time to 5=always/80-100% of time) and measured anxiety symptoms that are most related to worry. The PWS-R was validated in a 2014 study and results of this study revealed moderate-to-high reliability (coefficient alphas ranged from 0.64 to 0.88; Moran et al., 2014). This measure was included to use in an exploratory correlational analysis with the STAI-S, to investigate whether postpartum specific worry overlaps with the STAI-S or is more distinct. The PWS-R was collected at both assessments. Missing data was mean imputed for 1participant at T_2.

Analysis Plan

Preliminary Analyses

Means and standard deviations were calculated to obtain descriptive statistics on all quantitative variables and frequency counts and percentages for categorical variables (see Table 1). Tests of normality were conducted on all major study variables and were found to be normally distributed and have acceptable levels of skew and kurtosis (Behrens, 1997). Bivariate correlations were used to explore stability in social support and maternal distress across time points. To explore stability in main variables (social support and maternal distress), correlations were performed to explore associations

between each at T_1 and T_2, and paired sample t tests were used to investigate if there were significant changes for variables across time points.

Bivariate correlations and one-way ANOVAs were used to identify sociodemographic variables (maternal age, days post-delivery, SES composite, marital status, ethnicity) that were associated with major study variables such as social support amount, social support satisfaction, and maternal distress. The SES variable was created by combining the standardized values of maternal years of education and household income. These socio-demographic factors were tested because they have been linked in the literature to one or more of the predictor or outcome variables: maternal age (Bornstein, Putnick, Suwalsky, & Gini, 2006), SES (Klebanov, Brooks-Gunn, & Duncan, 1994), ethnicity (Vaux, 1985), parity (Lagerberg & Magnusson, 2013), marital status (Cairney, Boyle, Offord, & Racine, 2003), postpartum timing (Campbell & Cohn, 1997; O'Hara, Neunaber, & Zekoski, 1984; Rahman & Creed, 2007), and employment status/parental leave (Gjerdingen, McGovern, Attanasio, Johnson, & Kozhimannil, 2014b). For the categorical covariates with more than two groups, variables were dummy coded. For ethnicity variables, categories of Hispanic or other ethnicity/race (e.g. Black/African American or Asian) were entered in models with the reference group as white. To account for employment status in subsequent analyses, the categories included as covariates were women that were currently employed, women that were unemployed, and these two groups were compared to the reference group: women on parental leave.

Any variables that were associated with predictor or outcomes ($p < .10$) were included as covariates in subsequent analyses. SES, marital status, parity, ethnicity, and

employment status (T_1 or T_2) were associated with predictor or outcome variables ($p < .10$) and included as covariates in all regression analyses (see Table 2).

Overall, there were very few instances of missing data in this study and no individuals were excluded as based on missing data. Due to such a small percentage of data missing (< 5%), mean imputation was used, and missing data was replaced with the mean of the available items on questionnaires. All statistical procedures were analyzed using IBM SPSS Statistics for Macintosh, version 24 (IBM Corp. 2016).

Table 2. Associations between Participant Characteristics and Social Support Amount and Satisfaction, and Maternal Distress

Sample Characteristics	Social Support Amount		Social Support Satisfaction		Maternal Distress	
	T1	T2	T1	T2	T1	T2
	Test Statistic (*p*- value)	Test Statistic (*p*- value)	Test Statistic (*p*- value)	Test Statistic (*p*- value)	Test Statistic (*p*- value)	Test Statistic (*p*- value)
Maternal Age	0.01 (.89)	0.02 (.80)	0.08 (.35)	-0.08 (.38)	-0.08 (0.39)	-0.08 (0.39)
Infant Age T1	-0.08 (.36)	-0.21 (.82)	0.02 (.85)	-0.11 (.24)	0.12 (0.17)	0.15 (0.10)
Infant Age T2	-0.07 (.44)	0.01 (.90)	-0.04 (.70)	-0.11 (.22)	0.12 (0.21)	0.15 (.10)
SES						
Household Income	0.19 (.03)*	0.20 (03)*	0.15 (.09)	0.11 (.22)	-0.07 (0.43)	-0.18 (0.04)*
Years of Education	0.19 (.03)*	0.23 (.01)*	0.11 (.20)	0.16 (.09)†	-0.16 (0.07)†	-0.23 (0.01)*
Married	4.24 (.04)*	2.55 (.11)	1.31 (.25)	1.72 (.19)	0.01 (0.93)	1.96 (0.16)
Primiparous	10.36 (.002)**	11.13 (.001)**	3.04 (.08)	11.48 (.001)**	1.72 (0.19)	6.46 (0.01)*
Ethnicity						
Non-Hispanic White	-0.635 (.53)	0.54 (.59)	-1.617 (.11)	-2.157 (.03)*	0.50 (.62)	0.16 (.87)
Hispanic	1.24 (.22)	-.40 (.69)	1.561 (.12)	2.56 (.01)*	-.80 (.42)	-0.08 (.99)
Psychiatric History[a]	3.63 (.03)*	8.07 (.001)**	0.60 (.55)	2.96 (.06)†	9.83 (0.00)**	15.66 (0.00)**
T_1 Employment status						
On parental leave	-1.25 (.21)	-1.93 (.06)†	-0.15 (.88)	-2.20 (.03)*	1.21 (.23)	2.38 (.02)*
Not Employed	2.70 (.01)**	4.03 (.00)**	1.02 (.31)	2.01 (.05)*	0.18 (.86)	-1.48 (.15)
Employed	-1.08 (.28)	-1.40 (.16)	-0.77 (.44)	0.53 (.59)	-1.47 (.14)	-0.94 (.35)
T_2 Employment status						
On parental leave	-2.07 (.04)*	-2.01 (.05)*	-0.76 (.45)	-0.36(.72)	-0.35 (.72)	0.31 (.75)
Not Employed	3.78 (.00)**	5.42 (.00)**	1.06 (.29)	2.34 (.02)*	-0.28 (.78)	-1.46 (.15)
Employed	-2.35 (.02)*	-2.99 (.00)**	-0.59 (.55)	-1.97 (.05)†	0.26 (.64)	1.19 (.24)

Note: Reported test statistics are Pearson r correlations for continuous variables and independent t-tests and one-way ANOVAs for categorical data.[a] Psychiatric history is significantly associated with key variables but is not included as covariate. † p< .10, * p<.05, ** p< .01

Data Analysis pertaining to Research Questions

Hypothesis 1a

First, two hierarchical linear regressions were performed to explore independent associations between 1) social support amount and maternal distress and 2) social support satisfaction and maternal distress. For these two regressions, identified covariates were entered in the first step (see Table 2). For the second step, social support amount or social support satisfaction were entered. Next, hierarchical linear regressions were performed to explore whether maternal social support satisfaction was associated with postpartum maternal distress, above and beyond social support amount. Identified covariates were entered in the first step (see Table 2) and the social support amount variable was entered in second step. In the third step, social support satisfaction was entered. The dependent variable in all regression analyses was maternal distress and this hypothesis was tested using hierarchical linear regressions at each time point (see Appendix A for supplemental analyses related to anxiety and depression as separate outcomes).

Similar to analyses described above, a follow up hierarchical regression analysis was conducted to explore associations between social support amount and satisfaction and postpartum specific worry (PWS-R). First, two hierarchical linear regressions were performed to explore independent associations between 1) social support amount and postpartum specific worry and 2) social support satisfaction and postpartum specific worry. For these regressions, identified covariates were entered in the first step (see Table 2). For the second step, social support amount or social support satisfaction were entered. Next, hierarchical linear regressions were performed to explore whether maternal social

support satisfaction was associated with postpartum specific worry, above and beyond social support amount. Identified covariates were entered in the first step (see Table 2) and the social support amount variable was entered in second step. In the third step, social support satisfaction was entered. The dependent variable in all regression analyses was postpartum specific worry and these analyses were performed using data at each time point.

Hypothesis 1b

Hierarchical linear regressions were performed to test the interaction between social support amount and satisfaction in relation to postpartum maternal distress. In the first step, identified covariates were entered (see Table 2). In the second step, social support amount and satisfaction variables were entered. In the final step, an interaction term for social support amount x social support satisfaction was entered. The dependent variable included in all regressions was maternal distress and this hypothesis was tested using hierarchical linear regressions at each time point.

Hypothesis 2

First, two hierarchical linear regressions were performed to explore the associations between 1) emotional support satisfaction and postpartum maternal distress and 2) instrumental support satisfaction and postpartum maternal distress. Identified covariates were entered in the first step (see Table 2), and in the second step, either instrumental support satisfaction or emotional support satisfaction was entered. Next, hierarchical linear regressions were performed to test whether emotional support satisfaction was associated with postpartum maternal distress above and beyond the

association with instrumental support. Identified covariates were entered in the first step (see Table 2) and instrumental support was entered in the second step. In the third step, emotional support satisfaction was entered. The dependent variable for these regressions was maternal distress and this hypothesis was tested using hierarchical linear regressions at each time point.

