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Title of Dissertation: RISK AND RESILIENCE FOR POSTPARTUM DEPRESSION IN MOTHERS OF INFANTS WHO REQUIRED NEONATAL-INTENSIVE-CARE-UNIT HOSPITALIZATION

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ABSTRACT

Title of Document: RISK AND RESILIENCE FOR POSTPARTUM DEPRESSION IN MOTHERS OF INFANTS WHO REQUIRED NEONATAL-INTENSIVE-CARE-UNIT-HOSPITALIZATION

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Postpartum depression is linked to significant negative outcomes for mothers, their life partners, and, particularly, their infants and young children. However, postpartum depression is the most common undiagnosed and untreated maternal mental health disorder in the United States and around the world. Mothers of infants treated in a neonatal intensive care unit (NICU) and who experience a developmental delay may be at particularly high risk for developing postpartum depression. There are few available well-validated measures that screen mothers for risk or protective factors for postpartum depression. The present study examined multiple factors hypothesized to increase risk or promote resilience for postpartum depression. Participants were 148 biological mothers of infants, currently or previously treated in a NICU. Mothers provided demographic information and completed measures of pregnancy unhappiness, avoidance coping, perceived life stress, relationship satisfaction, and social support, and answered questions regarding their awareness of, concerns about, and personal preferences for receiving services and support if and when they experienced symptoms of postpartum depression. Higher pregnancy unhappiness, perceived stress, and use of avoidance coping were associated with higher postpartum depression symptoms scores; higher relationship

satisfaction and social support were associated with lower scores. In addition, social support moderated the effects of stress on mothers' symptoms of postpartum depression but did not moderate the effects of stress on mothers' use of avoidance coping.

Keywords: Depression, Postpartum Depression, Risk, Resilience, NICU

RISK AND RESILIENCE FOR POSTPARTUM DEPRESSION IN MOTHERS OF INFANTS WHO REQUIRED NEONATAL-INTENSIVE-CARE-UNIT HOSPTIALIZATION

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Dedication

This work is dedicated to my husband John Kenny. I could never have done this without your support, patience and faith in my ability to make it to the finish line in spite of all the hurdles and challenges.

This journey has taken so much longer than I ever anticipated and many times I questioned whether it made any sense to keep going. On the hardest days I would often stop and think about the experiences and events that pointed me toward this path and all those who I carry with me in my heart and in my memories, who for one reason or another never ever had this opportunity. With that as motivation, and with the support and encouragement of my husband and so many others, I finally made it.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Currently, the United States ranks among the lowest of higher-income nations on indicators of both population and maternal and child health. Life expectancy and lifecourse health outcomes are particularly poor for women and children, with the United States having some of the highest rates of maternal deaths and infant mortality and low birth-weight (Bulletin of the WHO, 2015). In addition, the United States spends more for worse health outcomes than the majority of other high-income countries throughout the world (Fraser, 2013). Halfon (2009) and Fraser (2013) call for a paradigm shift in the approach to healthcare in the United States. This paradigm shift calls for improving health-development trajectories toward better lifecourse outcomes by allocating resources toward promoting health development at the beginning of life, particularly through an increased focus on maternal and child health.

Postpartum and maternal depression is an important driver of health outcomes for mothers, children, family systems and society (Wachs, Black & Engle, 2009; Wisner, Chambers & Sit, 2006). The symptoms of postpartum depression impair mothers' ability to engage their infants and young children in responsive, development-enhancing "serve-and-return" interactions (Center on the Developing Child, 2009, 2015; Tronick & Reck, 2009). Symptoms of postpartum depression are detrimental to healthy mother–infant relationships (Tronick & Reck, 2009) and infant development (Center on the Developing Child, 2009; Sohr-Preston & Scaramella, 2006), particularly among mother–infant dyads in which infants required a neonatal-intensive-care-unit (NICU) hospitalization (R. Feldman, 2007; Poehlmann et al., 2011). Mothers' symptoms of postpartum depression also increase the risk that spouses or significant others will experience distress and

mental health disorders (Goodman, 2008; Letourneau et al., 2012) and that father–child relationships will be negatively impacted (Goodman, 2004, 2008; Paulson, Dauber & Leiferman, 2006). Finally, mothers' symptoms of postpartum depression substantially diminish their own quality of life and well-being (Edhborg, Friberg, et al., 2005; Sapolsky, 2014).

Evidence from the literature indicates that fewer than 50% of mothers experiencing symptoms of postpartum depression receive a diagnosis, and it is estimated that only 20% of mothers who are diagnosed receive any treatment (Horowitz & Goodman, 2004). Improving the rate of diagnosis and treatment for postpartum depression and minimizing the impact of postpartum depression and other maternal depression is a key component of promoting better health outcomes for the larger society (Fraser, 2013; Halfon 2009). Addressing the current low rate of treatment and diagnosis for postpartum and maternal depression requires addressing gaps in the literature and barriers associated with universal, periodic screening of mothers for risk for or resilience to postpartum depression (Horowitz, Murphy, Gregory & Wojcik, 2011; Kozhimannil, Adams, Soumerai, Busch, & Huskamp, 2011).

Achieving this goal will require multiple approaches (Earls, 2010; Fraser, 2013). Important steps to addressing the current low rates of diagnosis and treatment for postpartum and maternal depression include, (a) identifying factors that accurately and consistently predict mothers' risk for or resilience to developing symptoms of postpartum depression (Gollan et al., 2017), (b) understanding mothers support seeking attitudes and behaviors, (c) examining mothers' beliefs regarding the impact of symptoms of postpartum depression on infants and young children, (d) improving training and

awareness for healthcare professionals and the general public regarding the symptoms of postpartum depression (Earls, 2010), and (e) developing validated tools to screen mothers for factors that increase mothers' risk for or promote resilience to developing symptoms of postpartum depression (Gollan, 2017).

Barriers to achieving better detection and treatment for postpartum depression include: the lack of a well-validated, easily administered screening measure that performs accurately and consistently in identifying who is most likely to be at risk for or resilient to developing postpartum depression (Gollan et al., 2017). In addition, little is known about maternal support seeking attitudes and behaviors or perceived barriers to receiving help or support for symptoms of postpartum depression across sub-populations of mothers, such as mothers of infants who require NICU hospitalization.

This study includes a sample of mothers of infants who required NICU hospitalization and extended developmental monitoring. It has two aims: (1) to examine the feasibility of developing a brief, easily administered measure of risk/resilience for postpartum depression by identifying a limited number of robust predictors of mothers' risk/resilience for symptoms of postpartum depression; and, (2) to improve current knowledge regarding support-seeking attitudes, behaviors and beliefs regarding perceived barriers that interfere with mothers receiving a diagnosis or treatment for their symptoms of postpartum depression.

The literature review that follows summarizes two postpartum mood disorders (postpartum blues and postpartum depression) and the importance of distinguishing between these two disorders. Then it reviews risk and resilience-promoting factors for postpartum depression relevant to mothers of infants who experienced a neonatal

hospitalization and were referred for extended developmental monitoring. The risk factors reviewed include infant illness, infant developmental delay, pregnancy unhappiness, perceived stress and avoidance coping; followed by a review of two resilience factors, practical social support and relationship satisfaction. Next, the literature outlining the barriers that interfere with mothers' likelihood of receiving a diagnosis of, or any supports or treatment for, postpartum depression is reviewed. Finally, a review of Life Course Health Development (LCHD; Halfon & Hochstein, 2002; Halfon, Larson, Lu, Tullis & Russ, 2014) as a theoretical framework is presented. Halfon's LCHD model emphasizes the concept of *linked lives*, suggesting that biological, social and environmental factors play a significant role in shaping individuals' life-course health trajectories (Halfon & Hochstein, 2002; Halfon et al., 2014). The literature review is followed by presentation of the methods and results from the present study of postpartum depression.

Chapter 2: Literature Review

Types of Postpartum Mood Disorders

Postpartum blues. Of the two postpartum mood disorders being reviewed, postpartum or "baby" blues is the mildest and most common (Brockington, 2004a, 2004b; Reck, Stehle, Reinig, & Mundt, 2009). Prevalence estimates for the blues are from 50% to as high as 80% among mothers in the first 2 to 11 days postpartum (Henshaw et al., 2004; Reck et al., 2009). Blues symptoms, though milder and more transient, are similar to those of postpartum depression and include irritability, confusion, brooding, low mood, hypersensitivity, tearfulness, and occasionally euphoria or numbness (Edhborg, 2008; O'Hara, 2009). Blues symptoms generally manifest between the third and fifth day postpartum, although new mothers can experience blues symptoms as early as 24 hours or as late as 11 days after delivery. Most mothers require no treatment, and symptoms generally resolve within one to three days of onset (Henshaw et al., 2004, O'Hara & Wisner, 2014).

Although typically mild and of limited duration, episodes of the blues are not always benign. In separate but similar studies, Henshaw et al. (2004) and Reck et al. (2009), examined associations between blues symptoms and risk for subsequent episodes of postpartum depression (N = 800, 853 women respectively). Henshaw et al. (2004) surveyed mothers for blues symptoms on Days 3 and 5 postpartum, and created a sub-sample from the larger sample matching on demographic characteristics mothers whose blues symptoms scores were at or above the 75th percentile (severe-blues-symptoms group) with mothers who did not experience the blues (no-blues-symptoms group). At 6 months postpartum, mothers in the matched pairs sub-sample completed an assessment

for symptoms of postpartum depression. Mothers in the severe-blues-symptoms group were significantly more likely to have developed major or minor postpartum depression than mothers in the no-blues-symptoms group. These mothers were also more likely to have experienced postpartum depression symptoms with an earlier onset and longer duration than the no-blues group of mothers (Henshaw et al., 2004). Mothers in the severe-blues-symptoms group who also reported having experienced an episode of depression prior to the index pregnancy were six times more likely to develop postpartum depression than comparison-group mothers (see also Edhborg, 2008; for similar findings). Postpartum depression is more severe, debilitating and, when left untreated, persistent than postpartum blues (Charney & Manji, 2004; Josefsson & Sydsjö, 2007).

Postpartum Depression. In the *Diagnostic and Statistical Manual of Mental Disorders,* (5th ed.; *DSM-5,* American Psychiatric Association, 2013), postpartum depression is not considered to be a stand-alone diagnosis. It is included under major depressive disorders. The diagnosis of postpartum depression is used to designate a present or recent episode of manic, mixed, or major depressive disorder, bipolar I and II, or brief psychotic disorder occurring within 4 weeks of childbirth. However, the more widely accepted parameters for defining postpartum depression in research and clinical practice are broader and include the onset of symptoms any time between 2 and 52 weeks postpartum, with a growing body of evidence indicating that mothers' symptoms of depression may persist or remit and recur as many as 18-24 months after the birth of their infant (Mayberry, Horowitz & DecLerq, 2007; Ross, Sellers, Gilbert-Evans & Romach, 2004).

Symptoms of postpartum depression include but are not limited to low mood, tearfulness, and guilt. In addition, many mothers experience obsessive thoughts and worries about infant safety. Mothers' obsessive thoughts often accompany compulsions to repeatedly check on the infant, including frequent nighttime checks to reassure themselves that the infant is breathing (Brockington, 2004a, 2004b; Miller, 2002). In contrast, mothers also report having obsessive thoughts about harming their infant or themselves (Brockington, MacDonald, & Wainscott, 2006; Letourneau et al., 2012). Irritability, anxiety, and phobias, as well as difficulties with concentration, making decisions, and caring for themselves and their infants are symptoms also commonly reported by mothers experiencing postpartum depression (Beck, 2002; Edhborg et al., 2005). These symptoms exist on a continuum from mild to severe, and research indicates that a woman's risk for psychiatric hospitalization may be at a lifetime high in the first three months postpartum (O'Hara & Wisner, 2014; Wisner et al., 2006). Therefore, educating healthcare professionals and the general public about the distinction between postpartum blues and postpartum depression is an important step in promoting maternal mental health (Earls, 2010; Edhborg, 2008).

In high-income countries, such as the United States, prevalence rates for postpartum reported in the literature are between 6.5% and 14.5% (O'Hara & Wisner, 2014; Vesga-Lopez et al., 2008). In samples of mothers with multiple risk factors, such as being low-income, single, and having fewer years of education, researchers have reported prevalence rates of postpartum depression as high as 28.3% (Mayberry et al., 2007; Segre, O'Hara, Arndt, & Stuart, 2007). However, capturing nationally representative prevalence rates is challenging. The research has several limitations including

heterogeneity of (a) methods for assessing postpartum depression (e.g., self-report, interview, and clinical interview); (b) time of assessment (e.g., 7 days to 1 year postpartum), and (c) whether the researchers used criteria that included symptoms consistent with minor and major depression (Gibson, McKenzie-McHarg, Shakespeare, Price, & Gray, 2009; Mayberry et al., 2007). Although research on postpartum depression has increased substantially over the past three decades, many questions remain: particularly, which factors accurately and consistently predict an increased risk for or are associated with resilience to developing symptoms of postpartum depression. Further research focused on identifying predictors of mothers' risk/resilience that will perform accurately and consistently in populations high risk mothers, including mothers of infants who required NICU hospitalization is warranted.

Risk Factors for Postpartum Depression

Infant illness. The transition to parenthood is one of the most significant developmental milestones of adulthood, and mothers often report feeling unprepared for the responsibility and workload that accompany being a parent (Bowlby, 1988; Keeton, Perry-Jenkins & Sayer, 2008). Changes in how a woman spends her time, her role identities, and the configuration of her social networks may be dramatic and unsettling whether a woman is becoming a mother for the first time or is adding an additional child to her family (Beck, 2002; Edhborg et al., 2005;). Women whose infants are born with life-threatening complications experience a violation of the expectations they held regarding the birth of their infant and the anticipated joy of becoming a mother. Mothers of neonatally ill infants must adjust their expectations and adapt to beginning their role as a mother in the unnatural environment of a NICU (Flacking, Ewald, Nyqvist, & Starrin,

2006; Jackson, Ternestedt, & Schollin, 2003). In some studies, exposure to the life changes and stress associated with infant illness and neonatal hospitalization has been linked to an increased risk for postpartum depression (Beck, 2003; Holditch-Davis et al., 2009). However, other studies report no association between severity of infant illness and maternal risk for depression (Belanger, 2007; R. Feldman, Weller, Leckman, Kuint, & Eidelman, 1999). The inconsistent findings in maternal risk for experiencing distress during or after a neonatal hospitalization may be associated with factors such as heterogeneity in the type of distress or maternal outcomes examined, inclusion–exclusion criteria for mothers and infants, variability in the times of assessment, and the lack of a consistent measure for symptoms of postpartum depression across studies (Morrell et al., 2016; Vigod et al., 2010).

In one of the very few methodologically rigorous systematic reviews of the literature examining risk for postpartum depression in mothers of infants born preterm, Vigod, Villegas, Dennis, and Ross, (2010) noted significant heterogeneity in methodology and results reported across the 26 studies (total N = 2392 mothers) that met their inclusion–exclusion criteria. Vigod et al. (2010) included in their review only studies that were peer-reviewed and reported prevalence or mean scores on a validated measure (self-report or observer-rated) of postpartum-depression symptoms. The authors grouped studies into two clinically distinct categories. The first category of studies was the low birth weight (LBW = < 2,500 grams)/preterm category. This category included studies of mothers of infants born with low birth weight or less than 38 weeks gestation. The second category of studies was the very low birth weight (VLBW = < 1500

grams)/very preterm category and included studies of mothers of infants born with very low birth weight or very preterm.

Among the 26 studies included in the Vigod et al. (2010) review, 13 included a comparison group of mothers of full-term infants. In the first category (mothers of LBW, preterm infants) six studies examined risk for postpartum depression and included a comparison group of full-term mothers. Four of the six studies found that mothers of LBW preterm infants were at higher risk for experiencing postpartum depression than were mothers of full-term infants. The remaining two studies found no significant differences between the two groups of mothers. In the second category (mothers of VLBW, very preterm infants), seven studies included a comparison group. Four of the seven studies reported that mothers of VLBW or very preterm infants were more likely to experience symptoms of postpartum depression compared to mothers of full-term infants, with the remaining three studies reporting no significant differences in risk between the two groups of mothers.

In summary, evidence from the Vigod et al. review (2010) suggests that, overall, mothers of VLBW (very preterm) and LBW (preterm infants) are more likely to experience symptoms of postpartum depression than mothers of infants born full-term. In addition, Vigod et al. also reported that mothers of very preterm, VLBW infants were at higher risk for experiencing persistently elevated symptoms of depression, with some mothers exhibiting symptoms for up to a year after the birth of their infant. The review also illustrates that many mothers of even the smallest, sickest infants do not develop symptoms of postpartum depression, suggesting that factors other than infant illness alone contribute to mothers' risk for experiencing postpartum depression.

The experience of infant NICU hospitalization can differ substantially from one mother-infant dyad to another due to the variability in infant gestational ages, birth weights, and other health complications. In a study including 177 rural African American mothers of infants born preterm/VLBW, Holditch-Davis et al. (2009) used latent class analysis to determine if they could categorize mothers' reactions to factors associated with the NICU hospitalization of their infants. They examined whether mothers' response patterns would conform to patterns of high or low *distress* and high or low *stress.* Distress was a composite of mothers' scores on measures of depression, anxiety, or post-traumatic stress. Stress was a composite of mothers' scores on measures of daily hassles and perceived stress associated with the appearance of their infant, the lack of privacy in the NICU, and alterations in maternal role attainment. The authors then examined which factors were most likely to predict mothers' response patterns (e.g., high distress / high stress or low distress / low stress). Mothers completed the initial assessment when their infants were still in the NICU but no longer critically ill, and completed multiple follow-up assessments until the infants were 24 months of age. At each follow-up assessment, mothers completed measures of distress (i.e., symptoms of depression, anxiety or post-traumatic stress), as well as stress (infant appearance, staff behavior, role attainment) and daily hassles.

Four distinguishable response patterns emerged from mothers' scores on measures of distress and stress (Holditch-Davis et al., 2009). However, only one of the four response patterns, low distress/low stress, conformed to the authors' expectations. Mothers in the low distress /low stress group exhibited low mean scores on all measures of distress and stress. The high-stress, high-depression and extreme distress response

patterns did not conform to the high/high, low/low, low/high or high/low dichotomous patterns anticipated by the authors. Mothers in the high stress group had the highest mean scores on measures of stress, moderate mean scores on measures of depression, anxiety and post-traumatic stress. Mothers in the high-stress group, in addition to having infants who were very ill, were more likely to have completed fewer years of education, to be single, and to be low-income. Mothers in the high-depression group exhibited the highest mean scores on measures of depression and concomitant anxiety, with only moderate mean scores on measures of post-traumatic stress, and all measures of stress. Finally, the extreme distress group of mothers exhibited very high mean scores on all measures of distress and stress. In addition, the mean scores on all measures of distress and stress remained high throughout the 24 months of the study for mothers in the extreme distress group. Mothers of the sickest infants were more likely to be in the extreme distress group than mothers of infants who were less ill.

The use of latent profile analysis to examine patterns of maternal distress/stress precluded the examination of the main effects of individual risk factors in predicting maternal symptoms of postpartum depression (Holditch-Davis et al., 2009). Therefore, no conclusions regarding the strength of specific, individual risk factors can be drawn from this study. However, the results do suggest that having a preterm, VLBW infant is associated with high levels of perceived stress and an increased risk of developing symptoms of postpartum depression. In addition, exposure to other contextual factors often linked to high levels of maternal stress, such as being single, being low income, and having attained fewer years of education, were associated with an increase in mothers' risk for experiencing persistently high levels of distress symptoms. Taken together, the

Vigod et al. (2010) review and the Holditch-Davis et al. (2009) study support the conclusion that many mothers of infants born preterm, and VLBW or LBW are at risk for experiencing elevated and potentially persistent symptoms of postpartum depression (see also Allen et al, 2004; Spinelli, Poehlmann & Bolt, 2013).

After the preterm LBW/VLBW birth of their infants, mothers and fathers often experience a series of adverse events that occur during an infant's hospitalization and may continue after the infant is discharged from the NICU (Bhutta, Cleves, Casey, Cradock, & Anand, 2002; L.T. Singer et al., 2010). Infants who experience a neonatal illness due to a preterm birth or other medical emergency are at higher risk for experiencing developmental delays and intellectual disabilities (DD/ID) in infancy, and early childhood (Aylward, 2002; Bhutta et al., 2002). Child DD/ID has been linked to high parenting demands, which contribute to persistently high levels of maternal distress increasing mothers' risk for depression in this population of mothers. Further research regarding which factors, in addition to infant illness, predict mothers' risk for postpartum depression is warranted.

Infant and toddler developmental delay after the NICU. Very few studies have examined mothers' risk for developing postpartum depression due to their child's failing a developmental screen at developmental follow-up after requiring NICU care. However, there are studies that examine caregiver risk for depression in the general population of parents of children with ID/DD. In one of the few studies with a mixed population of caregivers, M. Feldman et al. (2007) examined linkages between child risk for DD/ID, and mothers' risk for depression in a sample of 178 primary caregivers (biological mothers or fathers, adoptive mothers, grandmothers, or aunts). The toddlers in the study

were eligible for early intervention services based on a diagnosis of global DD/ID or a condition associated with an increased risk for a diagnosis of DD/ID. The authors reported that 20% of caregivers in the full sample had symptoms of depression in the clinically significant range.

To further examine which factors most strongly correlated with caregiver risk for depression, participants were then categorized into groups based on the diagnostic or risk status of the index child(ren) (M. Feldman et al., 2007). Children in Group 1 exhibited global delays due to an undetermined etiology at the time of study participation. Group 2 consisted of children diagnosed with a condition known to be associated with an increased risk for experiencing DD/ID (i.e., trisomy 21, fetal alcohol syndrome [FAS]). Group 3 consisted of children considered to be at-risk for DD/ID due to being born preterm/LBW/VLBW, or a multiple (twins, triplets). Caregivers of children in the DD/ID unknown etiology group had the highest mean depression symptoms scores, followed by caregivers of the preterm/LBW/multiple group. Caregivers of the children with diagnosed conditions known to associate with risk for DD/ID such as trisomy 21 and FAS (group 2) exhibited the lowest mean depression symptoms scores.

The authors proposed that the lower mean depression-symptom scores among caregivers of the children in the known risk groups (trisomy 21, FAS and preterm, LBW/VLBW/multiple) indicate that over time, most caregivers learn to come to terms with the possible outcomes associated with their children's diagnoses, and to adjust their hopes and expectations regarding their children's futures (M. Feldman et al., 2007). This group of caregivers, on the whole, had been aware that their child was at risk for experiencing DD/ID from the time of, or shortly after their child's birth. In contrast,

parents of children expected to develop typically but exhibiting significant delays were more likely to exhibit higher symptoms of depression, particularly in the absence of a diagnosed condition or identifiable cause for their children's DD/ID. In this group of caregivers, there had been no expectation of their children experiencing a developmental delay, and the period of time between their child's diagnosis and study participation was the shortest. Thus, this group of parents was more likely to be distressed and likely still mourning the unanticipated change in their hopes and expectations for their child's future. Finally, M. Feldman et al. reported that caregiver use of escape–avoidance coping, caregiver reported social support and caregiver reported child behavior problems were all important factors linked to risk for experiencing symptoms of depression.

In a review of the literature examining well-being in families of children with DD/ID in countries with relative economic stability, the International Association for the Scientific Study of Intellectual and Developmental Disabilities (IASSIDD; Families Special Interest Working Group, 2013) reported that in general, mothers of DD/ID children experience higher levels of stress and lower levels of physical and mental well-being. However, the authors also noted that, in spite of the added work and responsibility associated with caring for a child with DD/ID, not all caregivers experience poor mental health outcomes (see also Gerstein, Crnic, Blacher & Baker., 2009; G. H. Singer, Ethridge, & Aldana, 2007). Additional factors associated with mental health outcomes among caregivers of DD/ID children included marital status, marital satisfaction, and family economic status (Families Special Interest Working Group, 2013; G. H. Singer et al., 2007). Also, caregivers' perceptions of child interactive competence, child problem behaviors, and access to coping resources predicted mental health outcomes among

caregivers of DD/ID children (Weiss & Chen, 2002). Overall, the literature suggests that parenting demands are higher for mothers of children with ID/DD; higher parenting demands, in turn, have been linked to mothers' increased risk for experiencing symptoms of depression (Families Special Interest Working Group, 2014; Olsson & Hwang, 2001). Additional research examining such factors is warranted.

Unhappy about pregnancy. Mothers' plans and intentions regarding pregnancy are often included when examining women's exposure to risk factors associated with developing symptoms of perinatal depression (McQuillan, Greil & Shreffler, 2011). However, pregnancy intention or planning as a predictor of risk for postpartum depression has yielded mixed results (Gaillard, Le Strat, Mandelbrot, Keita, & Dubertret, 2014; Leathers & Kelley, 2000). Given the substantial changes in relationships, lifestyle, and role identity that occur across the transition to parenthood (Edhborg et al., 2005), it has been hypothesized that women who did not plan to become pregnant might be less prepared for these significant changes and thus are at higher risk for developing symptoms of postpartum depression. Across the pregnancy intention and planning literature, there is growing evidence suggesting that using pregnancy planning in isolation may not capture the true psychological impact of the pregnancy on women's mental health outcomes.

In a meta-analysis examining predictors of postpartum depression, Beck (2001) reported a small effect size for an unplanned/unwanted pregnancy on maternal risk for experiencing symptoms of postpartum depression. In a study with 264 women followed prospectively from pregnancy into the postpartum period, Gaillard et al. (2014) reported that an unplanned pregnancy did not predict mothers' risk for developing postpartum

depression. Lachance-Grzela and Bouchard (2009) reported that marital status moderated women's risk for experiencing postpartum depression subsequent to an unplanned pregnancy. Married women whose pregnancies were planned experienced fewer symptoms of depression than married women whose pregnancies were not planned. Leathers and Kelly (2000) probed a different aspect of the relationship between pregnancy planning in couples and mothers' risk for experiencing depression. They found that partner agreement best predicted women's risk for developing symptoms of depression. When women and their spouse or partner reported the pregnancy as planned, women experienced fewer symptoms of depression. Similarly, when women and their spouse or partner reported the pregnancy as unplanned, women experienced fewer symptoms of depression. However, when women and their spouses/partners did not agree on whether the pregnancy was planned, or unplanned women were more likely to have higher depressive symptoms scores. Finally, in their synthesis of the postpartum depression literature, Robertson, Grace, Wallington, and Stewart (2004) reported mixed results on the association between an unplanned pregnancy and a woman's risk for developing symptoms of postpartum depression.

McQuillan et al. (2011) proposed that new research in the emerging field of fertility intention offers evidence that the current dichotomous categorization for pregnancy planning as *unplanned* or *planned* should be expanded to include a third category indicating "okay either way." According to the authors, approximately 23% of women of childbearing age are "okay either way," with getting pregnant and becoming a mother or not having any children. Therefore, asking whether a pregnancy was planned fails to capture whether becoming pregnant is associated with significantly higher levels

of maternal psychological distress or disturbance in approximately one quarter of women of childbearing age.

Mothers who are unhappy about an unintended pregnancy that culminates in the birth of an infant who is severely ill and may be at risk for life-long health challenges, developmental delays or intellectual disability, may experience a sense of helplessness or diminished mastery and control at this sequence of events. In an extensive body of research, Thoits (1995, 2006, 2010, 2011) and Keeton et al. (2008) linked an individual's sense of mastery or control during exposure to challenging life events, such as the transition to parenthood, to an increased risk for or increased likelihood of resilience to negative outcomes. In a large sample (N = 1,044) of pregnant urban black women, Blake, Kiely, Gard, El-Mohandes, and El-Khorazaty (2007) examined pregnancy intentions (planning), pregnancy happiness, risk for engaging in unsafe behaviors (e.g., use of alcohol or illicit substances, and late initiation of prenatal care), and depression. The authors reported that mothers' unhappiness about a pregnancy, regardless of whether the pregnancy was intended, was the better predictor of mothers' depressive symptoms.

Pregnancy and parenting are not static experiences. Parenting specifically is a dynamic, evolving, lifelong role. Mothers' attitudes or perceptions regarding the demands associated with parenting are linked to an increased risk for experiencing symptoms of depression (Edhborg et al., 2005; Keeton et al., 2008). Further research regarding whether women's pregnancy unhappiness will better predict risk for postpartum depression is warranted. In addition, the perceived stress and the perception of access to help and support to manage the stress associated with pregnancy and the transition to

motherhood are likely to play a role in women's risk for or resilience to developing symptoms of postpartum depression.

Perceived stress. Stress is a term used by engineers to describe mechanical forces and pressures applied to objects. In the early days of research on the links between exposure to adversity and health outcomes, Hans Selye (as cited in McEwen, 2000) borrowed the term to conceptualize the internal and external pressures (e.g., physiological and psychological) experienced by living organisms (McEwen, 2000; Thoits, 2010). Scientists whose research focuses on examining the linkages between the physiological and psychological pressures of exposure to stress and health outcomes recommend including new, more precise terminology when writing about exposure to stress and health (Ganzel, Morris & Wethington, 2010; McEwen & Wingfield, 2010). Researchers recommend replacing the term *stress* with the terms allostasis, allostatic load, allostatic accommodation, or allostatic overload. Scientists suggest that these terms are clearer and more precise in capturing the concepts of physiological and psychological "wear and tear" , adaptation and dysregulation associated with the daily hassles of life, as well as exposure to stress and adversity (Ganzel et al., 2010; McEwen, 2008a, 2012b).

The term *allostasis* refers to the *normal* dynamic, yet regulated state of the stress-response-system. In humans, the stress-response-system comprises organ systems, as well as hormones, amino acids, and neurotransmitters that function together to maintain allostasis (Ganzel et al., 2010; McEwen & Wingfield, 2010). Alertness and arousal, learning and memory, and immune functioning are all vital aspects of everyday life and are part of and regulated by the mammalian stress-response-system (Ganzel et al., 2010; National Scientific Council on the Developing Child, 2014). Allostasis is maintained by a

feedback loop that allows the stress-response-system to respond flexibly and adaptively to internal or external environmental stimuli (McEwen et al., 2015; McEwen & Wingfield, 2010). Allostatic load describes the cumulative "wear and tear" or burden associated with lifetime exposure to stress, adversity, and hassles. *Allostatic accommodation* refers to the effort of maintaining physiological and psychological regulation through accommodating or adapting to one's real-time, current level of daily hassles or stress, as well as exposure to current discrete adverse events. The amygdala and basal ganglia serve as primary components of allostatic accommodation (Ganzel et al., 2010). These parts of the brain are key structures of the core emotional regulation networks in the brain, central, and peripheral nervous systems. *Allostatic overload* occurs when a system or individual is exposed to internal and external pressures that exceed the capacity for allostatic accommodation, or adaptive capacity, of that system or individual (Ganzel et al., 2010; McEwen & Gianaros, 2010, 2011).

The stress-response-system not only ensures survival through the regulation of day-to-day functioning but also through orchestration of the fight-or-flight response. The fight-or-flight response activates when an individual is faced with a situation that is perceived as highly threatening to his or her survival or the survival of a loved one. Activation of the fight-or-flight response has evolved to allow an individual to respond to a perceived threat, followed by deactivation of the fight-or-flight response and a return of body systems to *normal* functioning or allostasis after the threat has passed or been resolved (Ganzel et al., 2010; Peters et al., 2017).

Human beings have evolved with the capacity to adapt and to maintain functional regulation within an "elastic-limit" (Cannon, 1935) when exposed to threat, stress, or

adversity. A well-regulated stress-response system efficiently terminates the fight-or-flight response after resolution of a perceived threat and returns to allostasis and well-being (Karatsoreos & McEwen, 2011; McEwen & Gianaros, 2011). However, the burden of ongoing allostatic accommodation resulting from exposure to multiple adverse experiences or ongoing, chronic stress is associated with a high allostatic load. Ganzel et al. (2010) suggest that a high allostatic load is associated with low physiological resilience to stress and adversity.