A follow up analysis was explored to examine whether partner support satisfaction was associated with postpartum maternal distress above and beyond other sources (i.e. parents, in-laws, other family and friends) of support satisfaction. Identified covariates were entered in the first step (see Table 2) and other sources of support satisfaction was entered in the second step. In the third step, partner support satisfaction was entered. The dependent variable for these regressions was maternal distress and all analyses were tested at each time point. In order to test whether the standardized beta values for partner and other sources of support satisfaction were significantly different from each other, their corresponding 95% confidence intervals were estimated via bias-corrected bootstrap (1,000 re-samples). If the confidence intervals overlapped less than 50%, the standardized beta values would be considered statistically significantly different from each other ($p < .05$; Cumming, 2009).

Exploratory Research Aim

This exploratory analysis was used to examine potential associations between PWS-R and STAI-S. More specifically, the strength of the correlation and the amount of overlap in the variance (r^2) was assessed to see how much of the STAI-S is capturing postpartum specific worry symptoms. Bivariate correlations were performed to determine

the strength and significance of associations between the PWS-R and STAI-S at T_1 and T_2. In addition, bivariate correlations were performed to explore associations between maternal depression with PWS-R and STAI-S. As a final step, linear regressions were performed to explore the association between social support satisfaction and PWS-R beyond STAI-S. In the hierarchical regression for the first step, covariates were entered. In the second step, STAI-S was entered and in the third step PWS-R was entered, with social support satisfaction as the dependent variable. Two regression analyses were performed to investigate concurrent associations at both time points.

Chapter Three: Results

Descriptive Statistics

As shown in Table 1, women in the sample were predominantly non-Hispanic white (85%), had a college degree or higher (88%), and had a household income of $100,000 or more (66.1%). In addition, the majority of women were on parental leave at T_1 (45%) and had returned to work by T_2 (around 4 months postpartum; 72%). Although this was a low risk sample, one third of women (32.3%) reported a psychiatric history.

Postpartum Maternal Distress Symptoms

Table 3 shows the means, standard deviations, and range of women's EPDS and STAI-S scores and the percentage of women in this sample that met criteria for moderate (> 10) or severe depression (> 13) or were above the cut off for STAI-S scores to indicate moderate levels of anxiety (>40) at T_1 and T_2. The mean EPDS score at T_1 was 6.05 (*SD* = 4.74) and at T_2 was 6.06 (*SD*= 5.25). 10 women scored above the cut off (≥ 13) at T_1 and 17 women had scores above the cut off at T_2. The mean STAI-S score at T_1 was 35.54 (*SD*=10.39) and at T_2 was 34.75 (SD=10.00). 44 women scored above the cut off for anxiety (≥40) at T_1 and 39 women scored above the cut off for state anxiety at T_2. Women with a history of psychiatric disorders had more symptoms on average of postpartum maternal distress at T_1 (t (125) = -5.01, p<.001) and T2 (t (125) = -4.54, p<.001). There was not a significant change from T_1 to T_2 for Depression (EPDS, t(122)=

-0.14, $p > .10$) or anxiety (STAI-S, t (122)= -0.99, $p = .32$) scores. State anxiety at T_1 and T_2 were significantly correlated (r (121) = .78, $p < .001$) as well as depression at T_1 and T_2 (r(121) = .69, $p < .001$). Due to the lack of significant change in maternal distress symptoms from T_1 to T_2 and the strong correlation between maternal distress symptoms at T_1 and T_2, change in maternal distress symptoms across time points was not explored as an outcome in subsequent analyses.

Social Support: Amount and Satisfaction

Table 3 shows means, standard deviations, and range for women's social support amount and satisfaction ratings at T_1 and T_2. Social support amount significantly decreased from T_1 to T_2 (t (122) = 7.88, $p < .001$). The mean social support satisfaction score was 74.12 (SD = 14.20) at T_1 and was 70.76 (SD = 15.44) at T_2, with significant decreases in satisfaction with support occurring from T_1 to T_2 as well (t (122) = 2.85, $p< .01$). Results from bivariate correlations show that social support satisfaction (r (123) = .54, $p < .001$) and social support amount (r (123) = .80, $p < .001$) are significantly correlated across assessments.

Table 3. Summary of Descriptive Statistics for Social Support and Maternal Distress

Maternal Distress Symptoms	T_1 (*N*=127)	T_2 (*N*=123)	T_1 to T_2 *t*-statistic (*p-value)*
Depressive Symptoms (M ± SD; Range; % at or above clinical threshold)	6.05 ± 4.74; 0-21; 8.0	6.06 ± 5.25; 0-23;13.8	-0.14 (.89)
State Anxiety (M ± SD; Range; % at or above clinical threshold)	35.54 ± 10.39; 20-63; 34.8	34.75 ± 10.00; 20-74; 31.7	0.99 (.32)
Social Support			
Social Support Amount (M ± SD; Range)	210.64 ± 40.48; 116-318	192.67 ± 40.53; 103-288	7.88** (.001)
Social Support Satisfaction (M ± SD; Range)	74.12 ± 14.20; 39-100	70.76 ± 15.44; 17-100	2.85* (.01)
Emotional Support Satisfaction (M ± SD; Range)	39.20 ± 6.52; 22-50	38.22 ± 7.59; 10-50	1.65 (.10)
Instrumental Support Satisfaction (M ± SD; Range)	34.91 ± 8.45; 15-50	32.54 ± 9.02; 7-50	3.31** (.001)

Note: † p< .10, * p<.05, ** p< .01.

Main Analyses

Social Support Satisfaction and Amount and Postpartum Maternal Distress at T_1 and T_2

Hierarchical regression analyses testing the primary hypothesis, revealed that greater satisfaction with social support was significantly associated with less maternal distress symptoms at T_1 (β = -.41, t (126) = -4.77, $p < .001$, see Figure 3) and at T_2 (β = -.42, t (122) = -4.78, $p < .001$, see Figure 3). Social support amount was not significantly associated with maternal distress symptoms at T_1 (β = -.15, t (126) = -1.58, $p > .10$, see Figure 3), however greater social support amount was significantly associated with less postpartum maternal distress symptoms at T_2 (β = -.20, t (122) = -2.05, $p < .05$, see Figure 3). Subsequent regression analyses revealed that greater social support satisfaction was significantly associated with less postpartum maternal distress symptoms, after accounting for social support amount at T_1 (β = -.42, t (126) = -4.45, $p < .001$ see Table 4) and T_2 (β = -.42, t (122) = -4.23, $p < .001$, see Table 4).

Hierarchical linear regression analyses revealed that the interaction between social support satisfaction and social support amount fell short of statistical significance at T_1 (β = -.02, t (126) = -.25, $p > .10$) and T_2 (β = .12 t (122) = 1.51, $p > .10$), while accounting for covariates.

Table 4. Summary of Hierarchical Regression Analyses examining Social Support and Maternal Distress

	Model 1: Covariates			Model 2: SS Amount			Model 3: SS Satisfaction		
Maternal distress symptoms at T_1	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*
Socioeconomic Status	-0.14	-0.16	0.12	-0.12	-0.14	0.12	-0.10	-0.11	0.11
Marital Status	-0.00	-0.02	0.78	0.02	0.19	0.78	0.03	0.26	0.71
Primiparous (1) vs. Multiparous (0)	-0.10	-0.39	0.36	-0.07	-0.25	0.36	-0.06	-0.21	0.34
Ethnicity									
Hispanic (1) vs. White (0)	0.04	0.23	0.58	0.03	0.19	0.58	-0.01	-0.04	0.54
Other Race/Ethnicity (1) vs. White (0)	-0.01	-0.07	0.82	0.00	0.02	0.81	-0.03	-0.28	0.76
T_1 Employment status									
Not employed (1) vs. parental leave (0)	-0.05	-0.22	0.48	-0.07	-0.29	0.48	-0.04	-0.16	0.45
Employed (1) vs. parental leave (0)	0.12	0.50	0.40	0.13	0.52	0.40	0.15	0.60	0.37
Social Support Amount T_1				-0.15	-0.40	0.26	0.03	0.07	0.26
Social Support Satisfaction T_1							-0.42***	-1.28	0.29
R^2	0.05			0.07			0.21		
F	0.90			1.11			3.34**		
Maternal distress symptoms at T_2									
Socioeconomic Status	-0.23*	-0.26	0.12	-0.21*	-0.24	0.12	-0.23*	-0.26	0.11
Marital Status	-0.09	-0.73	0.74	-0.07	-0.59	0.73	-0.05	-0.42	0.68
Primiparous (1) vs. Multiparous (0)	-0.19*	-0.73	0.35	-0.15	-0.55	0.35	-0.09	-0.34	0.33
Ethnicity									
Hispanic (1) vs. White (0)	-0.08	-0.52	0.59	-0.05	-0.33	0.58	-0.16†	-1.01	0.57
Other Race/Ethnicity (1) vs. White (0)	0.04	0.32	0.82	0.04	0.36	0.81	0.04	0.32	0.75
T_1 Employment status									
Not employed (1) vs. parental leave (0)	0.04	0.16	0.83	-0.07	-0.34	0.85	-0.01	-0.07	0.80
Employed (1) vs. parental leave (0)	0.05	0.22	0.77	0.00	-0.02	0.76	0.05	0.21	0.72
Social Support Amount T_2				-0.20*	-0.54	0.26	-0.00	0.01	0.28
Social Support Satisfaction T_2							-0.42***	-1.11	0.26
R^2	0.11			0.14			0.26		
F	2.07†			2.39*			4.42***		

Note: † $p < .10$, *$p < .05$. **$p < .01$, $p < .001$***

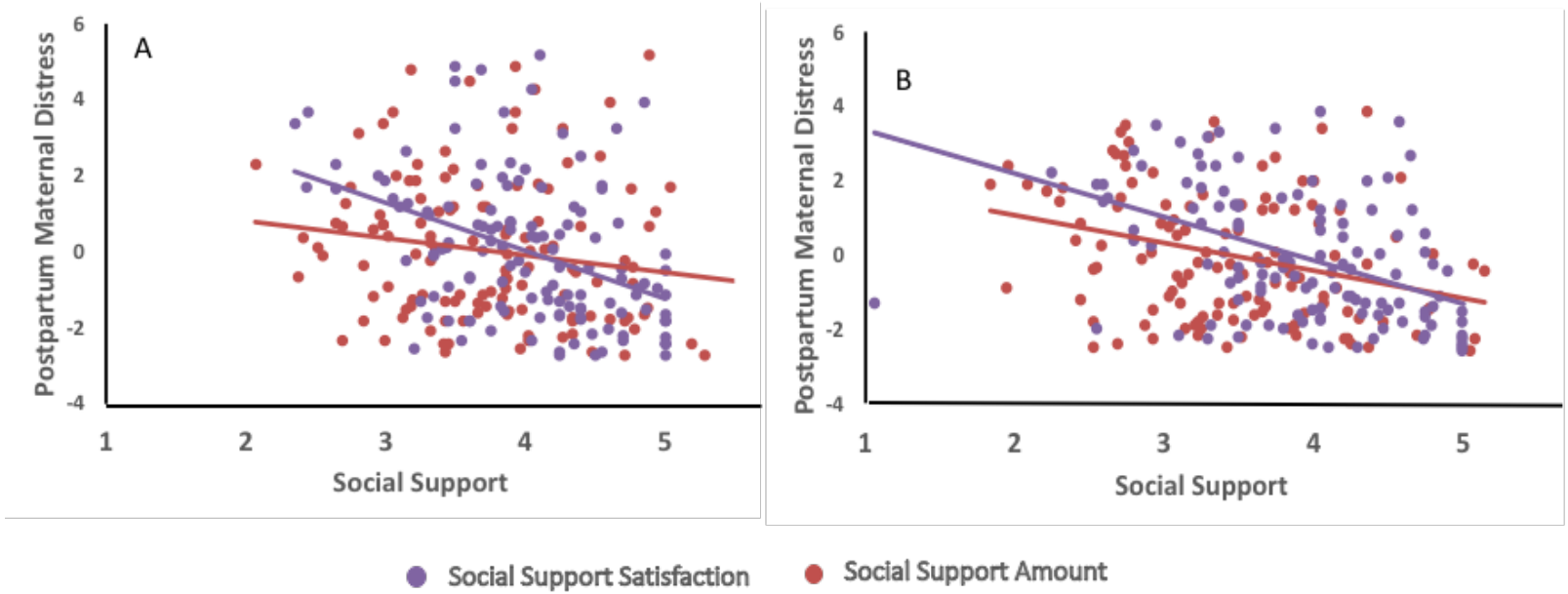

Figure 3. Scatterplots of social support satisfaction (purple) and amount (red) (expressed as average scores) with postpartum maternal distress (expressed as anxiety and depression combined standardized scores). Data were analyzed continuously using regressions. **A)** associations for social support satisfaction ($\beta = -.41$, $p < .001$) and social support amount ($\beta = -.15$, $p > .10$) at 2 months postpartum and **B)** associations for social support satisfaction ($\beta = -.42$, $p < .001$) and social support amount ($\beta = -.20$, $p < .05$) at 4 months postpartum.

Social Support Satisfaction and Amount and Postpartum Specific Worry at T_1 and T_2

Hierarchical regression analyses revealed that greater satisfaction with social support was significantly associated with less postpartum specific worry symptoms at T_1 (β = -.43, t (126) = -5.08, $p < .001$). The association between satisfaction with social support satisfaction and postpartum specific worry symptoms was marginally significant at T_2 (β = -.18, t (122) = -1.87, $p < .10$). Social support amount was not significantly associated with maternal postpartum specific worry at T_1 (β = -.12, t (126) = -.1.23, $p > .10$) or T_2 (β = -.05, t (126) = -.43, $p > .10$). Subsequent regression analyses revealed that greater social support satisfaction was significantly associated with less maternal postpartum specific worry symptoms, after accounting for social support amount at T_1 (β = -.46, t (126) = -4.95, $p < .001$) and there was a marginal association at T_2 (β = -.21, t (122) = -1.88, $p < .10$).

Emotional vs. Instrumental Support Satisfaction and Postpartum Maternal Distress Symptoms at T_1 and T_2

Subsequent regression analyses testing hypothesis 2 revealed that greater emotional support was significantly associated with less postpartum maternal distress symptoms at T_1 (β = -.44, t (126) = -5.30, $p < .001$, see Figure 4) and T_2 (β = -.45, t (122) = -5.16, $p < .001$, see Figure 4). Results also showed that greater instrumental support was significantly associated with less postpartum maternal distress symptoms at T_1 (β = -.34, t (126) = -3.91, $p < .001$, see Figure 4) and T_2 (β = -.35, t (122) = -3.88, $p < .001$, see

Figure 4). Next, analyses revealed that greater emotional support satisfaction was significantly associated with less maternal distress symptoms, after accounting for instrumental support at T_1 (β = -.55, t (126) = -3.50, $p < .001$, see model 3 in Table 5) and T_2 (β = -.44, t (122) = -3.06, $p < .01$, see model 3 in Table 5).

Partner vs. Other Source of Support Satisfaction and Postpartum Maternal Distress Symptoms at T_1 and T_2

Hierarchical regression analyses revealed that greater support satisfaction from partners (β =-.20, t (126) = -2.13, $p < .05$) and from other sources (β = -.30, t (126) = -3.29, $p < .001$) were significantly associated with less postpartum maternal distress symptoms at T_1. Results also showed that greater satisfaction with support from other sources was significantly associated with less postpartum maternal distress symptoms at T_2 (β = -.34, t (122) = -3.66, $p < .001$). However, analyses revealed that partner support satisfaction fell short of statistical significance at T_2 (β = -.14, t (122) = -1.49, $p > .10$).

To evaluate if the differences in partner support and other source of support standardized beta values were statistically significant, the confidence intervals for beta weights were examined to see if there was less than 50% overlap between beta values. For both time points, half of the average of the overlapping confidence intervals was calculated (T_1= .07, T_2 =.06) and added to partner support lower bound estimate (T_1:-.32; T_2: -.16), which yielded -.25 for T_1 and -.10 for T_2. For T_1, since the other source of support upper bound estimate of -.17 exceeded the value of -.25, the difference between partner and other support standardized beta values ($\Delta\beta$ = .13) was not considered statistically significant ($p > .05$). However, at T_2 the other source of support upper bound

confidence interval estimate of -.17 was less than the value of -.10, and thus, the difference between partner and other support standardized beta values ($\Delta\beta = .13$) was considered statistically significant ($p < .05$).