Prolonged activation of the stress-response-system that results from exposure to chronic or repetitive stressors, which accumulate over the course of an individual's life time, can result in allostatic overload and dysregulation of the stress-response-system. Dysregulation of the stress response system results in a breakdown in an individual's capacity for adaptation and allostatic accommodation and has been linked to an increased risk for mental health disorders such as depression, anxiety, and PTSD (Ganzel et al., 2010; McEwen et al., 2015). In addition, research suggests that many regions in the brain are particularly sensitive to exposure to stress or adversity during sensitive or critical periods of development (Anacker et al., 2014; S. Kim & Strathearn, 2016). Thus, exposure to high levels of stress or adversity during critical or sensitive developmental periods may exert a particularly detrimental impact on an individual's lifecourse health outcomes (Halfon et al., 2014; McEwen & Morrison, 2013).

In the extant literature, an emergent birth, a NICU hospitalization, and long-term developmental monitoring for a child have been associated with high parenting demands (Busse, Stromgren, Thorngate & Thomas, 2013; L.T. Singer et al., 2010) and high levels of maternal perceived stress (Holditch-Davis et al., 2009; Spinelli et al.2013). In a survey

of 14,500 mothers, Austin and Priest (2005) reported that women who experienced a higher number of acute adverse events or higher levels of chronic adversity during pregnancy and the postpartum period were significantly more likely to report symptoms of postpartum depression. Also, Busse et al. (2013), in a pilot study (N = 30), examined some of the additional demands and stressors associated with the hospitalization of one's newborn and compared scores of parents of medically stable infants receiving care in the NICU with population norm scores on the Patient Reported Outcomes Measurement Information System (PROMIS). Parents of infants in the NICU scored one standard deviation above the population norm on depression (27%) and anxiety (56%). Forty percent scored one standard deviation above the norm on fatigue, and 37% scored one standard deviation above the norm on sleep disturbance.

There is a growing body of evidence indicating that the perinatal period (pregnancy through lactation) is a sensitive developmental period for women (P. Kim et al., 2016; S. Kim & Strathearn, 2016). It is also well established that infancy and early childhood are periods of critical or sensitive development (Anacker et al., 2014; Szyf, 2011). Thus, the acute and chronic stress associated with an emergent birth, a NICU hospitalization and referral for extended developmental monitoring are likely to significantly increase mothers' risk for experiencing allostatic overload and symptoms of postpartum depression. (Center of the Developing Child, 2009, 2016; Szyf, 2009).

Exposure to multiple adverse experiences in the perinatal period, a time already associated with significant upheaval and change, is likely to be associated with a high allostatic load and may increase mothers' risk for experiencing symptoms of postpartum depression. However, Ganzel et al. (2010) and others (e.g., Davidson &McEwen, 2012:

Taylor & Stanton, 2007: Thoits, 1995, 2010, 2011) suggest that exposure to adversity, stress and high allostatic load explain only part of an individual's vulnerability to negative outcomes. To better understand the physiological and psychological impact of exposure to stress and adversity, it is important to also understand the role of adaptation and coping.

Avoidance coping. *Coping* describes the physiological, cognitive, and behavioral mechanisms or strategies for allostatic accommodation employed by individuals to maintain or return to physiological and psychological stability or allostasis during or after exposure to adverse or stressful events (Folkman, Lazarus, Dunkel-Schetter, DeLongis & Gruen, 1986). Coping strategies can be broadly conceptualized as either approach or avoidant in orientation. An approach orientation encompasses behaviors or activities aimed toward solving or managing an event or problem or the associated emotions. An avoidant approach encompasses behaviors or activities associated with distancing the individual from the event or problem or from the associated emotions. Avoidance coping includes the use of disengagement through substance use, denial, or distraction (Brissette, Scheier, & Carver, 2002; Taylor & Stanton, 2007).

Reichman, Miller, Gordon and Hendricks-Munoz (2000) examined stress appraisal, coping and psychological distress in a small sample (N = 35) of mothers of preterm VLBW infants. The authors reported that mothers who reported perceiving their situation as more uncontrollable and who used higher levels of escape-avoidant coping experienced more distress as measured by the Brief Symptoms Index (BSI, Derogatis, 1983). Eisengart, Singer, Fulton and Bayley (2003) also examined the influence of coping, social support, demographic characteristics, and psychological distress in a

sample of 199 mothers of preterm infants at high-risk, VLBW (n = 77) and low-risk, LBW (n = 43) with a comparison group of mothers of normal birth-weight infants. Eisengart et al. reported that greater reliance on avoidance coping was associated with higher levels of maternal psychological distress across infant risk status groups. The authors also reported that mothers who were lower socioeconomic status were more likely to use avoidant coping than mothers who were more socioeconomically advantaged.

Melnyk et al. (2006) conducted a randomized clinical trial with an intervention developed to foster approach-oriented coping by promoting positive interactions between parents and infants hospitalized in the NICU. They hypothesized that fostering parents' beliefs that they can engage in caring for their infant and promote their infants' development would promote better mental health in a group of mothers (and fathers) at high risk for experiencing anxiety or depression. Melnyk et al. also hypothesized that improving parents' mental health outcomes could result in higher quality infant-parent interactions and shorter NICU hospitalizations for infants. Mothers and fathers in the intervention group (Creating Opportunities for Parent Empowerment; COPE) received written and audio informational materials, person-to-person instructions, and hands-on practice to reinforce learning of the topics included in the COPE program. During their infants' hospitalization, mothers in the COPE intervention had lower overall perceived stress and NICU-specific stress scores (e.g., infant appearance, noise, and staff behavior) than mothers in the control group. When their infants were 2 months corrected age, COPE mothers also had lower depression and anxiety symptoms scores when compared

with mothers in the control (standard-of-care) group. In addition, observers blind to group status rated COPE mothers as having more positive infant-mother interactions.

Coping strategies that directly alleviate a stressful situation and provide a sense of control or mastery are linked to the best mental and physical health outcomes. Mothers of infants receiving care in a NICU, whose life or long-term health may be in serious jeopardy, are in a situation that does not lend itself to manipulation or control. Taylor and Stanton (2007) and Thoits (1995) suggest that when individuals are exposed to stressors that exceed their intrinsic as well as extrinsic coping resources, individuals are at risk for *defaulting* to avoidance coping.

In research related to the neurobiological underpinnings of the human stress response, Kozlowsaka et al. (2015) and Roelofs (2017) suggest that when confronted with highly threatening situations, the initial reaction on activation of the stress-response system is not to "fight-or-flee," but to "freeze." Kozlowska et al. and Roelofs also suggest that an initial freeze response is functionally adaptive in that the brain is processing all available information and determining whether fighting or fleeing will have the best possible chance of survival. Maintaining or returning to behavioral and emotional regulation through deployment of coping strategies is one of the primary roles of the core emotional regulation system in the brain. The strategies or resources individuals use to cope with adverse events are thought to be associated with individuals' subsequent adaptation, adjustment, and long-term health outcomes (Karatsoreos & McEwen, 2011, 2013; McEwen, Gray & Nasca, 2015). However, some individuals appear to be prone to becoming stuck in the freeze response pattern and are unable to move to the next phase of the threat response - adaptive coping. It is not well understood

whether mothers of infants who require NICU hospitalization and extended developmental monitoring are more prone to using avoidance coping strategies. Similarly, little is known about avoidance coping tendencies in mothers with limited access to coping resources, such as social support, and with lower relationship satisfaction (Eisengart et al., 2003; White-Traut et al., 2014).

Resilience Promoting Factors and Postpartum Depression

Everyone is exposed to the daily hassles of life and every person experiences developmental shifts (Sameroff, 2010), major life events (i.e., entering a committed relationship) and adversity. Ganzel et al. (2010) proposed that the brain and the core emotional regulation system are the mediators between individual's experiences, their perceptions about these experiences, and their ability to maintain allostasis. Ganzel at al. further suggest that an individual's perceptions and behavioral responses to life experiences are positively or negatively influenced by the cumulative "wear and tear" of previous experiences across the lifecourse.

Resilience is the ability of an individual to maintain physiological and psychological regulation in response to the instability and change associated with everyday life events as well as exposure to stress and adversity or, if dysregulation occurs, the ability to continue to engage in adaptive strategies until able to return to a regulated state (Center on the Developing Child, 2015; Russo, Murrough, Han, Charney & Nestler, 2012). Coping resources and coping strategies are the mediators of adjustment, adaptation, and resilience in response to the hassles of daily life as well as exposure to adversity (Taylor & Stanton, 2007; Thoits, 1995, 2011).

Social support. The term *social support* incorporates social ties and practical resources (e.g., help with transportation, childcare, or finances; Thoits, 2011). Social ties refer to an individual's network of family, friends, colleagues, and fellow members of specific groups (e.g. faith, or civic organizations; Thoits, 2011). Functional or practical social support refers to the resources and functions provided by the people or institutions in an individual's network of social ties, such as a sense of being valued, and loved, sympathy, encouragement, information, active listening and advice (Thoits, 2011).

Davidson and McEwen (2012) suggest that the brains of humans and other primates are continually influenced by and exceptionally sensitive to social experiences. They also suggest that social interactions exert a strong influence on brain plasticity throughout the lifecourse. Consistent with the work of Davidson and McEwen, Halfon et al. (2014), in the principles of Lifecourse Health Development framework, emphasize the concept of *linked lives*. The linked lives concept illustrates the level at which humans are embedded within complex social systems, and how those systems interact with and influence development and well-being across the lifecourse.

Scientists from multiple disciplines working together at the Center for the Developing Child (2015, 2016), and the National Scientific Council for the Developing Child (2012) continue to examine the influence of social embedding and social interactions on health and well-being across the lifecourse. They have proposed the use of a "conceptually guided taxonomy" (Shonkoff, 2010, p. 359) for conceptualizing the intersection of exposure to stress and adversity, appraisal and perception, social support, and health outcomes for children and adults (National Scientific Council on the Developing Child, 2014; Shonkoff, 2010, 2012). They propose that perceiving stress as

positive, tolerable, or toxic is strongly influenced by an individual's access to social support (National Scientific Council on the Developing Child, 2014; Shonkoff, 2010, 2012). Positive stress aligns with experiences that are common to everyday life and generally perceived as stimulating or challenging yet manageable (National Scientific Council on the Developing Child, 2014; Sameroff & Rosenblum, 2006). Tolerable stress aligns with life events that are more negative, difficult, or taxing such as the illness or possible loss of a loved one or losing a job. The illness of a loved one or loss of one's livelihood are associated with a significant increase in allostatic load and the subjective perception of being burdened or stressed. However, researchers suggest that when individuals have access to adequate coping resources, particularly in the form of nurturing relationships and other forms of help and support from their social networks, they are more likely to subjectively perceive such events as uncomfortable but tolerable (National Scientific Council on the Developing Child, 2014; Shonkoff, 2010, 2012). In the absence of adequate support and coping resources, such events are more likely to be perceived as overwhelming or unmanageable. Stress that is perceived as overwhelming and unmanageable is referred to as *toxic*. Toxic stress is associated with increased activation of the stress-response-system and cascading physiological changes in the brain and body that are linked to increased risk for depression, diabetes, and cardiovascular disease (National Scientific Council on the Developing Child, 2014; Shonkoff, 2010, 2012).

Studies examining the influence of social support on mothers' likelihood of experiencing postpartum depression lend support to the practicality of this taxonomy for conceptualizing the linkages between exposure to stress, access to social support and risk

for disorders such as postpartum depression. Dennis and Letourneau (2007) surveyed 498 mothers regarding their preferences for receiving practical and emotional support from specific sources (i.e., their partners, their own mothers, and other women with children). Mothers who reported receiving nurturing from their partner and had emotional connections with other mothers exhibited the lowest postpartum depression symptom scores. Dennis and Letourneau (2007) also noted that when there was a good fit between the type of support (practical or emotional) and the source (their partner, their mother, other women) of social support mothers desired and the supports they received, social support was associated with fewer symptoms of postpartum depression. Dennis and Letourneau hypothesized that when the social support mothers want or need do not match the support they receive, social support is less likely to promote resilience to developing symptoms of postpartum depression.

Poehlmann et al. (2009) also examined social support received from family members (partner, parents, in-laws) and mothers' risk for experiencing symptoms of depression in a prospective study with 181 mothers of infants born preterm, LBW. The authors reported that, although mothers' level of depression diminished somewhat after their infants were discharged from the NICU, mothers' depressive symptoms fluctuated with the level of social support received. Over the 24 months of the study, mothers' symptoms of depression increased as their social support decreased.

There is growing evidence that to promote resilience, social supports must meet individuals' perceived needs. Hoekstra-Weebers, Jaspers, Kamps, and Klip (2001) examined the link between social support and parents' mental health in a study of parents of children diagnosed with cancer. Parents reported that during the initial phase of crisis

associated with their child's diagnosis, offers of support from family and friends were relatively high, followed by a substantial decline in reported support over the following 12-month course of the study. Hoekstra-Weebers et al. also reported that mothers in the study who were dissatisfied with the type and level of social support they received were more likely to develop symptoms of depression. Mothers explained that the offers of emotional support, such as visits or phone calls from well-meaning family and friends, interfered with their ability to accomplish practical household tasks, and led to an increase rather than a decrease in their level of distress.

Exposure to high levels of perceived stress can derail mental and physical health (Center on the Developing Child, 2015, 2016; McEwen, 2000, 2008b). However, the strength and breadth of one's social ties and the presence of nurturing, supportive relationships provide a counterpoint to adverse exposures and exert a significant influence on mental and physical health (Cobb, 1976; S.; Ozbay et al., 2007). The literature also suggests that social support consistently correlates with better mental health outcomes in multiple contexts, including for women transitioning to parenthood or adding an additional child to the family (Beck, 2001; Dennis & Letourneau, 2007). Thoits (1995, 2010, 2011) suggested that continued examination of the influence of social support on mental and physical health outcomes is critical to further improve our ability to promote better health outcomes for individuals exposed to stress and adversity.

Relationship satisfaction. The transition to parenthood ushers in many additional responsibilities and stressors for each parent, as well as substantial shifts in the couple dynamic (Belsky, Lang & Rovine, 1985; Dew & Wilcox, 2011). The presence of a significant other during this period of change and instability implies access to financial,

practical, and emotional supports, factors that have been linked to better mental health outcomes for mothers (Dennis & Letourneau, 2007; Gerstein et al., 2009). However, dissatisfaction with the significant other relationship, regardless of instrumental or financial support, has been associated with an increased risk for postpartum depression, particularly during the transition to motherhood (Dennis & Letourneau, 2007; Dew & Wilcox, 2011).

The research on changes in marital satisfaction across the transition to parenthood is mixed. Results reported from some studies indicate a decline in marital satisfaction during this transition (Bradbury, Fincham & Beach, 2000; Schulz, Cowan & Cowan, 2006). However, scholars in the field of marital satisfaction report that a decrease in marital satisfaction over time is the natural course of marriage (Karney & Bradbury, 1995), suggesting that decreased marital satisfaction in the transition to parenthood could be nothing more than an artifact of this phenomenon. In a meta-analysis of parenthood and marital satisfaction including 90 studies with a total of 31,331 participants, Twenge, Campbell, and Foster (2003) examined marital satisfaction among couples with and without children. The authors reported a small but significant effect (d = .19) of parenting on marital satisfaction, with 45% of married/cohabiting couples with children reporting lower levels of marital/relationship satisfaction. Mothers with children under the age of 2 were most likely to experience the negative effects of parenting on marital satisfaction. In addition, relationship satisfaction in both partners decreased as the number of children in the home increased (Twenge et al.).

In a separate meta-analysis of 14 studies with 1,554 participants, Beck (2001) reported a moderate, negative association (r = -.36) between relationship satisfaction and

risk for developing postpartum depression. Bilszta et al. (2008) compared levels of postpartum depression symptoms in single/unpartnered and married/partnered women in a sample of 1,578 Australian women. Mothers in relationships who reported satisfaction with the amount or quality of partner support they received were more likely to have lower postpartum-depression-symptom scores than mothers who were less satisfied with their relationships and mothers who were single (Bilszta et al., 2008). Nurturance or warmth from one's partner was also associated with fewer symptoms of depression in mothers in studies by Dennis and Letourneau (2007) and Weiss and Chen (2002).