Table 5. Summary of Hierarchical Regression Analysis for Emotional and Instrumental Support Associated with Postpartum Maternal Distress Symptoms

	Model 1: Covariates			Model 2: Instrumental			Model 3: Emotional and Instrumental		
Maternal Distress Symptoms at T_1	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*
Socioeconomic Status	-0.14	-0.17	0.12	-0.12	-0.13	0.11	-0.09	-0.10	0.10
Marital Status	-0.00	-0.02	0.77	0.02	0.12	0.72	0.04	0.30	0.69
Primiparous (1) vs. Multiparous (0)	-0.10	-0.39	0.36	-0.06	-0.24	0.34	-0.05	-0.19	0.32
Ethnicity									
Hispanic (1) vs. White (0)	0.04	0.22	0.58	-0.02	-0.15	0.56	0.04	0.24	0.54
Other Race/Ethnicity(1) vs. White(0)	-0.01	-0.06	0.82	-0.02	-0.18	0.77	-0.04	-0.33	0.74
T_1 Employment status									
Not employed (1) vs. parental leave (0)	-0.04	-0.20	0.48	-0.02	-0.101	0.45	-0.05	-0.21	0.44
Employed (1) vs. parental leave (0)	0.12	0.51	0.40	0.15	0.62	0.38	0.14	0.56	0.36
Instrumental Support T_1				-0.35***	-0.96	0.24	0.12	0.33	0.44
Emotional Support T_1							-0.55**	-1.80	0.52
R^2	0.05			0.17			0.24		
F	0.81			2.57*			3.75***		
Maternal Distress Symptoms at T_2									
Socioeconomic Status	-0.25	-0.28	0.12	-0.26**	-0.30	0.11	-0.22*	-0.26	0.11
Marital Status	-0.10	-0.82	0.74	-0.08	-0.64	0.70	-0.05	-0.41	0.68
Primiparous (1) vs. Multiparous (0)	-0.20*	-0.76	0.35	-0.11	-0.42	0.34	-0.10	-0.39	0.33
Ethnicity									
Hispanic (1) vs. White (0)	-0.08	-0.54	0.59	-0.14	-0.90	0.56	-0.17†	-1.06	0.54
Other Race/Ethnicity (1) vs. White (0)	0.04	0.39	0.82	0.05	0.43	0.77	0.04	0.31	0.75
T_2 Employment status									
Not employed (1) vs. parental leave (0)	0.09	0.36	0.77	0.11	0.44	0.73	0.05	0.21	0.70
Employed (1) vs. parental leave (0)	0.06	0.26	0.83	0.04	0.17	0.78	-0.03	-0.12	0.76
Instrumental Support T_2				-0.35***	-0.80	0.21	-0.01	-0.01	0.33
Emotional Support T_2							-0.44***	-1.22	0.40
R^2	0.12			0.23			0.29		
F	1.98†			3.68***			4.49***		

Note: † $p < .10$, *$p < .05$. **$p < .01$, $p < .001$**

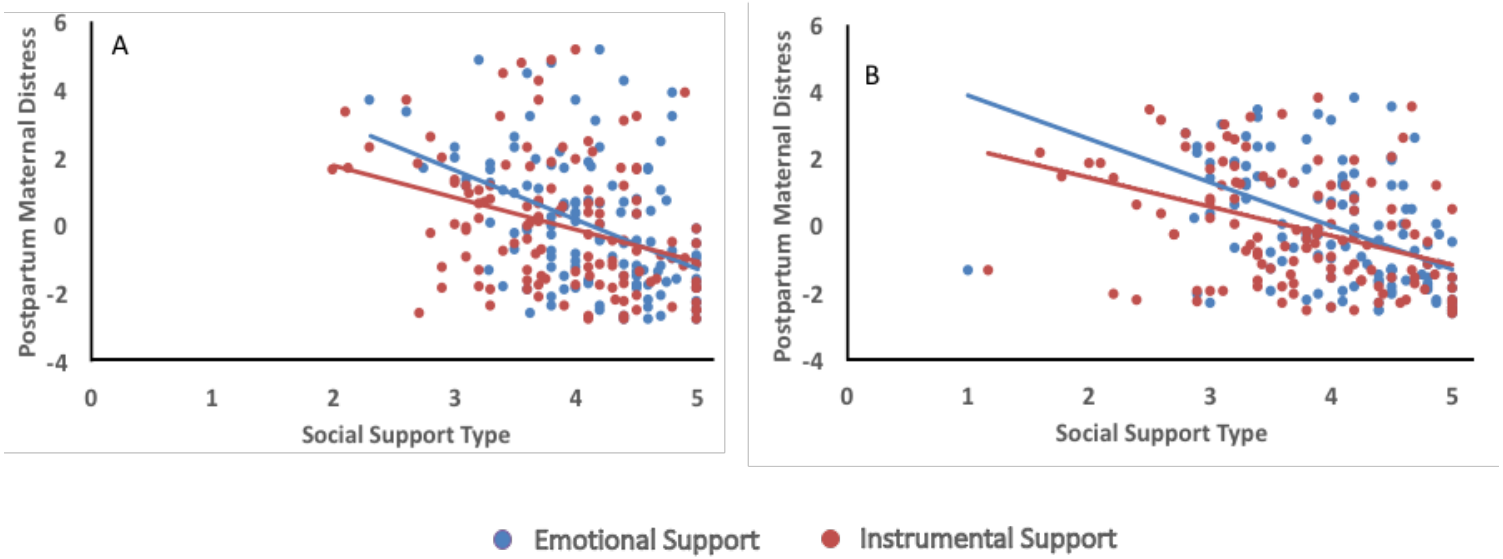

Figure 4. Scatterplots of emotional support (blue) and instrumental support (red) (expressed as average scores) with postpartum maternal distress (expressed as anxiety and depression combined standardized scores). Data were analyzed continuously using regressions and all associations depicted here are significant. **A)** depicts associations for emotional support ($\beta = -.44$, $p < .001$) and instrumental support ($\beta = -.34$, $p < .001$) at 2 months postpartum and **B)** depicts associations for emotional support ($\beta = -.45$, $p < .001$) and instrumental support ($\beta = -.35$, $p < .001$) at 4 months postpartum.

Postpartum Specific Worry vs. General Anxiety

Correlational analyses were conducted to examine associations between women's STAI-S and PWS-R scores at T_1 and T_2. Results revealed a positive moderate correlation between women's postpartum specific worry and state anxiety at T_1 and T_2 (see Table 6). For this correlation the proportion of shared variance between the two constructs at T_1 is 38% and at T_2 is 30%. Results also revealed a positive moderate correlation between women's postpartum specific worry and postpartum depressive symptoms at T_1 and T_2 (see Table 6). For this correlation the proportion of shared variance between the two constructs at T_1 is 29% and at T_2 is 26%. Although there is overlap, the percentages of shared variance suggest that there is variance not explained by overlap of postpartum specific worry with general anxiety and depressive symptoms during the postpartum period.

Table 6. Summary of Bivariate Correlations between PWS-R, STAI-S, and Depression

	State Anxiety	*Depression*
	r	*r*
Postpartum Worry T_1[a]	.62***	.54***
Postpartum Worry T_2[b]	.55***	.51***

Note: [a] Correlations were performed with all T_1 data, [b] Correlations with all T_2 data. $p < .001$***

In a subsequent analysis, hierarchical linear regressions revealed that lower social support satisfaction was significantly associated with higher general anxiety ($\beta = -.22$, $t(126) = -2.10$, $p < .05$, see model 2 in Table 7) and postpartum worry ($\beta = -.28$, $t(126) = -2.69$, $p < .01$, see model 2 in Table 7) at T_1, while accounting for covariates. At T_2, lower

social support satisfaction was significantly associated with higher general anxiety (β = -.47, t (122) = -4.60, $p < .001$ see model 2 in Table 7), whereas social support satisfaction was not significantly associated with postpartum worry (β = .08, t (122) = .87, $p > .10$, see model 2 in Table 7), demonstrating a persistent association with general anxiety at both time points and with postpartum specific worry only at 2 months postpartum.

Table 7. Summary of Regressions between Postpartum Specific Worry, General Anxiety, and Social Support Satisfaction

	Model 1: Covariates			Model 2: General Anxiety			Model 3: Postpartum Worry and General Anxiety		
	β	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*
	Social Support Satisfaction T_1								
Socioeconomic Status	0.10	0.04	0.04	0.04	0.02	0.03	0.01	0.00	0.03
Marital Status	0.07	0.18	0.25	0.05	0.14	0.23	0.07	0.19	0.22
Primiparous (1) vs. Multiparous (0)	0.12	0.15	0.11	0.08	0.10	0.11	0.11	0.14	0.10
Ethnicity									
Hispanic (1) vs. White (0)	-0.11	-0.22	0.19	-0.10	-0.21	0.17	-0.09	-0.19	0.17
Other Race/Ethnicity(1) vs. White(0)	-0.05	-0.15	0.26	-0.07	-0.21	0.24	-0.06	-0.17	0.23
T_1 Employment status									
Not employed (1) vs. on parental leave (0)	0.04	0.06	0.15	0.01	0.01	0.14	-0.00	-0.00	0.14
Employed (1) vs on parental leave (0)	0.06	0.08	0.13	0.13	0.17	0.12	0.10	0.14	0.12
General Anxiety T_1				-0.40***	-0.48	0.10	-0.22*	-0.27	0.13
Postpartum Worry T_1							-0.28**	-0.24	0.09
R^2	0.27			0.48			0.52		
F	1.19			3.78***			4.31***		
	Social Support Satisfaction T_2								
Socioeconomic Status	0.01	0.00	0.04	-0.11	-0.05	0.04	-0.11	-0.05	0.041
Marital Status	0.09	0.29	0.27	0.08	0.24	0.25	0.08	0.23	0.25
Primiparous (1) vs. Multiparous (0)	0.25**	0.36	0.13	0.16†	0.23	0.12	0.15†	0.22	0.12
Ethnicity									
Hispanic (1) vs. White (0)	-0.18*	-0.44	0.22	-0.22*	-0.53	0.20	-0.23*	-0.56	0.20
Other Race/Ethnicity(1) vs. White(0)	-0.00	-0.00	0.30	0.01	0.04	0.28	0.01	0.03	0.28
T_1 Employment status									
Not employed (1) vs. on parental leave (0)	-0.13	-0.21	0.31	-0.07	-0.13	0.28	-0.06	-0.11	0.28
Employed (1) vs on parental leave (0)	-0.01	-0.02	0.29	0.06	0.10	0.26	0.07	0.18	0.26
General Anxiety T_2				-0.42***	-0.6	0.12	-0.47***	-0.67	0.15
Postpartum Worry T_2							0.08	0.08	0.09
R^2	0.39			0.55			.55		
F	2.53*			5.42***			4.94***		

Note: † $p < .10$, * $p < .05$. ** $p < .01$, $p < .001$***

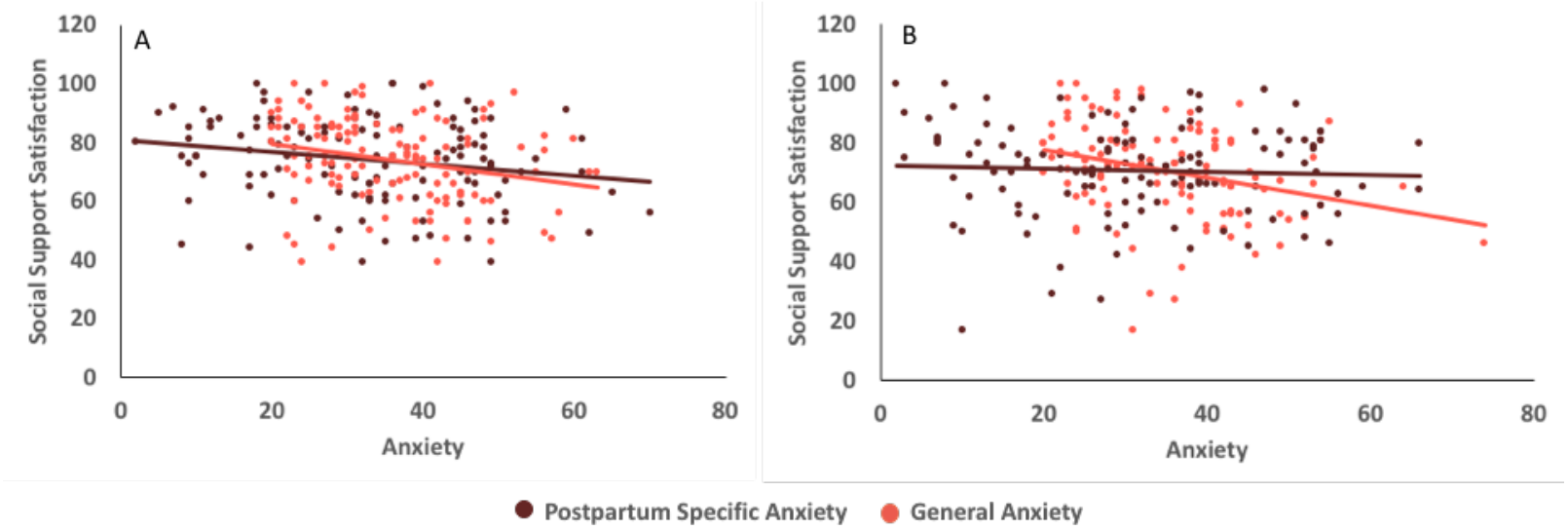

Figure 5. Scatterplots of postpartum specific anxiety (PWS-R; dark red) and general anxiety (STAI-S; orange) with social support satisfaction. Data were analyzed continuously using regressions. **A)** depicts social support satisfaction significantly associated with both PWS-R ($\beta = -.28$, $p < .01$) and STAI-S ($\beta = -.22$, $p < .05$) at 2 months postpartum and **B)** depicts social support satisfaction significantly associated with STAI-S ($\beta = -.47$, $p < .001$), but not with PWS-R ($\beta = .08$, $p > .10$).

Chapter Four: Discussion

This is the first report to demonstrate that greater satisfaction with social support is associated with less maternal distress, above and beyond associations with amount of social support at both 2 and 4 months postpartum. When explored in more detail, our study demonstrates that greater satisfaction with emotional support is associated with lower postpartum maternal distress symptoms across both 2 and 4 months, above and beyond instrumental support. Women with greater social support satisfaction had less postpartum specific anxiety, which strengthens evidence for links between higher quality support and lower postpartum distress symptoms (McVey & Tuohy, 2007; Razurel & Kaiser, 2015). These findings support the hypotheses that suggest that greater satisfaction with social support and, specifically, emotional types of support, are consistently related to maternal distress from 2 to 4 months postpartum. Thus, maternal perceptions of social support may represent a meaningful protective factor. These findings also extend previous theories, such as Cohen's specificity hypothesis (Cohen & McKay, 1984), by showing that when quality of support (i.e. satisfaction ratings) support is perceived as inadequate, postpartum distress symptomatology may rise.

Satisfaction with Social Support and Maternal Distress

Using maternal ratings of social support satisfaction and amount, the current study found that greater satisfaction with support is associated with less maternal distress in the

postpartum period, above and beyond associations with amount of support. Social support amount was not significantly independently associated with maternal distress symptoms at 2 months postpartum, but at 4 months postpartum less social support was significantly associated with more maternal distress symptoms. These findings suggest that satisfaction with social support is a major factor involved in the women's postpartum psychological adjustment. In fact, research has shown that greater social support amounts are not always associated with less distress symptoms, particularly when the women are less satisfied with the support (McVey & Tuohy, 2007). Maternal ratings of satisfaction with support is described as a measure of how women perceive the helpfulness of their support (Razurel & Kaiser, 2015), and thus, by asking about satisfaction we are getting at their assessment of the support's helpfulness. Prior research shows that social support perceived as higher quality reduces the risk of postpartum distress (Collins et al., 1993; McVey & Tuohy, 2007; Racine et al., 2019; Razurel & Kaiser, 2015) and its severity (O'Hara & Swain, 1996). Although support could be considered higher or lower in quality for many reasons, these findings point to the importance of considering the quality of support as well as the quantity when attempting to help mothers with their postpartum mental health. These findings reflect other work theorizing that both quantity and quality of social support uniquely contribute towards women's coping success in the postpartum period (Cohen & McKay, 1984; Cutrona et al., 1990; Rini et al., 2006).

Although this study's findings do not firmly establish that social support is causally influencing postpartum maternal distress, findings indicate that a reverse causality is not likely. Some may argue that reverse causality is occurring which would mean that maternal psychological symptoms are influencing women to rate social support

as less satisfactory. Specifically, research with non-postpartum individuals supports that depressed individuals may have more selective bias to negative details when recalling information (Gotlib, 1983; Gotlib & Krasnoperova, 1998; Wenze, Gunthert, & German, 2012). The finding that greater social support satisfaction is associated with less postpartum specific worry, above and beyond social support amount, weakens the argument for reverse causality because anxiety does not influence the same negative biases as depression (Beck & Clark, 1997; Britton, Lissek, Grillon, Norcross, & Pine, 2011). For example, if only depression was associated with social support satisfaction, reverse causality could be a likely underlying cause, however, both a composite including anxiety and postpartum specific worry are associated with support satisfaction. Thus, while causality cannot be confirmed, our findings that greater social support satisfaction is associated with less postpartum specific worry and maternal distress increases the likelihood that social support is affecting postpartum maternal mental health symptoms.

Considering the robustness of the identified associations across depression, anxiety, and postpartum specific anxiety, greater satisfaction with support may be surmised as an important factor for lower risk for postpartum mental health symptoms. Thus, efforts to enhance women's social support quality may be an effective avenue by which postpartum maternal anxiety and depression may be alleviated. Future research should directly explore causality to establish whether satisfaction with support functions as a protective factor for alleviation of postpartum mental health symptoms broadly. If satisfaction with social support is a proxy for the quality of support women receive and a mechanism for reduction of maternal distress symptoms, measurement of support satisfaction could be important for screenings and interventions with postpartum women.

The direction of association between social support amount and maternal distress matches the expected direction at both 2 and 4 months postpartum, such that with less social support, women experience more postpartum distress symptoms. However, unlike satisfaction with support, women reported significantly lower amounts of social support at 4 months than at 2 months postpartum. If mothers receive less social support as time progresses in the postpartum period, associations with distress symptoms may not emerge until the later 4-month postpartum assessment. Further research should investigate whether changes in the amount of support received early versus later in postpartum influence distress symptoms differentially from consistently low amounts of support.