Although single motherhood is linked to a higher risk for developing symptoms of postpartum depression in some studies (Mayberry et al., 2007; Segre et al., 2007), growing evidence indicates that in addition to the instrumental and financial support that are assumed to accompany being married or in a committed relationship, the quality of the significant-other relationship is likely to be important in predicting risk for postpartum depression. Also, with greater numbers of unmarried, cohabiting heterosexual and same-sex couples rearing children, using marital status as the only marker of relationship status or risk fails to capture the full details of mothers' support systems. Therefore, further research examining the influence of satisfaction with the significant-other relationship, rather than marital status, on mothers' risk for developing postpartum depression is warranted.

Awareness and Barriers to the Diagnosis and Treatment for Postpartum Depression

The corpus of research examining the barriers associated with mothers' receiving the diagnosis of or treatment for postpartum depression is small (Abrams, Dornig, & Curran, 2009; Yawn et al., 2012). Potential barriers that impede mothers' likelihood of

receiving a diagnosis or treatment for symptoms of postpartum depression that are reported in the literature include (a) extensive variability in the amount and accuracy of information about postpartum depression that is accessible to mothers from diverse backgrounds; (b) mothers' lack of information regarding where to access mental health services for postpartum depression; (c) fear or stigma associated with mental health diagnoses and treatment; and (d) ease of access to services among mothers with infants and young children (Abrams, et al., 2009; Yawn et al., 2012). At the state and national level, factors thought to be associated with the current low rates of treatment and diagnosis include: parity for mental health services, the lack of accessible mental health care and information for all mothers regardless of education, ethnicity, and income, and the lack of coordination and collaboration among healthcare disciplines (Kozhimannil et al., 2011; Yawn et al., 2012).

Abrams et al. (2009) examined community awareness of postpartum depression in a qualitative study that included: (a) mothers with postpartum depression; (b) community experts (i.e., people from the communities where mothers were recruited with backgrounds and experiences that were similar to the mothers of interest); and (c) service providers (nurses, midwives, and social workers) from the community. Mothers disclosed that they did not have adequate information regarding the existence of services available to them, nor was the information they did receive helpful or accurate. According to Abrams et al., family and friends were often the source of mistaken information regarding symptoms of postpartum depression. However, even when mothers talked with professionals about their symptoms, they were often advised to "wait and see" if their symptoms would improve, rather than referred for diagnosis or treatment of their

symptoms. On the rare occasions that physicians did recommend any treatment, a prescription for antidepressants was often the only treatment option mothers were offered. Finally, Abrams et al. reported that service providers in the community indicated they were not confident in their ability to distinguish symptoms of postpartum depression from anxiety or stress and did not know what they could or should do to address mothers' needs for mental health services.

The small amount of available literature on public awareness and prevention of postpartum depression suggests that broader educational campaigns focused on the public, as well as educational campaigns targeted to pregnant women and mothers, are important in improving the rates of diagnosis and treatment (Buist et al., 2005; Sealy, Fraser, Simpson, Evans, & Hartford, 2009). In one example of a targeted educational campaign, Heh and Fu (2003) used an informational pamphlet as an intervention. Mothers discharged from the hospital after childbirth were assigned to either the information intervention or the control group. Intervention-group mothers received a pamphlet that described the differences between symptoms of postpartum blues, postpartum depression, and postpartum psychosis. The pamphlet also contained stress- and time-management tips for new mothers and guidance for when they should call or contact a nurse or physician. The control group received standard care. At 3 months postpartum, fewer women in the intervention group exhibited elevated depressive symptom scores; 91% of the intervention group mothers reported that the pamphlet was very helpful. They indicated that the information promoted their understanding regarding which emotional, mental, and physical experiences were typical of the postpartum period. Mothers also reported they used the guidelines and tips to help them construct a decision

tree. Mothers employed cognitive strategies in deciding when their symptoms merited asking for some extra support from their social networks or when they should seek professional help, which depended on the persistence and intensity of the symptoms they experienced.

Nevertheless, information and educational campaigns also present a specific set of challenges. Garg, Morton and Heneghan (2005) propose that women's overly optimistic and idealized expectations regarding pregnancy and motherhood result in pregnant women being reluctant to read or give adequate attention to information provided to them during the prenatal period. They found that during pregnancy, women were more dismissive of information regarding challenges they did not expect to encounter. Another significant challenge associated with parent education-focused prevention and intervention programs is that exposure to such programs is often lowest among mothers who need them most, that is, mothers who experience cumulative life stressors. Mothers who are overwhelmed by the day-to-day burdens associated with caring for one or more children and with few resources, such as access to transportation and childcare, are often the least able or likely to engage with parent education based intervention programs (Elliott et al., 2000; Matthey, Kavanagh, Howie, Barnett, & Charles, 2004). Much of the research has been qualitative with small sample sizes, and few studies have examined support seeking attitudes and behaviors, specifically in mothers of infants who required NICU hospitalization and extended developmental monitoring. Little is known about mothers' perspectives regarding barriers to seeking help or support through specific questions such as where, when, and from whom they are most comfortable receiving support for symptoms of postpartum depression is warranted.

Taken together, the literature indicates a number of barriers that contribute to the extremely poor rates of diagnosis and treatment of postpartum depression. A lack of accurate information available to mothers and the public about symptoms of postpartum depression, the stigma attached to having a mental health disorder, inadequate mental health services for mothers with young children, and a lack of interdisciplinary collaboration among professionals who provide health care to young families contribute to this issue (Dennis & Chung-Lee, 2006; Yawn et al., 2012). Few studies have surveyed samples of mothers who may be particularly vulnerable to developing symptoms of postpartum depression, such as mothers of infants who required NICU hospitalization and extended developmental monitoring. It is important to determine what information they have about the symptoms of or resources for people experiencing symptoms of postpartum depression, or their preferences for and concerns about accessing support for symptoms of postpartum depression.

A Theoretical Framework for Risk for or Resilience to Postpartum Depression

A Life Course Health Development (LCHD) framework (Halfon & Hochstein, 2002; Halfon, Larson, Lu, Tullis & Russ, 2014) was used as a guide to develop the hypotheses for this study. The LCHD framework pulls from many fields, including biological systems theory, the social and behavioral sciences, neurosciences, and genomics (Halfon et al., 2014). The concept of *linked lives* is emphasized in LCHD models, to illustrate that individuals are complex biological systems embedded within complex social systems such as families, neighborhoods, communities and societies. These systems interact in reciprocal, dynamic, and non-linear ways, shaping health-

development trajectories at the individual, family, community and societal levels (Hertzman & Boyce, 2010).

The role of experiences and environments in shaping health-development trajectories throughout the lifecourse is reflected in the principles of the LCHD framework which include: (a) health, like language and abstract reasoning, is a "developmental capacity"; (b) health-development and health trajectories are dynamic and continue to develop or unfold throughout an individual's life course; (c) exposure to environments and events within the systems in which individuals' are embedded such as family, culture, neighborhood, community, society and historical era influence current and future health outcomes; (d) health-development trajectories are marked by periods of sensitivity to the timing and sequence of exposures and experiences; (e) positive health-development trajectories can be derailed or disrupted by exposures to adverse or stressful experiences and events. However, humans have evolved with the capacity to deploy adaptive coping strategies that are associated with shifting or leveraging health trajectories toward positive outcomes even in the most challenging and constraining of circumstances; (f) health outcomes are also influenced by the timing of the intersections between the individual's personal developmental trajectory, "local" social contexts, and historical, national and cultural events and experiences.

As suggested by the principles of the LCHD framework (Halfon et al., 2014) there are stages in development during which humans have evolved to be particularly sensitive to the influence of the timing and sequence of exposures or experiences. Exposures to stress and adversity exert a powerful influence on health development, particularly when such exposures coincide with sensitive periods of development

(McEwen & Gianaros, 2010; National Scientific Council on the Developing Child, 2010, 2012). The principles of the LCHD framework are particularly salient as a framework for understanding the impact of postpartum /maternal depression on individual, family and societal health outcomes. Recent research suggests that the perinatal period (pregnancy through lactation) and the transition to parenthood is such a period of heightened sensitivity to the timing and sequence of experiences for mothers and fathers (P. Kim et al., 2010; P. Kim, Strathearn & Swain, 2016). In addition, there is strong evidence that for infants and young children, the first thousand days post-conception is a period of development that is particularly sensitive to the timing and sequence of experiences (Barker, 2012).

Research from studies using advanced imaging (P. Kim et al., 2016), as well neurobiology (S. Kim & Strathearn, 2016), suggest that human mothers are biologically primed to undergo protective, adaptive neurobiological changes that encompass alterations in levels of hormones, as well as brain architecture in preparation for childbirth and caregiving for children. Adaptations, such as increased levels of the hormone oxytocin that begin in pregnancy, have been linked to protective effects, such as a decrease in maternal stress reactivity during pregnancy and the early postpartum and regulation of heart rate and blood pressure. In addition, oxytocin is a primary driver of maternal bonding and caregiving behaviors directed toward infants and children (S. Kim & Strathearn, 2016).

In their review of the recent literature examining the linkages between oxytocin and maternal brain plasticity in the perinatal period, S. Kim and Strathearn (2016) suggest that higher levels of oxytocin are protective against maternal exposure to stress

and therefore maternal distress in the perinatal period. However, exposure to chronic stress has been linked to inhibition of the body's ability to increase levels of oxytocin, as well as the number of oxytocin receptors in multiple brain regions, such as the amygdala and medial preoptic area (S. Kim & Strathearn, 2016). In addition, exposure to early life stress, particularly maternal neglect and insecure attachment, has also been linked to decreased levels of circulating oxytocin and fewer oxytocin receptors in mothers with insecure attachment histories. This reduction in levels of circulating oxytocin and oxytocin receptors increases mothers' risk for stress-response-system dysregulation and for disordered or insecure attachment with their infants (P. Kim, Strathearn & Swain, 2016; S. Kim & Strathearn, 2016).

Exposure to adversity or stress resulting from a preterm birth or other neonatal emergency during this overlapping period of heightened sensitivity has the potential to disrupt the well-being of mothers and infants. When one or more individuals in the family system experiences distress during this vulnerable period (Goodman, 2004; Letourneau et al., 2012) the dyadic relationships between mothers-infants, mothers-fathers, and fathers-infants and thus the entire family system is at increased risk for negative outcomes, and for perpetuating an intergenerational cycle of risk (Gollan et al, 2017; Halfon et al., 2014). Some researchers suggest that infants who are born preterm or require NICU hospitalization may be a "double hazard" population, at risk for substantially negative outcomes (Escalona, 1982).

However, as the principles of the LCHD framework suggest, humans have evolved with the capacity to be flexible, to adapt or to cope, when exposed to stress and adversity. Flexibility and adaptability are also important drivers of an individual's ability

to maintain or return to a state of stability or allostasis – that is, to exhibit resilience during and after periods of exposure to high stress or adversity (Ganzel et al., 2010; Karatsoreos & McEwen, 2011, 2013). There is strong evidence from the literature that exposure to stress and adversity, particularly during sensitive periods of development, is associated with an increased risk for experiencing negative health outcomes such as depression. However, the coping strategies that individuals deploy and their access to coping resources, such as social support, particularly in the form of warm, nurturing relationships, also play an important role in individuals' health development (Center on the Developing Child, 2015; Thoits, 1995, 2006, 2010, 2011).

The Present Study

Summary and hypotheses. Research has established that postpartum depression is linked to substantially negative outcomes for mothers, their children, and their life partners (Goodman, 2008; Letourneau et al., 2012). When mothers experience symptoms of postpartum depression, their quality of life is substantially diminished. In addition, symptoms of depression interfere with mothers' ability to engage their infants and young children in critical developmental experiences (Center on the Developing Child, 2009, 2012; Tronick & Reck, 2009). Finally, spouses or life partners of women with postpartum depression often experience significant distress and are at risk for developing postpartum depression themselves (Goodman, 2008), diminishing their quality of life (Setse et al., 2009) and further compromising the quality of care provided for infants and young children (Boath, Bradley & Henshaw, 2005; Paulson et al., 2006). Mothers who experience the NICU hospitalization of their infant may be at substantial risk for postpartum depression, and infants who are born preterm or otherwise require NICU

hospitalization may be at substantial risk for developmental delays (Aylward, 2002; Bener, 2013). Taken together, the negative impact of postpartum depression on the mental and physical well-being of mothers, their life partners, and their children constitutes a substantial public health concern (Bener, 2013; Wachs et al., 2009).

The substantial personal and public health consequences associated with postpartum depression, in conjunction with the low rates of detection and treatment, underline the importance of further research to: (1) identify factors that robustly predict maternal risk for or resilience to developing symptoms of postpartum depression, which can be used to create a measure of risk/resilience for postpartum depression which performs accurately and consistently across populations of mothers, (2) understand mothers' support seeking attitudes and behaviors and mothers' perspective regarding the possible obstacles or barriers that may play a role in preventing mothers from receiving a diagnosis or treatment for symptoms of postpartum depression (Dennis & Chung-Lee, 2006; Goodman & Tyler-Viola, 2010).

Using the principles of the LCHD model (Halfon et al., 2014) as a guiding framework in developing hypotheses to address Aim 1, the present study examined the associations between infant illness, child developmental delay, unhappiness about pregnancy, perceived stress, avoidance coping, relationship satisfaction and social support, and mothers' level of postpartum depression symptoms (S. Cohen & Janicki-Deverts, 2009; S. Cohen & Wills, 1985; Fox, Levitt, & Nelson, 2010; Hertzman, 2012; Luthar, Cicchetti, & Becker, 2000; McEwen, 2008a, 2012; McEwen, Eiland, Hunter, & Miller, 2012; Sameroff & Rosenblum, 2006; Shonkoff, 2010, 2012; Shonkoff, Boyce & McEwen, 2009; Thoits, 1995, 2010, 2011).

The first aim of the present study was to identify robust predictors of risk for or resilience to developing symptoms of postpartum depression in mothers of infants who required NICU hospitalization and subsequent extended developmental monitoring. To address this aim, a number of factors hypothesized to be associated with either increased risk for or resilience to experiencing postpartum depression were examined. In addition, although avoidance coping was not the primary outcome of interest in this study, an exploratory analysis was included to examine whether an interactive effect of social support and stress in predicting mothers' use of avoidance coping was observed. The second aim was to examine whether mothers indicate that they experience obstacles or barriers that inhibit or prohibit their seeking services or support for symptoms of postpartum depression. To address this aim, mothers were asked to answer questions regarding their thoughts on (a) the potential impact of symptoms of postpartum depression on infants and young children; (b) their knowledge of the availability of support services; (c) their concerns about seeking support; and (d) the who, what, and where of mothers' preferences for receiving services for symptoms of postpartum depression.

Aim One: Examining risk and resilience factors.

For hypothesis testing, a separate hierarchical multiple regression (HMR) analysis was conducted for each risk/resilience factor to examine the independent contribution of each construct (above and beyond the effects of covariates) with maximum power to detect effects. However, it is also useful to examine whether the factors found to be significantly associated with mothers' symptoms of postpartum depression remain

significant when tested together. Such an inclusive model sheds light on the potential relative importance of these risk/resilience factors when considered in combination.

Predicting symptoms of postpartum depression from risk factors.

H1: Infant illness (general). Higher infant illness scores on the NICU health scale, a measure of the severity of infant illness, will predict higher levels of maternal postpartum depression symptoms.

H2: Developmental delay. Infants' experiencing developmental delays as documented by the BBDS (Hussey-Gardner, 2006), will predict higher levels of maternal postpartum depression symptoms.

H3: Pregnancy unhappiness. Higher maternal pregnancy unhappiness scores will predict higher maternal postpartum depression symptoms.

H4: Perceived stress. Higher maternal perceived stress scores will predict higher maternal postpartum depression symptoms.

H5: Avoidance coping. Higher maternal use of avoidance-coping strategies will predict higher maternal postpartum depression symptoms.

Predicting postpartum depression symptoms from resilience factors.

H6: Social support. Higher reported social support will predict lower maternal postpartum depression symptoms.

H7: Social support as a moderator.

a. Social support will moderate the effects of stress on mothers' symptoms of depression such that in mothers with higher stress, higher social support will predict lower maternal postpartum depression symptoms.