The current study did not find a significant interaction between social support amount and satisfaction in relation to maternal distress symptoms at 2 and 4 months postpartum. Contrary to my hypothesis, results reveal that women's satisfaction with support is unaffected at different levels of support amount. Similar to main findings described above, this lack of interaction between support satisfaction and amount may indicate greater satisfaction with support is associated with reduced maternal distress, independent from the amount of support received. Despite the null findings, it is possible that this study sample had insufficient power to detect a small effect. Furthermore, our sample had constricted variance for both amount of and satisfaction with support measures. Future studies should investigate the potential interactions between amount of and satisfaction with support using a larger sample with a more diverse range of available supports in order to examine possible interaction effects.

Satisfaction with Social Support: Type and Source

Further analyses delving into satisfaction with social support ratings reveal that greater satisfaction with emotional support is significantly associated with less maternal distress symptoms, above and beyond instrumental support satisfaction at both assessments. Greater instrumental support was associated with less postpartum maternal distress at both assessments when explored independent from emotional support satisfaction. These findings indicate that when considering both instrumental and emotional support, emotional support accounts for more variance in maternal distress. Although causality claims are not established in the current study, emotional support has been linked with lower postpartum maternal distress in prior studies (Hetherington et al., 2018; Razurel & Kaiser, 2015; Sampson et al., 2015). These studies have found that relationships with more emotional support are judged as more supportive by women than those where instrumental support is provided (Cutrona et al., 1990). A possible explanation may be that mothers, while benefiting from instrumental support, may need to feel that they are being supported emotionally to more effectively reduce their distress symptoms.

Analyses also reveal that greater satisfaction with partner support is not significantly associated with less postpartum distress at 4 months postpartum, whereas support from other sources is. Greater satisfaction with support from all sources (i.e. partners, family, and friends) was significantly associated with less maternal distress at 2 months postpartum. This pattern of findings was unexpected considering that emotional support satisfaction was associated across the two assessments, and in prior studies partners are usually identified as a woman's main source of emotional support (Dennis &

Ross, 2006; Negron, Martin, Almog, Balbierz, & Howell, 2013; Sampson et al., 2015; Skipstein et al., 2012; Xie et al., 2010). Thus, this finding does not lend itself to the explanation that partners are providing all the emotional support, or that emotional support may be a proxy for relationship quality, since partner support satisfaction was not a consistent correlate. Further the finding that satisfaction with support from family and friends is more strongly associated with postpartum distress at 4 months than partner support suggests that support from parents, in-laws, family, and friends is important, particularly later in the postpartum period.

The non-significant association with partner support at 4 months, in conjunction with the consistent links between emotional support and postpartum distress, may be explained by a few mechanisms. First, it is possible that emotional support is being received primarily by partners, however this effect is not apparent in this study for two reasons. The majority of women were highly satisfied with support provided by partners, whereas in another sample that has more variability a stronger link between partner support and maternal distress symptoms could be more robust. Second, the links between partner support and emotional support were not directly explored, hence making conclusions regarding emotional support as driven by partners indeterminable. This finding extends previous work which argues that providers other than partners play an important role in social support and having more providers of support has been linked to better outcomes for postpartum adjustment (Leung, 1985; Logsdon, Birkimer, & Barbee, 1997). Prior research has also demonstrated that parental support may play a different role than partner support for influencing maternal self-efficacy and distress symptomatology (Haslam, Pakenham, & Smith, 2006). Our findings, therefore, could be

explained through the unique contributions of support provided by parents and family on maternal distress symptomatology.

It is also noteworthy that partner support was significantly associated with less distress at 2 months postpartum, which may indicate higher quality partner support is helpful for postpartum mental health, particularly in the early postpartum period. This finding is consistent with prior work emphasizing the importance of partner support (Dennis & Ross, 2006; O'Hara, 1986; Sampson et al., 2015), and adds to this literature by with some evidence that it may be more critical to focus on enhancing partner support earlier in postpartum period.

Overall these findings point to enhancing support provided by all sources, and making sure women have a variety of sources, not just partner support. In addition, emotional support may be particularly salient and expectant and new parents could be informed about benefits of emotional support provided by partner and other sources in an attempt to increase maternal confidence and self-efficacy and reduce risk for maternal distress. Again, causality is not established in these findings, however, the association between greater satisfaction with support and less postpartum distress is repeatedly held when broken down by types, sources, and in association with postpartum specific worry. Thus, further longitudinal and quasi-experimental studies are needed to determine if maternal satisfaction with support, by type and source, is working as a buffer for postpartum distress.

Longitudinal Examination of Maternal Distress

Another aim of the present study was to investigate how social support amount and satisfaction at 2 months postpartum predicts change in maternal distress

longitudinally from 2 to 4 months postpartum. However, the analyses show that maternal distress did not change significantly across the two assessments and distress symptoms are highly correlated across assessments. Interestingly, this lack of change reveals that maternal distress levels are stable across 2 to 4 months postpartum. These data are consistent with a large amount of literature finding that levels of anxiety (Agrati et al., 2015; Dipietro et al., 2008; Keeton, Perry-Jenkins, & Sayer, 2008) and depression (Beeghly et al., 2002; Dipietro et al., 2008; Heron, O'Connor, Evans, Golding, & Glover, 2004) are stable and highly correlated across fairly long ranges in the postpartum period. For instance, Beeghly and colleagues (2002) found that postpartum depression did not change from 3-12 months, regardless of symptom severity. For women that are experiencing moderate to severe symptom levels of postpartum distress, stability of symptoms may indicate that women are not getting the treatment they need. In addition, these distress symptoms may extend beyond the early postpartum period. Alternatively, even though as a group these women have stability in their postpartum distress symptoms, it is possible that on a more individual level there were changes that were not captured by these group analyses. Future studies could conduct more sensitive analyses which may be able to tease apart more individual level change in depression and anxiety symptoms and help determine the causal effects of social support for potentially improving maternal distress symptoms.

Postpartum Specific Anxiety as a Distinct Construct from General Anxiety

This study found that mother's postpartum specific worry is significantly and positively correlated with general anxiety at 2 and 4 months postpartum. Postpartum

specific worry only explained 30-38% of the variance of general anxiety, which indicates the majority of the variance is unique between these measures. This finding is consistent with a recent study which found significant positive correlations between their measure of postpartum specific anxiety and general anxiety (Fallon et al., 2016). Fallon and Colleagues found a stronger correlation between postpartum specific anxiety and general anxiety (r = .74) than our study and used a different and newly developed measure, which impedes direct comparisons to this study. A larger body of research does explore anxiety specific to the prenatal period (i.e. pregnancy specific anxiety) and this research shows a similar pattern of findings when pregnancy anxiety is compared to general anxiety (Blair et al., 2011; Buss et al., 2011; Dunkel Schetter & Tanner, 2012; Huizink, Mulder, de Medina, Visser, & Buitelaar, 2004; Saisto, Salmela-Aro, Nurmi, & Halmesmäki, 2001). These studies demonstrate that approximately 20-30% of the total variance in a pregnancy anxiety scale is predicted by general anxiety (Huizink et al., 2004; Saisto et al., 2001). Similar to our findings, the correlation coefficient for the association between pregnancy specific anxiety and general state anxiety has commonly been found to be in the .50 -.60 range (Blair et al., 2011). This work supports that pregnancy specific anxiety and general anxiety may be regarded as distinct entities in the prenatal period. Similarly, it is possible there are significant distinctions between postpartum specific worry and general anxiety, which could indicate a distinct postpartum worry type of anxiety is present after childbirth.

The current study reveals that lower social support satisfaction is significantly associated with more postpartum specific worry, beyond the associations with general anxiety at 2 months but does not reach significance at 4 months postpartum. It is possible

that the association between social support satisfaction and postpartum specific worry loses strength by 4 months postpartum. As described earlier, satisfaction with support is marginally associated with postpartum specific worry at 4 months, which provides corroborating evidence for this change in associations from 2 to 4 months postpartum. There is no study to date which explores associations between postpartum specific worry and social support satisfaction, and addresses possible distinctions with general anxiety.

A common idea about becoming a mother is that some level of anxiety related to this new role and responsibility is normative and adaptive. A possible explanation for the lack of significant association between social support satisfaction and postpartum specific worry at 4 months may be that women's postpartum specific worry is not be responsive to social support in the same way as their general anxiety symptoms, particularly after the early postpartum period. For example, it is possible as a mother adjusts to the challenges of having a new baby, normative levels of anxiety would be expected to remit as time progresses. However, women with postpartum specific anxiety continuing later (e.g. 3 - 4 months and beyond) may have more severe symptoms, which may weaken the relation to social support and indicate need for additional supports to buffer these symptoms. Some prenatal research proposes that pregnancy specific anxiety is more physiological and acute than general anxiety (Dipietro et al., 2008; Huizink et al., 2004), and postpartum specific worry could be similar, with underlying hormones driving a more acute symptomatology (Beck & Driscoll, 2006). Thus, a postpartum specific anxiety that is more severe and influenced by biological factors, would likely be distinct from general anxiety and thus, have different patterns of association with social support. Alternatively, the postpartum specific worry measure (PWS-R) is not a standardized measure and

although it has good internal consistency (Moran et al., 2014), this finding may be confounded by a measurement issue. However, these findings illuminate the possibility that postpartum specific anxiety is distinct from general anxiety and draw attention to the need for tailored interventions to provide support specific to postpartum struggles. Such interventions could benefit from focusing on alternative supports, such as postpartum specific mental health peer groups and professional services.