Exploratory test of moderation.

b. Social support will moderate the effects of stress on mothers' use of avoidance coping such that in mothers with higher stress, higher social support will predict lower use of avoidance coping.

H8: Relationship satisfaction. Higher maternal reported relationship satisfaction will predict lower maternal postpartum depression symptoms.

Aim Two: awareness and barriers to the diagnosis of postpartum depression.

This was an exploratory aim designed to collect information about potential barriers to diagnosis and treatment for postpartum depression and mothers' awareness of the potential impact of symptoms of postpartum depression on infants and young children. Accordingly, no hypotheses were generated; however, four primary research questions were proposed.

Q1: Do mothers know where they can get help or support for symptoms of postpartum depression?

Q2: Do mothers think that symptoms consistent with postpartum depression impact infants and young children?

Q3: Do mothers have concerns about seeking help or support for symptoms consistent with postpartum depression?

Q4: Where do mothers feel comfortable seeking help or support for symptoms consistent with postpartum depression?

Chapter 3: Method

Participants

Participants were mothers who were recruited during the NICU hospitalization of their infant at the University of Maryland Medical System (UMMS) or when their child was receiving developmental follow-up at the UMMS NICU Follow-Up Clinic. Infants seen at the NICU Follow-Up Clinic represent a population of children who were smaller, sicker, and at higher risk for experiencing subsequent delays than the overall population of infants who receive NICU care. The University of Maryland, Baltimore County and the University of Maryland Baltimore Institutional Review Boards granted permission to conduct the research study prior to participant recruitment.

Mothers were approached and offered the opportunity to complete the study questionnaires while visiting their infant in the NICU or attending a NICU Follow-Up Clinic appointment with their infant or toddler. Participant recruitment and enrollment activities in the NICU and in the NICU Follow-Up Clinic were completed by the principal investigator. In the NICU, mothers were recruited for study participation when their infant was considered medically stable by the treating physician. Mothers were not approached if social workers or NICU medical staff considered them or their partners to be in substantial emotional distress. Exclusion criteria included mothers who were not expected to retain custody of their infant after hospital discharge and mothers of multiples if one infant passed away while in the NICU. In the NICU Follow-Up Clinic, mothers were approached regarding study participation once they were settled in an examination room and waiting to see a physician or other clinic staff member. Mothers were asked if they would be interested in participating in a research study and completing

questionnaires regarding their life as the mother of an infant who was cared for in a NICU at the time of his or her birth.

Participants were 148 mothers of an infant or toddler between 10 days and 23 months old (M = 8.76 months, SD = 6.42 months) receiving healthcare services in the UMMS NICU or from the NICU Follow-Up Clinic at the University of Maryland Medical Center, in the UMMS. The UMMS is located in West Baltimore and serves individuals in the communities surrounding the hospital, as well as throughout the state of Maryland. The UMMS NICU and NICU Follow-Up Clinic populations include mothers across the socioeconomic spectrum.

Eligible participants were English speaking women, at least 18 years of age, considered competent to provide informed consent, and the mother of an infant who was currently or previously treated in a NICU. Two-hundred and fourteen mothers completed the informed consent process; however, 53 mothers did not complete any of the study surveys. Of the 161 mothers who completed one or more surveys, 10 were missing more than 50% of at least one survey and were dropped from the analysis. Two infant NICU discharge summaries could not be located; therefore, those mothers were excluded from the final analyses. One additional participant was removed from the final analyses because her data proved to be a multivariate outlier, leaving a final sample of 148 mothers.

Chi-square and *t*-test analyses were utilized to compare differences between mothers who consented to participate in the study but did not complete the surveys and those who did, as well as any differences between mothers recruited in the NICU and those recruited in the NICU Follow-Up Clinic. Available demographic and descriptive statistics for

mothers who did and did not complete the study and their infants appear in Table 1. Demographic and descriptive statistics for mothers recruited in the NICU and the NICU Follow-Up Clinic and their infants appear in Table 2 and descriptives for criterion, predictor and covariates appear in Table 3. White mothers were significantly more likely to have completed the study questionnaires than Black mothers. Independent *t*-test analysis indicated that, not surprisingly, mothers who completed the study questionnaires during their infant's NICU hospitalization had younger children than mothers who completed the study questionnaires at a NICU Follow-Up Clinic appointment.

Table 1

Comparing Demographic Characteristics Between Mothers Who Completed Study Surveys and Mothers Who Did Not

		Completers (N = 161)		Noncompleters (N = 53)			
Characteristic		%	*n*	%	*n*	χ^2	*p*
Location						.903	.34
	NICU	80.0	44	20.0	11		
	Clinic	73.6	117	26.4	42		
Race						14.562	<.001
	AA	65.8	79	34.2	41		
	White	90.9	60	9.1	6		
	Other	78.6	22	21.4	6		
Parity						1.094	.30
	Primi	79.6	78	20.4	20		
	Multi	73.5	83	26.5	30		
Infant gender						2.650	.10
	Male	70.6	72	29.4	30		
	Female	80.2	89	19.8	22		
		M	*SD*	*M*	*SD*	*t*	
Mother age		29.99	6.19	30.25	6.72	.236	.81
Infant age		267.43	196.17	256.96	183.62	-.335	.74
Birth weight		1420.02	743.55	1406.35	697.59	-.114	.91
Gest. age		215.08	30.20	213.16	32.06	-.375	.71
Length stay		47.07	30.92	52.08	36.13	.954	.34

Note. Gest. Age = Infant Gestational age = weeks since conception, Length stay = Length of Infant's NICU Stay in days.

Table 2

Demographics: Comparing Mothers Recruited from the NICU and the NICU Follow-Up Clinic

	NICU *N* = 40		NICU clinic *N* = 108			
Characteristic	%	*n*	%	*n*	χ^2	*p*
Maternal race					.252	.62
Black/other	57.5	23	62.0	67		
White	42.5	17	38.0	41		
Relationship status					.000	.99
Relationship	82.5	33	82.4	89		
Married	45.0	18	47.2	51		
Maternal educ					4.962	.18
GED/HS	25.0	10	22.4	24		
AS/some coll.	50.0	20	35.5	38		
BA or higher	25.0	10	42.1	45		
Parity					.292	.59
Primiparous	45.0	18	50.0	54		
Infant gender					.187	.67
Female	52.5	21	56.5	61		
Gestation					.805	.37
Singleton	72.5	29	78.7	85		
Maternal income					7.351	.39
0	17.5	7	13.9	15		
10,000 or less	10.0	4	11.0	12		
20,000 or less	7.5	3	12.0	13		
30,000 or less	12.5	5	17.6	19		
40,000 or less	12.5	5	9.3	10		
50,000 or less	5.0	3	8.3	9		
60,000 or less	5.0	2	3.7	4		
70,000 more	27.5	11	21.7	26		
	M	*SD*	*M*	*SD*	*t*	*p*
Maternal age	29.15	7.18	30.74	6.47	-1.290	.20
Infant BW	1520.13	839.30	1372.34	711.23	1.068	.29
Infant GA	221.08	36.19	213.07	27.82	1.427	.16
Infant age	54.88	83.54	339.84	161.95	-10.603	<.001

Note. GED = general education development; HS = high school; AS = associate's degree; BA = bachelor's degree; infant BW = infant birth weight; infant GA = infant gestational age.

Table 3

Descriptives for Criterion, Predictor, and Demographic Variables

Variable	*N*	*M*	*SD*	α	Range		Skew
					Potential	Actual	
Depression	148	6.00	5.00	.821	21	20	.387
Infant illness	148	8.90	4.74	.801	23	21	.346
Pregnancy unhap.	148	3.25	1.01	N/A	4	4	-1.342
Perceived stress	148	16.31	7.93	.914	40	39	.269
AvoidCOPE	148	8.83	2.78	.682	12	18	.863
social support	148	32.90	6.20	.883	30	27	-.954
Rel. satisfaction	122	15.39	5.18	.925	21	21	1.113
Income	148	4.30	2.41	N/A	7	7	-.246
Maternal age	148	30.31	6.68	N/A	N/A	N/A	.418
Variable	*n*	Frequencies					Skew
Developmental delay	108	56.9% (Delayed)					.231
History of depression	148	36.7% (Yes)					.556
Parity	148	48.6% (Primiparous, one child)					-.055
Relationship status	148	82.4% (In a relationship)					-1.722
Education	148	23.1% (GED/HS), 39.5% (AS/Some college) 37.4% (BA or higher)					-.250

Note. Pregnancy uhap. = pregnancy unhappiness; AvoidCOPE = avoidance coping; GED = general education development; HS = high school; AS = associate's degree; BA = bachelor's degree; Rel. satisfaction = Relationship satisfaction.

The final sample of mothers was racially, economically, and educationally diverse (46.6% Black, 39.2 % White, 6.1% Hispanic, 3.4% Asian, and 4.8% other). Maternal age was between 18 and 49 years (*M* = 30.31, *SD* = 6.68), and families' median yearly income was $45,800 (*M* = $43,000, *SD* = 23, 800, range 0 – > 70,000). Slightly more than half the infants were female (55.4%). Infant birth weight ranged from 480 to 4,276 grams (*M* = 1412.28, *SD* = 747.95); infant gestational age ranged from 23 to 40.4 weeks (*M* = 30.65, *SD* = 4.34). The mean NICU Health Scale score was 8.90 (*SD*=4.74, range = 0-20).

Assessments and Measures

Outcome measure.

Postpartum depression. The Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987; see Appendix A) is a 10-item self-report measure developed to screen for postnatal/postpartum depression. Researchers frequently use the EPDS in clinical and research settings and have validated the instrument with participants who represent a broad range of cultural and linguistic backgrounds (Gaynes et al., 2005; Gibson et al., 2009; Oates et al., 2004). Examples of EPDS questions include "I have looked forward with enjoyment to things," "I have
been able to laugh and see the funny side of things," and "I have felt sad or miserable." Response options for the EPDS are 0–3, with higher numbers indicating higher levels of distress. The EPDS has demonstrated construct (Gaynes et al., 2005; Jolley & Betrus, 2007) and discriminant validity, with reported sensitivity ranging from .68 to .95 and reported specificity ranging from .88 to .93 (Gaynes et al., 2005; Jolley & Betrus, 2007).

As there are currently no specific measures developed for use with pregnant and postpartum women, several researchers have studied the efficacy of using the EPDS as a single screening tool to examine maternal risk for anxiety as well as depression in the postpartum period. A number of researchers now report evidence for the two-factor structure of the EPDS: anxiety and depression. Researchers also indicated good validity and reliability of EPDS Items 1 and 2 and 6 through 10, known as the EPDS-7, for measuring symptoms of postpartum depression, and Items 3 through 5, known as the EPDS-3A, for measuring anxiety (Jomeen & Martin, 2005; Matthey, 2008; Matthey, Fisher, & Rowe, 2013; Matthey, Valenti, Souter, & Ross-Hamid, 2013; Ross et al., 2004;

Rowe, Fisher, & Loh, 2008; Swalm, Brooks, Doherty, Nathan, & Jacques, 2010; Tuohy & McVey, 2008). Given that the present study was part of a larger research project examining risk and protective factors for postpartum depression and postpartum anxiety (not reported in this study), postpartum depression was operationally defined as the summed scaled scores for Items 1–2 and 6–10 of the EPDS, referenced as the EPDS-7 (Cronbach's alpha for the present sample = .821). To improve the ability to compare the data from the present study with data reported for variations of the EPDS in the literature, such as overall rates of depression, scores on the EPDS 7 were scaled (as recommended in Kabir, Sheeder, & Kelly, 2008). The recommended procedure consisted of multiplying mothers' scores by 10 and dividing by the number of items answered.

Risk factor measures.

Infant illness. The 10-item NICU Health Scale (Wonodi, Belanger, & Hussey-Gardner, see Appendix B) measuring infant illness, developed for the present study, includes the following 10 indicators of infant illness (a) infant birth-weight, (b) cardiovascular events, (c) chronic lung disease (d) days on oxygen, (e) gestational age, (f) gastrointestinal issues, (g) intrauterine growth restriction/small for gestational age, (h) medical other (i) retinopathy of prematurity, and (j) number of transfusions. I obtained this information from the infant's' NICU discharge summaries. To enable the creation of a single scale using health indicators that included dichotomous (i.e., condition present – No = 0, condition present – Yes = 1) as well as continuous (i.e., gestational age in weeks) variables, all health indicator items were coded into either dichotomous or interval variables, with higher scores indicating higher severity of infant illness during NICU hospitalization. Examples of coding include gestational age 0 = > 36 weeks gestation, 1 =

32–35+ weeks gestation, 2 = 28–31+ weeks gestation, 3 = 24–27+ weeks gestation, 4 = < 24 weeks gestation; infant cardiovascular diagnoses or events coded 0 = Not present, 1 = treated with medication only, 2 = treated surgically; retinopathy of prematurity 1 = yes/0 = no. Cronbach's alpha for the 10-item NICU Health Scale was .80. The NICU Health Scale correlated (r = .84, p <.01) with infants' length of NICU hospitalization (M = 47.47 days, SD =30.56 days, range = 6-160 days), which is often used by researchers as a proxy to reflect infant illness severity. The strong correlation of the NICU Health Scale with length of hospital stay is an indicator of construct validity for the NICU Health Scale.

Developmental delay after the NICU. The *Best Beginnings Developmental Screen* (BBDS; Hussey-Gardner, 2006; see Appendix B) is a criterion-referenced tool for screening the acquisition and quality of developmental milestones for children from 36 weeks post-conceptual age through 39 months across six domains: adaptive, social-emotional, fine motor, cognitive, language, and gross motor. The purpose of the BBDS is to identify infants and toddlers whose development may be delayed or atypical and to recommend further evaluation for eligibility for early intervention services. Children's performances on the BBDS are scored as pass (developmental milestones are being acquired as expected), suspect (the child is exhibiting delays but the delay in weeks or months is not greater than 25% of their age), or refer (fail, delay 25% or greater, the child is not acquiring developmental milestones in the expected timeframe or the child uses atypical strategies to accomplish developmental tasks; Hussey-Gardner, 2006). In the present study 108 mothers were recruited from the NICU Follow-Up Clinic with 108 children in the subgroup of children who were screened with the BBDS. In this subgroup of children 46 children (43.1%) of the children passed, 40 (36.7%) were suspect (delayed

< 25%) and 22 (20.2%) failed (delayed > 25%) given that the variable or factor of interest was mothers' response to child developmental delay not the severity or percentage of the delay, children whose overall scores on the BBDS were either suspect or refer were coded as 0 = delayed, children who passed their BBDS were coded 1 = Not delayed. I obtained children's BBDS scores from their NICU Follow-Up Clinic charts.

The American Academy of Pediatrics (2006) recommends that developmental screening tools used in pediatric settings demonstrate sensitivity and specificity of .70 or above. Three sets of researchers have examined the validity of the BBDS. Depending on the population studied, comparison tool used, and the professional implementing the screen, results revealed sensitivity ranging from .77 to 1.0 and a stable specificity of .91 (Hussey-Gardner, 2015). When physicians administered the BBDS with infants and toddlers born prematurely, the instrument demonstrated good sensitivity, .88, specificity, .91 and construct validity, with the gold standard among infant and toddler developmental-assessment tools, the *Bayley Scales of Infant Development*, 2nd edition (BSID-II, Bayley, 1993; Hussey-Gardner & McNinch, 2006; McNinch & Hussey-Gardner, 2006).

Pregnancy unhappiness. Mothers indicated their level of happiness on learning that they were pregnant with the index child, on a Likert scale coded 0 = very unhappy to 4 = very happy on the Demographics/Brief Social History survey (see Appendix C). Higher scores indicated higher maternal pregnancy happiness.

Perceived stress. The Perceived Stress Scale 10 (PSS-10; S. Cohen, Kamarck, & Mermelstein, 1983; S. Cohen & Williamson, 1988; see Appendix D) is a 10-item, 5-point rating scale developed to measure the degree to which individuals perceived their lives to

be unpredictable, overwhelming, or out of their control during the previous 30-day period. Sample questions from the PSS include "In the last month how often have you felt nervous and stressed?" and "In the last month how often have you been angered because of things that were outside of your control?" PSS response options range from never to very often, scored 0 through 4, with items coded or reverse-scored such that higher scores indicate higher levels of perceived stress. Researchers have used the PSS in multiple studies examining associations between higher PSS scores and health outcomes (Andreou et al., 2011; S. Cohen et al., 1983; S. Cohen & Williamson, 1988). In each of these studies, higher PSS scores predicted outcomes known to be associated with high levels of perceived stress including (a) telomere length (Epel et al., 2004), (b) cortisol levels (Pruessner, Hellhammer, & Kirschbaum,1999; Ruiz, Fullerton, Brown, & Schoolfield, 2001; van Eck, Berkhof, Nicolson, & Sulon, 1996), and (c) immune functioning (Wright, 2012), suggesting strong construct validity (S. Cohen & Janicki-Deverts, 2012). The PSS has demonstrated adequate psychometric properties across populations including pregnant women, African Americans, and adults with low literacy (Mitchell, Crane, & Kim, 2008; Roberti, Harrington, & Storch, 2006; Sharp, Kimmel, Kee, Saltoun, & Chih-Hung, 2007). Perceived life stress was operationally defined as the sum of scores on the PSS 10. In the present study, Cronbach's alpha for internal consistency was .914.

Avoidance coping. The full version of the BriefCOPE consists of 14 subscales derived from the larger 60-item COPE (Carver, Scheier & Weintraum, 1989), which measures conceptually distinct coping strategies frequently used by individuals who are facing stressful life situations (Carver et al., 1989, see Appendix E). The BriefCOPE was

developed from the COPE to address difficulties associated with multiple lengthy assessments and measures that impede complete and accurate data collection in many research protocols; therefore, researchers may use the BriefCOPE either in its entirety, or with individual subscales (Carver, 1997). Avoidance coping was the construct of interest in this study. Avoidance coping responses are those in which individuals use cognitions or behaviors to deny or distract themselves from the situation or event they perceive as distressing or stressful. Subscales representing avoidance-coping responses used in this study were Substance Use, Self-Blame, and Behavioral Disengagement. Example items include "I've been using alcohol or other drugs to make myself feel better," and "I've been giving up the attempt to cope." Response options for all BriefCOPE items are the same and were coded 1– 4: "I haven't been doing this at all" = 1, "I've been doing this…"; (a) a little bit = 2; (b) a medium amount = 3; (c) a lot = 4, with higher scale scores indicating higher use of avoidance coping.

The full BriefCOPE has demonstrated good convergent and discriminant validity (Carver, 1997; Clark, Bormann, Cropanzano, & James, 1995; Fillion, Kovacs, Gagnon, & Endler, 2002) and internal reliability ranging from low to good (Cronbach's alphas from .64–.90; Carver, 1997). Cronbach's alpha for the measure of avoidance coping which included the BriefCOPE subscales: Substance Use, Self-Blame, and Behavioral Disengagement was.682). Convergent and discriminant validity data for these three subscales used independently are not available.

Resilience-promoting factor measures.

Relationship satisfaction. The Couple Satisfaction Index (CSI-4; Funk & Rogge, 2007, see Appendix G) is a Likert-type scale measure, developed from the larger CSI-32,

using the four items yielding the most information relevant to relationship satisfaction. In the present study, relationship satisfaction was defined as mothers' summed scores on the CSI-4. Examples of CSI-4 items include "I have a warm and comfortable relationship with my partner" and "In general, how satisfied are you with your relationship?" Response options are a Likert-type scale 0–5 ranging from extremely unhappy to extremely happy, reverse-coded as needed so that higher CSI-4 scores reflect higher relationship satisfaction. All versions of the CSI, including the CSI-4 (four items) demonstrate strong correlations (r = .87) with the widely used Dyadic Adjustment Scale (Funk & Rogge, 2007; Graham, Diebels, & Barnow, 2011; Spanier, 1976). The CSI-4 also has strong discriminant validity and distinguishes satisfied from dissatisfied couples (Funk & Rogge, 2007; Graham et al., 2011). Cronbach's alpha for the CSI-4 was .925.

Social support. Social support was measured using the Longitudinal Study of Child Abuse and Neglect (LONGSCAN) 10-item version of the Duke-University of North Carolina Functional Social Support Questionnaire (Duke-UNC FSSQ; Broadhead, Gehlbach, de Gruy, & Kaplan, 1998, see Appendix F). Functional support (referenced as practical social support from here forward) aligns with the quality or practicality of support provided and the perceived quality or usefulness of social supports available to an individual. The FSSQ consists of three subscales reflecting confidant support, affective support, and instrumental support. Statements begin with "I have" or "I get"; example items include "People who care what happens to me," "Chances to talk to someone…," "Help when I need transportation." All response options range from (1–4) "much less than I would like" to "as much as, I would like" (reverse coded as need) so that higher FSSQ scores reflect higher levels of social support. Researchers have used the

FSSQ as a measure of social support with various populations, including pregnant women. The FSSQ has adequate internal consistency and concurrent validity with the Interpersonal Support Evaluation List (Castle, Slade, Barranco-Wadlow, & Rogers, 2008; Isaacs & Hall, 2011). To determine whether the subscales of the FSSQ could be combined for a social support composite score in the present study, I conducted correlation analyses. Correlations between individual subscales and the total FSSQ score were strong (.638–.873) and Cronbach's alpha with the full FSSQ was .883. Thus, I used the composite FSSQ score.

Awareness and Barriers

Mothers completed the *After a Baby Survey* (see Appendix H), developed for the present study to examine (a) mothers' knowledge of where they could access help or support if they experienced symptoms consistent with postpartum depression (b) mothers' thoughts on whether symptoms of postpartum depression impact the development of infants and young children, (c) mothers concerns about seeking help or support for symptoms consistent with postpartum depression, and (d) mothers' preferences regarding where and from whom they wanted to receive help and support if they experienced symptoms consistent with postpartum depression. Unless otherwise noted, most questions required a "yes" or "no" response. Mothers answered questions such as; "Do you think babies or children less than 2 years old notice if their mother is down or blue?"; and "Do you know where mothers who feel down or blue can get help if they need help?" Mothers also responded to questions regarding their level of comfort or concerns regarding seeking supports for symptoms of postpartum depression ("Would you be worried about people thinking you were not a good mother if you were to ask for

help with feeling down or blue after having a baby?"). Response options included: Not at all worried, A little worried, or Very worried. Finally, mothers responded to questions asking specifically where and from whom they would most prefer to receive supports for symptoms of postpartum depression ("If you needed help with feeling down or blue after having a baby, where would you want to get the help and support you needed? (a) your doctor, pediatrician, or nurse, (b) a psychologist, social worker, or therapist? (c) a pastor, priest, or counselor at your church or a church? (d) your mother, aunt, father, sibling, or other relative?"). Frequency analyses were used to describe mothers' answers to the survey questions.

Covariates. Several demographic variables have been linked to an increased risk for postpartum depression in the literature - maternal age, education, marital status, parity, income, previous personal or familial history of depression. Across the postpartum-depression literature, having experienced one or more episodes of depression prior to or during the index pregnancy has been strongly linked to an increased risk for developing postpartum depression (Beck, 2001; Dennis & Ross, 2006a). There is also some evidence in the literature for a heritable risk for developing symptoms of postpartum depression (Forty et al., 2006). Research suggests that mothers with a female relative (sister, mother, grandmother, aunt) who experienced symptoms of postpartum depression are at higher risk themselves for experiencing postpartum depression (Dennis & Ross, 2006a; Forty et al., 2006). Descriptive statistics for maternal demographic and covariate variables appear in Table 4. Taking into account theory and the need to preserve power, the covariates income, parity and a history of depression were selected.

Table 4

Correlations and Descriptive Statistics: Maternal Demographic Variables and Covariates (N = 148).

Variables	EPDS	Age	Inc.	Educ.	Race	Parity	Rel	HDep
EPDS	—							
Age	-.011	—						
Income	-.142	.501**	—					
Education	-.053	.485**	.710**	—				
*Race	.104	.156	.359**	.217**	—			
Parity	-.017	.240**	.001	-.089	.034	—		
RelStatus	.121	-.355**	-.529**	-.437**	-.253**	.030	—	
HDep	.330**	-.019	.024	.032	.208*	-.059	.010	—
Means	6.0	30.3	*4.3	2.3	N/A	N/A	N/A	N/A
SD	5.1	6.7	2.4	1.0	N/A	N/A	N/A	N/A
Min.–Max.	0–20	18–49	0–8	1–4	N/A	N/A	N/A	N/A
Range	20	31	8	3	N/A	N/A	N/A	N/A

Note. EPDS = Edinburgh Postnatal Depression Scale, Race (dichotomous) was coded 1 = Black/ African American/other, 2 = white, RelStatus = Relationship Status, HDep = history of depression; Min.–Max. = minimum to maximum; income, parity (dichotomous) and history of depression (dichotomous) are the covariates; * 4.3 in units of $10,000 = $43,000; *$p$ = .05, **p = < .01.

History of depression. In an adaptation from Dennis and Ross (2006a), mothers answered yes or no to questions asking whether they had a history of depression or whether they had a first-order female relative with a history of postpartum depression. Q1) “Were you ever diagnosed with depression during a pregnancy?”; Q2) “Were you every diagnosed with depression after having a baby?”; Q3) “Were you ever diagnosed with depression at any other time in your life?”; Q4) You’re your grandmother, mother aunt(s) or sister (s) ever become depressed or receive a diagnosis of postpartum depression after they had a baby?”. Mothers’ answers to questions one through four were collapsed into a dichotomous variable. Maternal history of depression was operationally defined as mothers responding “yes” to any of the above questions; a history of depression was dichotomized as 0 = No history of depression, self or family, 1 = a personal or family history of depression (see Table 5 and Appendix C).

Table 5

Summary of Mothers Responses to History of Depression Questions1-4

Questions	Yes	
	%	(n)
Q 1. Were you ever diagnosed with depression during a pregnancy?	6	(9)
Q 2. Were you every diagnosed with depression after having a baby?	13.5	(20)
Q 3. Were you ever diagnosed with depression at any other time in your life?	23.0	(34)
Q 4. Did you're your grandmother, mother aunt(s) or sister (s) ever become depressed or receive a diagnosis of postpartum depression after they had a baby?	15.0	(22)
Mothers responded yes to:		
Question 2 - Only	5.0	(7)
Question 3 - Only	14.2	(21)
Question 1, 2 and 3	5.0	(8)
Question 4 - Only	7.0	(11)

Note: None of the mothers answered yes to Q1 only.

Parity. Mother's' parity status was coded as 1 = primiparous (a first-time mother with one child), or 2 = multiparous (a mother with more than one child, either through a single pregnancy culminating in a multiple birth or multiple pregnancies resulting in multiple children (see Appendix C).

Income. Mothers indicated their annual income by checking the appropriate line item $10,000 or less, $20,000 or less, … or $ 70,000 or more, coded as 1–7 (see Appendix C).

Procedure

Mothers completed both verbal and written informed consent, and all participants signed a Health Insurance Portability and Accountability Act (HIPAA) form granting permission for UMMS to share information from their infants' medical chart to abstract child health and development information. All mothers received a copy of their signed informed consent and HIPAA documents and a research folder containing the research

measures. To avoid systematic missing data due to participant fatigue or mothers not having enough time to complete the battery of questionnaires, the order in which mothers completed the battery of research questionnaires was random rather than controlled. Mothers who consented to participate in the NICU or the NICU Follow-Up Clinic were able to choose to finish the battery (a) in person at the time of consent, (b) at home and either returning them at a future NICU Follow-Up appointment or mailing them in a self-addressed-stamped-envelope, (c) during a home visit with the researcher, or (d) over the phone with the researcher. All participants who chose to complete the remaining questionnaires at home (i.e., option b) received a reminder note in the mail and/or an in-person reminder at a subsequent appointment. To address literacy issues, all participants had the option to complete the questionnaires in an interview format in person or by phone. Of the 148 mothers included in the study, 66 mothers completed the survey battery in person either in the NICU or Follow-Up clinic, 21 mothers from the NICU kept the survey battery and returned the surveys at a future NICU visit, 54 mothers completed the survey battery at home and returned them via self-addressed-stamped-envelope, 4 mothers completed the all surveys via a phone interview and 3 mothers completed the surveys at a home visit. All mothers who chose to complete the surveys during a home visit, completed the surveys independently while the researcher waited.

All participants received an informational pamphlet regarding the signs and symptoms of "the blues," postpartum depression, and stress-management tips, and listing informational websites as well as a 1-800 warm line and the Maryland 1-800 crisis hotline for mothers to call for more information or if they were in need of immediate assistance. Participants received their copy of the informational pamphlet after

completing the surveys. As compensation for participation in the study, participants received a gift card redeemable at a vendor in the hospital (e.g., Au Bon Pain or Subway) valued at $5.00.

Analytic Plan

Missing data. Overall, only 0.053% of the data were missing; however, 42 mothers had at least one missing value on a questionnaire item. Missing data were attributed to mothers inadvertently skipping a question or a page on a questionnaire. Some values were missing due to mothers writing in that they did not know the answer to a certain question. Although the overall percentage of missing values was small, multiple imputation (MI) was the strategy used to address missing data. Data were not imputed for participants missing more than 50% of the values on one or more measures (n = 10); instead, those participants were excluded from analyses. Two infant-discharge summaries could not be located; therefore, those mothers were excluded from analyses. All other infant data were complete and no infant data were imputed.

Using SPSS v. 21 a multiple imputation (MI) procedure set for 10 imputations was conducted. After HMR analyses, Microsoft Excel 2010 was used to calculate the average of the respective statistic across the 10 imputed analyses for those analyses that SPSS did not provide an estimated pooled statistic. The use of MI to address missing data is considered a statistically principled method that balances the tension between data quality and ease of use (Newgard & Haukoos, 2007; Starkweather, 2014; Wayman, 2003). MI uses the existing values from the dataset to predict missing values, preserving data variability and incorporating a measure of uncertainty associated with the estimation of missing data (Newgard & Haukoos, 2007; Starkweather, 2014, Module 6, Research

and Statistical Support, University of North Texas, www.unt.edu/rss/class/Jon/ SPSS_SC/ Module6/ SPSS_M6_2.htm; Wayman, 2003). The results reported from data analyses are the results of analyses using the imputed data set. All tables, where applicable, include the original and imputed estimates.

Planned analyses. For hypothesis testing, a separate hierarchical multiple regression (HMR) analysis was conducted for each predictor variable, to examine the independent contribution of each construct (above and beyond the effects of covariates) with maximum power to detect effects when examined unilaterally. Accordingly, a separate hierarchical multiple regression (HMR) analysis was conducted for each of the hypothesized risk and protective factor predictor variables (Morgan, Leech, Gloeckner, & Barrett, 2012; Tabachnick & Fidell, 2001). For each hierarchical multiple regression, I entered the covariates as a block in Block 1/Step 1 and the individual predictor variable in Block 2/Step 2. To control for the risk of inflated Type I error associated with multiple analyses, alpha was set at .01.

In addition to the hierarchical multiple regression analyses for each individual variable of interest, I conducted tests of moderation, examining the interactive effect of social support on stress and symptoms of postpartum depression and the exploratory test of moderation examining the effects of social support x stress on mothers' use of avoidance coping. Using recommendations from Aiken and West (1991) for simplified, meaningful interpretability of interaction effects, the first-order predictor variables of stress and social support were mean-centered; then, the interaction term was created by multiplying the centered first-order variables prior to conducting the stress x social

support on depression, and the stress x social support on use of avoidance coping HMR analyses.

The next step, after examining the individual risk- and resilience-promoting factor predictor variables, was to conduct an inclusive hierarchical multiple regression analysis, using each of the variables that was significant in the prediction of postpartum depression symptoms in the individual hierarchical multiple regression analyses. Such an inclusive model sheds light on the relative importance of these risk and resilience promoting factors when considered in combination. Accordingly, I conducted an additional hierarchical multiple regression in which I included the covariates, and the risk or resilience factors found to be significant in the individual hierarchical multiple regression hypothesis testing, and the stress X social-support interaction term, which was also significant in predicting postpartum depression symptoms. Significant changes in R^2 served as a test of the variables as a set, and individual beta weights for each predictor were interpreted as an indication of the relative importance of the individual variables in the prediction of postpartum depression symptoms.