Strengths and Limitations

One strength of the current study is that it explores social support prospectively across repeated measures that extend past the immediate postpartum period (i.e. 0-2 months). Less literature has explored maternal distress later in the postpartum period (i.e. past 2 months). This study not only examines satisfaction with and amount of social support, but also breaks type of support out by instrumental and emotional level and observes all of these factors in relation to a broad array of maternal distress symptoms. While other studies have explored social support in relation to postpartum distress, none explore both anxiety and depression in the context of social support needs being met and specific types of support. The level of detail included in the present analysis supports a more granular level of insight into postpartum maternal outcomes.

Despite the novel findings of this study, some limitations should be addressed. One limitation is the use of self-report for social support and depression and anxiety symptom measurement. It is possible self-report biases may have contributed to women's answers about symptom severity or social support satisfaction due to social desirability or awareness of the potential benefits of social support. Future interventions should

incorporate observations in addition to self-report, such as partner report or experimental designs that test the relationships identified in this study. For example, an intervention that provides support training to partners could be a direct way to improve quality of social support for mothers (Pilkington, Milne, Cairns, & Whelan, 2016) and test the effects of such improvements on relevant outcomes**.** As for maternal distress, clinical interviews could be used to get a less biased assessment of distress levels in the postpartum period.

Considering we were unable to assess social support's effect on distress symptom change across the postpartum period, some methodological improvements could benefit a future study to allow for this type of longitudinal examination. For example, the measurement of more than two time points and across a longer portion of the first postpartum year may provide a better design for exploring changes in maternal distress symptoms. Thus, the current study may have benefited from testing of more complex models such as trajectory models (i.e. hierarchical linear modeling or structural equation modeling) but these additional analyses were restricted due to sample size and limited assessments. A trajectory analysis design including more time points would improve the study's ability to make causal inferences regarding associations between social support satisfaction and maternal distress.

It is possible that mothers with more postpartum distress may have a negative bias toward social support and recall their social support as less satisfactory. The theory that depressed individuals may have more selective bias to negative details when recalling information has been evidenced in research in non-postpartum individuals (Gotlib, 1983; Gotlib & Krasnoperova, 1998; Wenze et al., 2012). Considering our study was not

experimental and could not affirm causality, the potential for this bias should be considered when interpreting the results. A pure experimental study is not possible in human studies, as it is unethical to tamper with the quality or effectiveness of support that women receive in the postpartum period. However, quasi-experimental designs that group women by support types, quality of support received, or implement social support interventions, could be investigated to better inform directionality of social support effects on postpartum distress symptoms.

A further limitation of the current study is that we did not include mothers with very low or absent social support. All mothers were cohabitating with a partner or married; thus, a baseline amount of support was available to all women in this study. It is possible that the results found in this study would differ for mothers receiving very limited or absent amounts of emotional or instrumental support. More studies are needed to explore these associations in populations with mothers receiving low or absent support in order to clarify how quantity of and satisfaction with support functions across settings to alleviate maternal distress symptomatology.

Clinical Implications

Determining the protective factors of maternal postpartum distress will not only have implications for mothers, but also for their parenting, infant, and child outcomes. The current study did not measure any parenting or infant characteristics or outcomes. However, there is evidence that postpartum distress can negatively impact parenting and child developmental outcomes (Feldman et al., 2009; Field, 2010). Therefore, increased attention to social support as a protective factor is needed. Findings from this study

suggest that emotional support is particularly helpful for new mothers and that increasing its quality and availability could in itself be a beneficial intervention. Interventions designed to increase social support effectiveness may be a progressive path forward to reduce postpartum distress. Rini and colleagues' (2006) theory of social support emphasizes that if social support is provided in an effective manner, it may help mothers' cope with stressors.

Further, the present study's findings may be important for practitioners of Interpersonal Psychotherapy (IPT), an evidenced-based practice used in perinatal mental health treatment. Enhancing social support is an integral component of IPT's theory and practice, particularly in regards to postpartum depression treatments (Stuart, 2012). For example, IPT research links postpartum depression closely to social factors and posits that depressed postpartum women tend to report lower satisfaction with support received (Grigoriadis & Ravitz, 2007). Thus, our finding that it is the perception of social support needs being met, not merely the amount of supports, fits with IPT's treatment model and could inform specific IPT treatment goals and action plans around enhancing social support.

Although there is now a mandatory depression screening for pregnant and postpartum women ("Screening Recommendations," n.d.), currently there are no routine checks in place to examine mother's social support as a protective factor. Women during the postpartum period may not always know what options are available to them to alleviate or prevent their depression and anxiety. Thus, recognition of potential protective factors, such as enhancing women's satisfaction with social support, may be of the utmost importance for prevention and treatment of postpartum psychopathology. These

findings suggest that assessment of maternal satisfaction with social support, in addition to ensuring they are receiving adequate amounts of support, may critically influence postpartum maternal distress outcomes.

Future Directions

In this study, we assessed many dimensions of social support and a large range of alternative factors such as SES, maternal employment status, and marital status. However, consideration of other mediating or risk factors may be important to elaborate influences of postpartum maternal distress. Prior studies provide compelling evidence for maternal personality characteristics as moderating the association between social support and maternal distress (Kofman et al., 2019; Maliszewska, Bidzan, Świątkowska-Freund, & Krzysztof, 2017). For instance, Kofman and colleagues (2019) found that women with high neuroticism were unable to benefit from high levels of social support, and still exhibited high levels of postpartum depression. Additionally, other studies have found neuroticism to be an independently strong risk factor for postpartum distress (Maliszewska et al., 2017). Thus, future studies, which are larger and prospective, should consider exploring maternal personality characteristics such as neuroticism.

Another important factor for further research would be to directly explore how the partner's depressive or anxiety symptoms might influence women's' postpartum distress, possibly through the quality and quantity of support the partner can provide. Partner support and involvement is integral during the postpartum period (Dennis & Ross, 2006; Goodman, Lusby, Thompson, Newport, & Stowe, 2014; Pilkington et al., 2016; Racine et al., 2019). However, the impact of partners' or fathers' mental health symptoms on

maternal postpartum distress continues to be unmeasured across most studies and represents a significant and likely meaningful gap. A small body of literature explored paternal depression in the postpartum period. These studies found links between fathers' depressive symptoms and women's increased risk for postpartum depressive symptoms (Paulson & Bazemore, 2010) and with impaired social support quality provided by fathers (Don & Mickelson, 2012) in the postpartum period. Due to the timeframe and scope of the current study, no data was collected from the partners/fathers. However, this is an area that is in critical need of further exploration.

The finding that social support satisfaction is strongly associated with mother's postpartum distress in a normative, low risk sample is useful and supplies a benchmark against which studies may examine populations facing additional disadvantages, such as poverty. Future studies with more diverse characteristics are required to better understand the specific support needs for women with lower SES and ethnically diverse backgrounds. In addition, larger studies which continue this detailed examination of social support have the potential to compare groups of women with clinical symptom levels and from different SES and cultural backgrounds.

Although outside the scope of this study, future studies should consider investigating biological measures, such as reproductive hormone fluctuations, to add dimension to understanding of the causes and consequences of postpartum maternal distress. Evidence from animal model studies point to reproductive hormones, such as estrogen and progesterone, playing an important role in maternal emotional states during the postpartum period. These biological theories have produced two lines of thinking regarding pathways in which biological mechanisms affect postpartum distress. Some

authors argue that certain women may be more susceptible to sharp declines in reproductive hormones after birth (Green, Barr, & Galea, 2009), whereas other authors attribute risk for maternal distress to women being sensitive to fluctuations in these hormones (Schiller, Meltzer-Brody, & Rubinow, 2015). Both animal and human studies have failed to produce clear conclusions regarding the influence of reproductive hormone fluctuations on increased risk for postpartum maternal distress. However, future research which aims to untangle the many factors that may influence postpartum maternal distress should consider the inclusion of biological measures, as this may be a factor which increases susceptibility for some women.

Conclusion

Considering the risk that poor maternal mental health poses for mother-child bonding, child development, and well-being (Feldman et al., 2009), it is important to understand the factors that may help women cope with this transition. Prior work on protective factors for postpartum maternal distress have presented an unclear picture. Findings from the current study fill a gap by providing a more nuanced understanding of the aspects of social support mothers find most helpful in the postpartum period, beyond receiving adequate amounts. Improved understanding of the multidimensional aspects of social support that buffer against postpartum maternal distress could improve preventions, interventions, and treatment**.** Continued attention is needed regarding specific protective factors such as social support for postpartum mothers' needs in order to strengthen outcomes for mothers and children.