Chapter 4: Results

Preliminary Analyses

Normality of variables and multicollinearity. The data were examined to ensure that the assumptions of normality, linearity, and homoscedasticity were met. With the exception of parity (kurtosis = 2.025), all skew and kurtosis values were within the ± 2.0 range, suggesting adequate symmetry and distribution of the primary variables of interest. Pearson correlation analysis was also used to test for multicollinearity between each of the independent variables with the dependent variable, and the covariates (see Table 6). All correlations were in the expected direction with none of the correlations between the independent variables and the dependent variable above .75; suggesting no evidence of significant multicollinearity between the dependent and independent variables.

Table 6

Correlation Matrix for Criterion, and Predictor Variables and Covariates (N = 148)

Variables	Dep	Illness	Delay	Unhap	Stress	Avoid	Sat	Soc	HxDep	Inc	Parity
Depression	—										
Illness	.041	—									
D. delay	-.068	.099	—								
Prg unhap	-.289**	.056	.053	—							
Stress	.750**	.071	-.035	-.250**	—						
Avoid cope	.602**	-.017	-.053	-.217**	-.609**	—					
Satisfaction	-.614**	-.060	.006	.446**	-.490**	-.405**	—				
Soc. sup.	-.650**	-.051	.025	.312**	-.642**	-.473**	.538**	—			
HxDep.	.330**	-.034	-.151	-.052	.275**	.297**	-.224*	-.273**	—		
Income	-.142	-.080	.136	.325**	-.026	-.025	.197*	.111	.775	—	
Parity	-.017	.056	.117	-.170*	-.142	.385	-.023	.037	-.059	.001	—
Means	6.00	8.90	N/A	3.25	16.31	8.83	15.39	32.90	N/A	4.30	N/A
SD	5.04	4.74	N/A	1.01	7.93	2.78	5.18	6.20	N//A	2.41	N/A
Min.–max.	0–20	0–20	N/A	0–4	0–39	6–17	0–21	13–40	N/A	0–7	N/A
Poss range	0–21	0–23	N/A	0–4	0–40	6–24	0–21	10–40	N/A	0–7	N/A

Note. Dep = Edinburgh Postnatal Depression Scale score, Illness = Infant illness, D. delay = developmental delay (n = 108), Prg. unhap = pregnancy unhappiness, Satisfaction = relationship satisfaction = (n = 122), Soc. sup. = social support, HxDep = history of depression;
*p = .05, ** p = .01, *** p < .001.

Predicting Symptoms of Postpartum Depression from Individual Risk Factors

In each of the individual predictor variable hierarchical multiple regression analyses, Step 1, predicting postpartum depression symptoms from the covariates was significant, with the F and R^2 statistics being the same for each analysis, F (3, 144) = 7.295; p <.01, R^2 = .13. The covariate, a history of depression, contributed significantly and positively to the prediction of postpartum depression symptoms in each of the individual hierarchical multiple regression analyses (see Table 7). Beta weights, *SEB*, unstandardized *B* and α values for the respective risk and protective factor variables and the covariates appear in Table 7**.**

Table 7

Data Summary: Risk/Resilience Factors and Covariates from Individual HMR Analyses, Predicting Postpartum Depression Symptoms in Mothers of Infants Requiring NICU Care, Steps 1 and 2 (N = 148)

Predictor	Covariate	*B*	*SEB*	*β*	$R^2/\Delta R^2$	*F*	*p*	f^2
Step 1	Parity	.024	.784	.002	.13/.13		<.001	
	Income	-.318	.170	-.150				
	Hist of dep	3.480	.817	.334				
Step 2								
NICU health		.05	.08	.04	.13/.00	.32	.57	.00
	Parity	.002	.786	.001			.99	
	Income	-.312	.166	-.147			.07	
	Hist of dep	3.492	.813	.335			<.001	
Dev. delay		.02	.62	.00	.13/.00	.00	.98	.00
	Parity	.021	.927	.002			.98	
	Income	-.319	.200	-.151			.11	
	Hist of dep	3.484	.970	.335			<.001	
Prg. unhappy		.13	.41	-.26	.19/.06	10.16	<.001	.07
	Parity	-.428	.773	-.043			.58	
	Income	-.139	.177	-.066			.43	
	Hist of dep	3.292	.794	.316			<.001	
Stress		.46	.04	.66	.60/.47	170.66	<.001	1.19
	Parity	.938	.536	.093			.08	
	Income	-.268	.116	-.127			.02	
	Hist of dep	1.464	.573	.141			.01	

Table continues

Avoid cope		.997	.12	.55	.41/.26	66.12	<.001	.46
	Parity	.326	.651	.032			.62	
	Income	-.281	.140	-.133			.05	
	Hist of dep	1.792	.707	.172			.01	
Satisfaction		-.55	.07	-.56	.42/.28	57.29	<.001	.49
	Parity	-.183	.712	-.018			.80	
	Income	-.077	.156	-.036			.62	
	Hist of dep	2.128	.761	.204			.001	
Support		-.48	.05	-.06	.45/.32	84.35	<.001	.59
	Parity	.145	.624	.014			.82	
	Income	-.170	.136	-.080			.21	
	Hist of dep	1.777	.674	.171			.01	

Note. Hist of dep = History of depression, NICU health = Neonatal intensive care unit health score, Dev. Delay = (n = 108), Prg. unhappy = pregnancy unhappiness, Avoid cope = Avoidance coping, Satisfaction = relationship satisfaction (n = 122), *Effect sizes calculated using Effect Size Calculator for Hierarchical Multiple Regression (Soper, 2014), *p = .05, ** p = .01, *** p < .001.

Infant illness. The hierarchical multiple regression with infant illness measured by the NICU general health scale, after controlling for the covariates, was significant, F (4, 143) = 5.509, p < .00, R^2 = .13. A history of depression remained significant in Step 2 and contributed uniquely to the prediction of postpartum depression symptoms (see Table 7). After controlling for the covariates, NICU health status did not explain any significant variability in postpartum depression symptoms F (1, 143) = .265, p = .61, ΔR^2 = <.01.

Developmental delay after the NICU. The hierarchical multiple regression with infant/toddler developmental delay, measured by the Best Beginnings Developmental Screen, was significant, F (4, 104) = 3.952; p = .01, R^2=.13, adjusted R^2 = .10. A history of depression remained significant in Step 2 and contributed uniquely to the prediction of postpartum depression symptoms (see Table 7). After controlling for the covariates, infant toddler/developmental delay did not explain any additional significant variability in postpartum depression symptoms F (1, 104) = .001; p = .96, ΔR^2 = <.01.

Pregnancy unhappiness. The hierarchical multiple regression with pregnancy unhappiness and the covariates as predictors was significant, F (4, 143) = 8.357; $p < .00$, R^2 =.19, adjusted R^2 = .17. Pregnancy unhappiness and a history of depression each contributed uniquely and significantly to the prediction of postpartum depression symptoms (see Table 7). After controlling for the covariates, maternal pregnancy unhappiness explained an additional 5.8% of the variability in postpartum depression symptoms F (1, 143) = 10.16; $p < .00$, $\Delta R^2 = .058$. Mothers with higher reported pregnancy unhappiness were more likely to experience higher levels of postpartum depression symptoms. Pregnancy unhappiness exerted a small ($f^2 = .07$) effect on the likelihood mothers would experience symptoms of postpartum depression.

Perceived stress. The hierarchical multiple regression with perceived stress and the covariates as predictors was significant, F (4, 143) = 54.578, $p < .00$, $R^2 = .60$, adjusted $R^2 = .59$. Perceived stress, a history of depression and income each contributed uniquely and significantly to the prediction of postpartum depression symptoms (see Table 7) After controlling for covariates, stress explained an additional 47.2% of the variability in postpartum depression symptoms, F (1, 143) = 170.656; $p < .001$, $\Delta R^2 = .472$. Mothers with higher stress were more likely to experience higher levels of symptoms. Perceived stress exerted a large ($f^2 = .1.19$) positive effect on the likelihood mothers would experience symptoms of postpartum depression.

Avoidance coping. The hierarchical multiple regression with avoidance coping and the covariates as predictors was significant, F (4, 143) = 24.497; $p < .00$, R^2 =.41, adjusted R^2 = .39. Avoidance coping and a history of depression contributed uniquely and significantly to predicting postpartum depression symptoms**.** After controlling for the

covariates, avoidance coping explained an additional 27.5% of the variability in postpartum depression symptoms F (1, 143) = 66.197, $p < .001$, $\Delta R^2 = .275$ (see Table 7). Mothers using more avoidance coping were more likely to experience higher levels of postpartum depression symptoms. Avoidance coping exerted a large ($f^2 = .46$) positive effect on the likelihood mothers would experience symptoms of postpartum depression.

Predicting Postpartum Depression from Resilience-Promoting Factors

Relationship satisfaction. This analysis was restricted to those mothers (n = 122) in a relationship at the time they completed the study. The hierarchical multiple regression with relationship satisfaction and the covariates as predictors was significant, F (4, 117) = 20.944; $p < .01$, $R^2 = .42$, adjusted $R^2 = .40$. Relationship satisfaction and a history of depression contributed uniquely and significantly to the prediction of postpartum depression symptoms (see Table 7)**.** After controlling for the covariates, relationship satisfaction explained an additional 28.5% of the variability in postpartum depression symptoms F (1, 117) = 57.298; $p < .001$, $\Delta R^2 = .285$. Mothers reporting lower relationship satisfaction were more likely to experience higher levels of postpartum depression symptoms. Relationship satisfaction exerted a large ($f^2 = .49$) effect on the likelihood mothers would experience symptoms of postpartum depression.

Social support. The hierarchical multiple regression with social support and the covariates as predictors was significant, F (4, 143) = 29.723; $p < .001$, $R^2 = .45$, adjusted $R^2 = .44$. Social support and a history of depression (see Table 7) contributed uniquely and significantly to predicting postpartum depression symptoms. After controlling for the covariates, social support explained an additional 32% of the variability in postpartum depression symptoms F (1, 143) = 84.352; $p < .001$, $\Delta R^2 = .32$. Mothers reporting lower

social support were more likely to experience higher levels of symptoms. Social support exerted a large (f^2 = .59) effect on the likelihood mothers would experience symptoms of postpartum depression.

Social support: Tests of moderation.

Postpartum depression, stress, and social support. A significant interaction between stress x social support on depression symptoms (see Table 8)**,** was observed [*t* (141) = -2.616, *p* = .01], indicating that the effects of stress on symptoms of postpartum depression varied as a function of the level of social support. At the mean level of social support, there was a significant effect of stress on postpartum depression symptoms [*t* (141) = 8.80, *p* < .01] such that mothers with higher levels of stress experienced higher levels of postpartum depression symptoms (see Table 8).

Following the recommendations of Aiken and West (1991) and J. Cohen and Cohen (2003), I evaluated the effect of stress on symptoms of postpartum depression at: the mean, one standard deviation below, and one standard deviation above the mean of social support, (see Figure 1). Although the effect of stress on postpartum-depression symptoms remained significant at all levels of social support, Figure 1 illustrates that as social support increases, the effects of stress on postpartum-depression symptoms are buffered or diminished. At the mean of social support, the effect of stress was [*t* (141) = 8.779, *p* < .001, *b* = .369], at one standard deviation below the mean [*t* (141) = 8.419, *p* < .001, *b* = .450], and at one standard deviation above the mean of social support the effect of stress on postpartum-depression symptoms was [*t* (141) = 5.692, *p* < .001, *b* = .289].

Table 8

Data Summary for Individual HMR Test of Moderation: Stress x Social Support with Simple Slopes, Steps 1–3 of the HMR Analysis (N = 148, Imputed)

Step	Interaction	Covariate	*B*	*SEB*	*t*	*p*
1		Parity	.024	.784	.031	.98
		Income	-.318	.170	1.876	.06
		Hist. depression	3.480	.817	4.260	<.001
	Constant		6.047	1.481	4.083	<.001
2		Parity	.797	.516	1.545	.12
		Income	-.218	.112	-1.949	.05
		Hist. depression	1.188	.555	2.139	.03
	Stress0 (centered)		.364	.043	8.477	<.001
	Soc. sup0 (centered)		-.198	.055	-3.608	.01
	Constant		5.272	.969	5.440	<.001
3	**Stress at *M* of Social support**					
		Parity	.790	.506	1.562	.12
		Income	-.225	.110	-2.048	.04
		Hist. depression	1.194	.545	2.191	.03
	Stress0 (centered)		.369	.042	8.779	<.001
	Soc. sup0 (centered)		-.144	.058	-2.495	.01
	Stress0 x soc. sup0		-.013	.005	-2.616	.01
	Constant		4.908	.960	5.114	<.001
	Stress at - 1 (*SD*) Social support					
		Parity	.790	.506	1.562	.12
		Income	-.225	.110	-2.048	.04
		Hist. depression	1.194	.545	2.191	.03
	Stress0 (centered)		.450	.053	8.419	<.001
	Social sup. low (-1 *SD*)		-.144	.058	-2.495	.01
	Stress0 x support low		-.013	.005	-2.616	.01
	Constant		5.798	1.048	5.533	.01
	Stress at + 1 (*SD*) Social support					
		Parity	.790	.506	1.562	.12
		Income	-.225	.110	-2.048	.04
		Hist. depression	1.194	.545	2.191	.03
	Stress0 (centered)		.289	.051	5.692	.01
	Social sup. high (+ 1 *SD*)		-.144	.058	-2.496	.001
	Stress0 x support high		-.013	.005	-2.616	.01
	Constant		4.018	.999	4.021	<.001

Note: Hist. depression = History of depression; Soc. sup. = Social support; *p = .05, ** p .01, *** p < .001.

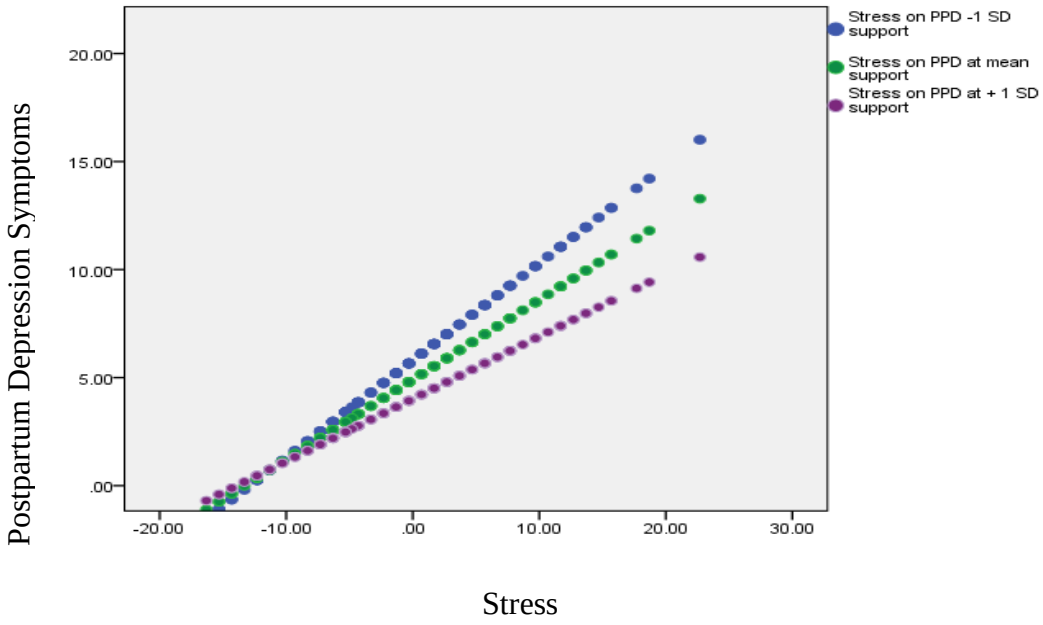

Figure 1. Individual hierarchical multiple regression: Stress on depression at the mean and ± 1 SD of support.