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Appendix A: Supplemental Analyses and Results

Analyses

Early Social Support Satisfaction, Social Support Satisfaction, and Postpartum Maternal Distress at T_1 and T_2

Bivariate correlations were conducted with early social support satisfaction prior to 2 months using a retrospective question and social support satisfaction and maternal distress at T_1 and T_2. These analyses were conducted to explore whether social support satisfaction rated before 2 months was associated with social support satisfaction or maternal distress at either T_1 or T_2.

Depression and Anxiety as Separate Outcomes

This supplemental analysis examined associations between social support amount and satisfaction and postpartum depression and anxiety symptoms separately at T_1 and T_2. Hierarchical multiple regressions were performed exploring associations between social support predictors at T_1 (social support amount and satisfaction) and depression and anxiety separately at T_1 and T_2 in cross-sectional analyses. The aim of this exploratory regression analysis was to test whether social support factors influence postpartum anxiety and depression differently. First, identified covariates were entered in the model. In the next step, social support amount and satisfaction were entered. Four regressions were performed first with depression as dependent variable and second with anxiety symptoms as dependent variable, at each time point (T_1 and T_2).

Results

Early Social Support Satisfaction, Social Support Satisfaction, and Postpartum Maternal Distress at T_1 and T_2

Results reveal that early social support satisfaction is not significantly correlated with social support satisfaction at T_1 (r (127) = .15, $p > .10$) or T_2 (r (123) = .02, $p > .10$). Subsequent analyses also revealed early social support satisfaction was not significantly associated with maternal distress at T_1 (r (127) = .02, $p > .10$) or T_2 (r (123) = .03, $p > .10$). Since early support satisfaction was not significantly associated with support satisfaction or maternal distress at either assessment it was not included in further analyses.

Depression and Anxiety as Separate Outcomes

Four hierarchical linear regression analyses were performed to explore associations between social support amount and satisfaction and postpartum depression and anxiety symptoms in separate models at both T_1 and T_2. These analyses revealed that social support amount was not significantly associated with anxiety (β = .01, t (126) = .09, *ns*) or depressive (β = .04, t (126) = .38, *ns*) symptoms at T_1 (see Table 8), nor anxiety (β = -.02, t (122) = -.19, *ns)* and depressive (β = -.37, t (122) = -.06, *ns*) symptoms at T_2 (see Table 9). However, greater social support satisfaction significantly predicted fewer postpartum anxiety (β = -.41, t (126) = -4.38, $p < .001$) and depressive (β = -.40, t (126) = -4.23, $p < .001$) symptoms at T_1 (see Table 8). Greater social support satisfaction also significantly predicted anxiety (β = -.42, t (122) = -4.25, $p < .001$) and depressive (β = -.37, t (122) = -3.55, $p < .001$) symptoms at T_2 (see Table 9). Thus, these

cross-sectional exploratory analyses revealed the same pattern of associations as analyses with maternal distress as the dependent variable.

Table 8. Summary of Hierarchical Regression Analyses for Social Support (amount and satisfaction) predicting Postpartum Depressive and Anxiety Symptoms at T_1

	Model 1: Covariates			Model 2: Social Support Amount			Model 2: Social Support Satisfaction		
	β	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*
	Maternal Anxiety Symptoms								
Socioeconomic Status	-0.14	-0.05	0.03	-0.13	-0.04	0.03	-0.10	-0.03	0.03
Marital Status	-0.04	-0.08	0.20	-0.01	-0.03	0.21	-0.01	-0.01	0.19
Primiparous (1) vs. Multiparous (0)	-0.10	-0.10	0.10	-0.06	-0.07	0.10	-0.05	-0.06	0.09
Ethnicity: Hispanic (1) vs. White (0)	0.015	0.03	0.16	0.01	0.02	0.16	-0.03	-0.04	0.15
Ethnicity: Other Race/Ethnicity (1) vs. White (0)	-0.05	-0.12	0.22	-0.04	-0.09	0.22	-0.07	-0.17	0.20
T_2 Employment status									
Not employed (1) vs. on parental leave (0)	-0.09	-0.10	0.13	-0.10	-0.13	0.13	-0.07	-0.09	0.12
Employed (1) vs. on parental leave (0)	0.16	0.18	0.11	0.17†	0.19	0.11	0.18*	0.21	0.10
Social Support Amount T_1				-0.16†	-0.12	0.07	0.01	0.01	0.07
Social Support Satisfaction T_1							-0.40***	-0.34	0.08
R^2	.07			.09			.22		
F	1.29			1.50			3.61***		
	Maternal Depressive Symptoms								
Socioeconomic Status	-0.12	-0.04	0.03	-0.11	-0.03	0.03	-0.08	-0.02	0.03
Marital Status	0.04	0.08	0.19	0.06	0.12	0.19	0.06	0.13	0.18
Primiparous (1) vs. Multiparous (0)	-0.09	-0.09	0.09	-0.06	-0.06	0.09	-0.05	-0.05	0.08
Ethnicity: Hispanic (1) vs. White (0)	0.05	0.08	0.14	0.05	0.08	0.14	0.01	0.02	0.14
Ethnicity: Other Race/Ethnicity (1) vs. White (0)	0.03	0.07	0.20	0.04	0.09	0.20	0.01	0.02	0.19
T_2 Employment status									
Not employed (1) vs. on parental leave (0)	-0.01	-0.01	0.12	-0.02	-0.03	0.12	0.01	0.01	0.11
Employed (1) vs on parental leave (0)	0.07	0.07	0.10	0.08	0.08	0.10	0.09	0.09	0.09
Social Support Amount T_1				-0.13	-0.09	0.06	0.04	0.03	0.07
Social Support Satisfaction T_1							-0.40***	-0.30	0.07
R^2	.04			.05			.17		
F	.68			.82			2.75**		

Note: † p< .10, * p<.05, ** p< .01, *** p< .001

Table 9. Summary of Hierarchical Regression Analyses for Social Support (amount and satisfaction) and Postpartum Depressive and Anxiety Symptoms at T_2

	Model 1: Covariates			Model 2: Social Support Amount			Model 2: Social Support Satisfaction		
	β	*B*	*SE(B)*	*β*	*B*	*SE(B)*	*β*	*B*	*SE(B)*
	Maternal Anxiety Symptoms								
Socioeconomic Status	-0.26	-0.08	0.03	-0.24	-0.07	0.03	-0.26	-0.08	0.03
Marital Status	-0.03	-0.06	0.19	-0.01	-0.02	0.19	0.01	0.03	0.18
Primiparous (1) vs. Multiparous (0)	-0.21	-0.21	0.09	-0.17	-0.16	0.09	-0.11	-0.11	0.09
Ethnicity: Hispanic (1) vs. White (0)	-0.09	-0.15	0.15	-0.06	-0.10	0.15	-0.17	-0.28	0.15
Ethnicity: Other Race/Ethnicity (1) vs. White (0)	0.02	0.05	0.21	0.03	0.06	0.21	0.02	0.05	0.20
T_2 Employment status	0.10	0.12	0.22	-0.01	-0.01	0.22	0.05	0.06	0.21
Not employed (1) vs. on parental leave (0)	0.15	0.17	0.20	0.09	0.10	0.20	0.15	0.16	0.18
Employed (1) vs. on parental leave (0)				-0.22	-0.15	0.07	-0.01	0.00	0.07
Social Support Amount T_2							-0.43	-0.30	0.07
Social Support Satisfaction T_2							-0.26	-0.08	0.03
R^2	.13			.16			.28		
F	2.36*			2.72**			4.91***		
	Maternal Depressive Symptoms								
Socioeconomic Status	-0.18†	-0.06	0.03	-0.16	-0.05	0.03	-0.18†	-0.06	0.03
Marital Status	-0.14	-0.33	0.20	-0.13	-0.29	0.20	-0.11	-0.25	0.19
Primiparous (1) vs. Multiparous (0)	-0.15	-0.16	0.10	-0.11	-0.12	0.10	-0.06	-0.07	0.09
Ethnicity: Hispanic (1) vs. White (0)	-0.06	-0.11	0.16	-0.04	-0.07	0.16	-0.13	-0.23	0.16
Ethnicity: Other Race/Ethnicity (1) vs. White (0)	0.05	0.12	0.23	0.05	0.13	0.23	0.05	0.12	0.21
T_2 Employment status									
Not employed (1) vs. on parental leave (0)	-0.04	-0.05	0.23	-0.13	-0.16	0.24	-0.08	-0.10	0.23
Employed (1) vs on parental leave (0)	-0.05	-0.06	0.21	-0.10	-0.12	0.21	-0.05	-0.06	0.20
Social Support Amount T_2				-0.17†	-0.13	0.07	0.01	0.01	0.08
Social Support Satisfaction T_2							-0.37***	-0.27	0.08
R^2	.10			.12			.21		
F	1.72			1.90†			3.36**		

Note: † p< .10, * p<.05, ** p< .01, *** p< .001