Avoidance coping, stress, and social support. Finally, although avoidance coping was not the primary outcome of interest in this study, I conducted an additional exploratory test of moderation to examine whether an interactive effect of social support and stress in predicting mothers' use of avoidance coping emerged. Taylor and Stanton (2007) and Thoits (1995, 2006, 2010, 2011) suggest that individuals who experience stressful or adverse events in the absence of adequate social support are more likely to use avoidant coping strategies (i.e., behavioral disengagement) to manage their distress. To examine the associations between social support, stress and avoidance coping I entered the covariates (history of depression, parity, income) in Step 1, the centered-stress and social-support variables in Step 2, and the interaction term centered stress x social support in Step 3. No significant interaction was observed between social support x stress on mothers' use of avoidance coping (see Table 9), [t (141) = .403, p = .69]. There

was, however, a main, positive effect of stress on avoidance coping [t (141) = 5.69, p < .001], such that mothers with higher levels of stress were more likely to have used higher levels of avoidance coping.

Table 9

Data Summary for Test of Moderation: Stress X Social Support on Use of Avoidance Coping and Covariates from Steps 1–3 of the HMR Analysis (N = 148)

Step	Interaction	Covariate	*B*	*SEB*	*β*	*t*	*p*
Step 1		Parity	-.303	.442	-.055	-.686	.50
		Income	-.037	.096	-.032	-.392	.70
		Hist. depression	1.693	.460	.294	3.682	<.001
	Constant		8.825	.836		10.560	<.001
Step 2		Parity	.060	.367	.011	.164	.87
		Income	-.002	.078	-.002	-030	.98
		Hist. depression	.738	.395	.128	1.869	.06
	Stress0 (centered)		.176	.031		5.751	<.001
	Soc. sup0 (cntred)		-.052	.039		-1.330	.18
	Constant		8.476	.686		12.348	<.001
Step 3		Parity	.061	.368	.011	.166	.87
		Income	-.002	.078	-.001	-.021	.98
		Hist. depression	.737	.396	.128	1.862	.06
	Stress0 (centered)		.175	.031		5.694	<.001
	Soc. sup0 (cntred)		-.058	.042		-1.380	.17
	Stress0 x Soc. sup0		.001	.004		.403	.69
	Constant		8.518	.696		12.241	<.001

Note: Hist. depression = History of depression; Soc. Sup. = Social support; *p = .05, ** p .01, *** p < .001.

Inclusive Model

Examining robust risk and resilience factors for postpartum depression.

After examining the individual risk- and resilience-promoting factor variables and the tests of moderation in individual analyses, an inclusive hierarchical multiple regression analysis was conducted. The inclusive model included each of the risk and resilience factor variables and the stress x social support on depression interaction term that were significant in the prediction of postpartum depression symptoms in the

individual hierarchical multiple regressions. Such an inclusive model sheds light on the relative importance of these risk and resilience promoting factors when considered in combination.

In the inclusive model hierarchical multiple regression, the covariates (history of depression, parity and income) were entered together as a set in Block 1/ Step 1, followed by the significant risk and resilience promoting factor variables: pregnancy unhappiness, avoidance coping, and stress (mean-centered), relationship satisfaction and social support (mean-centered) entered together as a set in Block 2/Step 2, and finally, the stress X social support interaction term was entered in Block 3/Step 3. The results for Steps 1-3, and the simple slopes analyses for the inclusive hierarchical regression model predicting postpartum depression symptoms, are presented in Tables 10 and 11 respectively.

Steps 1 and 2 of the inclusive model hierarchical multiple regression predicting postpartum depression symptoms from the covariates alone was significant, F (3, 118) = 5.978; p = .001, R^2 =.13, adjusted R^2 = .11, with a history of depression contributing significantly to the prediction of postpartum depression symptoms. Step 2 of the inclusive model, including the significant individual risk and resilience factor variables, controlling for the covariates, was also significant, F (5, 113) = 40.914; $p < .001$, ΔR^2 =.56. The variables perceived stress, avoidance coping, relationship satisfaction, and social support as a set accounted for 56% of the variance in the prediction of the symptoms of postpartum depression. Step 3 with the interaction term controlling for the covariates in Step 1, and the individual predictors in Step 2, was also significant F (1, 112) = 6.873; p = .01, ΔR^2 =.02, adjusted R^2 = .69. The inclusion of the stress x social-support interaction term accounted for an additional 2% to the variance in the prediction of symptoms of

postpartum depression over and above the covariates in Block 1/Step 1 and the individual predictors as a set in Block 2/Step 2.

Table 10

Data Summary for Inclusive Model HMR Predicting Symptoms of Postpartum Depression from Predictor Variables and Interaction Term Significant in Individual HMR analyses, Controlling for Covariates (N = 148)

Variable	*B*	*SEB*	β or *t*	*p*	R^2	ΔR^2
Step 1				<.001	.13**	
Parity	.024	.866	.002	.98		
Income	-.318	.186	-.150	.09		
History of depression	3.480	.901	.334	<.001		
Constant	6.047	1.635		<.001		
Step 2				<.001	.69***	.56***
Parity	.698	.546	.069	.21		
Income	-.171	.119	-.081	.16		
History of depression	.792	.582	.076	.18		
Stress0 (centered)	.278	.050	5.557	<.001		
Soc. sup0 (centered)	-.125	.060	-2.097	.04		
Avoidance coping	.284	.123	.157	.02		
Prg. unhappiness	.260	.310	.052	.41		
Rel. satisfaction	-.235	.067	-.241	<.001		
Constant	5.638	1.960	2.877	.01		
Step 3				.01	.71	.02**
Parity	.679	.533	.068	.21		
Income	-.175	.116	-.082	.14		
History of depression	.793	.567	.076	.17		
Stress0 (centered)	.282	.049	5.778	<.001		
Soc. sup0 (centered)	-.068	.062	-1.098	.28		
Avoidance coping	.294	.120	.163	.02		
Prg. unhappiness	.230	.303	.046	.45		
Rel. satisfaction	-.234	.065	-.240	<.001		
Stress0 x soc. sup0	-.013	.005	-2.621	.01		

Note: Soc. Sup. = Social support; Prg. unhappiness = Pregnancy unhappiness; Rel. satisfaction = Relationship satisfaction; *p = .05, ** p .01, *** p < .001.

Table 11

Data Summary for Inclusive Model Test of Moderation: Stress X Social Support Symptoms of Postpartum Depression: Simple Slopes, at M and ± One SD of Social Support (N = 148, Imputed)

Variable	*B*	*SEB*	β/*t*	*p*	R^2	ΔR^2
Stress at Mean of Soc. Sup.				.01	.71	.02
Parity	.679	.534	.068	.20		
Income	-.175	.119	-.082	.14		
History of depression	.793	.569	.076	.16		
Stress0 (centered)	.282	.049	5.777	<.001		
Social support0 (centered)	-.068	.062	-1.098	.27		
Avoidance coping	.294	.120	.163	.01		
Pregnancy unhappiness	.230	.303	.046	.45		
Relationship satisfaction	-.234	.065	-.240	<.001		
Stress0 x social support0	-.013	.005	-2.620	.01		
Stress at – 1 *SD* Soc. Sup.						
Parity	.680	.534	.068	.20		
Income	-.175	.119	-.083	.14		
History of depression	.794	.569	.076	.16		
Stress0 (centered)	.365	.059	6.166	<.001		
Social support low (-1*SD*)	-.069	.062	-1.111	.27		
Avoidance coping	.295	.120	.163	.01		
Pregnancy unhappiness	.229	.304	.046	.45		
Relationship satisfaction	-.233	.065	-.239	<.001		
Stress at + 1 *SD* Soc. Sup.						
Parity	.680	.535	.068	.20		
Income	-.175	.119	-.083	.14		
History of depression	.795	.569	.076	.16		
Stress0 (centered)	.201	.057	3.504	<.001		
Social support high (+1*SD*)	-.070	.062	-1.128	.26		
Avoidance coping	.295	.120	.163	.01		
Pregnancy unhappiness	.227	.304	.046	.46		
Satisfaction	-.231	.065	-.237	<.001		
Stress0 x social support high	-.013	.005	-2.559	.01		

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

The significant interaction between stress and social support [t (112) = -2.62, p = .01] indicated, as in the individual hierarchical multiple regression test of moderation, that the effects of stress on symptoms of postpartum depression changed as a function of the level of social support mothers reported receiving. As in the individual hierarchical multiple regression test of moderation, the recommendations of Aiken and West (1991)

and J. Cohen & Cohen (2003) were utilized to evaluate the effect of stress on postpartum depression symptoms at three levels of social support (the mean and ± 1 *SD* from the mean, see Figure 2).

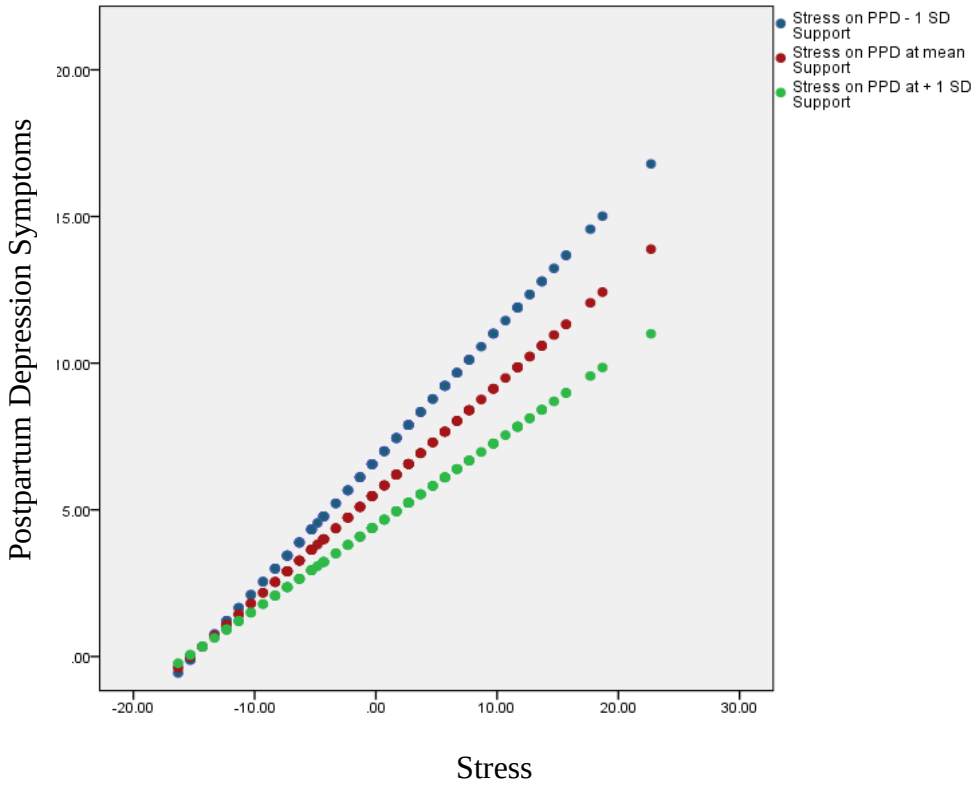

Figure 2. Inclusive model: Stress on depression at the mean and ± 1 *SD* of support.

The effect of stress on postpartum depression symptoms remained significant at all three levels of social support: the mean of social support [t (112) = 5.777, $p < .001$, b = .282], at one standard deviation below the mean [t (112) = 6.166, $p < .001$, b = .365] and at one standard deviation above the mean [t (112) = 3.504, $p < .001$, b = .201]. However, the figure illustrates that as social support increased, the effects of stress on postpartum depression symptoms was buffered or diminished.

Avoidance coping and relationship satisfaction also each contributed uniquely and significantly to the prediction of symptoms of postpartum depression in the inclusive model hierarchical multiple regression. Relationship satisfaction was negatively associated with symptoms of postpartum depression such that mothers reporting lower relationship satisfaction were more likely to experience higher levels of depression. Avoidance coping was positively associated with symptoms of postpartum depression, such that mothers reporting a higher reliance on the use of avoidance coping were more likely to experience higher levels of postpartum depression symptoms (see Table10).

Post-hoc analyses

Although this study did not follow the same group of mothers from 10 days after delivery through 24 months postpartum to examine whether mothers levels of perceived stress or symptoms of postpartum depression changed across time examining mothers' mean postpartum depression symptoms scores and mean perceived stress scores across infant age groups provided some insight into changes in symptoms of depression and levels of stress across the first two years of life in mothers of infants who required NICU hospitalization and extended developmental monitoring. Two post-hoc ANOVA's comparing means for mothers' EPDS and PSS scores respectively across five infant child age groups. No statistically significant differences in mean postpartum symptoms scores or mean perceived stress scores across five infant age groups were found (see Tables 12 and13).

Table 12

Comparison of Mother's Mean Scores and Standard Deviations Across Child Age Groups

Child Age Groups	(*n*)	EPDS *M* (*SD*)	PSS *M* (*SD*)	FSSQ *M* (*SD*)	*CSI (*n*) *M* (*SD*)
10 d – 4m 15d	(42)	5.85 (4.75)	15.83 (8.48)	34.14 (4.85)	16.31 (4.56) (38)
4m 16d – 8m 15d	(33)	6.05 (5.80)	16.73 (8.70)	32.71 (6.21)	16.12 (4.48) (25)
8m 16d – 12m 0d	(30)	6.00 (4.69)	16.33 (7.36)	33.20 (5.87)	14.00 (6.11) (23)
12m 1d – 18m 0d	(26)	5.66 (4.97)	16.47 (7.72)	32.69 (7.39)	15.67 (4.60) (23)
18m 1d – 24 mos	(15)	6.85 (5.58)	16.56 (6.94)	29.81 (7.44)	13.27 (6.92) (13)

**Note: N* = 148, EPDS = Edinburgh Postnatal Depression Scale, PSS = Perceived Stress Scale, FSSQ = Functional Social Support Questionnaire, **N* = 122, CSI = Couple Satisfaction Index

Table 13

One Way Analysis of Variance Summary Table Comparing Children's Age Groups on Mothers Depression, Stress and Social Support

Source	*df*	*SS*	*MS*	*F*	*p*
EPDS					
Between Groups	4	15.73	4.01	.151	.96
Within Groups	143	3722.54	26.07		
Total	147	3741.14			
PSS					
Between Groups	4	16.81	4.20	.065	.99
Within Groups	143	9225.83	64.52		
Total	147	9242.64			
FSSQ					
Between Groups	4	222.50	55.63	1.465	.22
Within Groups	143	5428.98	37.97		
Total	147	5651.48			
CSI	4	150.65	37.66	1.923	.23
	117	3096.96	26.47		
	121				

Summary – Predicting Risk and Resilience for Postpartum Depression

As hypothesized, mothers' unhappiness regarding the index pregnancy, higher reliance on avoidance coping, and high levels of perceived stress predicted higher levels

of symptoms consistent with postpartum depression in individual factor hypothesis testing. Also, in individual factor hypothesis testing, mothers' perceptions of practical social support from their social network and relationship satisfaction were significant predictors of postpartum depression symptoms, with higher levels of support from their networks and higher relationship satisfaction predicting fewer symptoms consistent with postpartum depression. Contrary to hypotheses, neither severity of infant illness nor failure on a developmental screen at developmental follow-up predicted postpartum depression symptoms. In addition, mothers' practical social support moderated the effects of stress on symptoms of depression; but in the exploratory test of moderation examining the interaction of social support x stress on mothers use of avoidance coping, no interaction was observed. Next, in the inclusive model which incorporated all predictors that demonstrated significance in individual analyses; the interaction term social support x stress, avoidance coping, and relationship satisfaction each predicted symptoms of postpartum depression. Neither mothers' pregnancy unhappiness nor the covariates (income, parity history of depression) contributed significantly to the prediction of symptoms of postpartum depression.

Awareness and Barriers

Table 14 shows frequency data for the *After a Baby* survey questions examining (1) mothers' awareness of where they could access help or support for symptoms of postpartum depression, (2) mothers' responses regarding whether they thought symptoms consistent with postpartum depression could impact the development of infants and young children, (3) whether mothers would be worried or concerned about seeking help or support for symptoms consistent

with postpartum depression; and, (4) where they would feel most comfortable seeking help or support for symptoms consistent with postpartum depression.

The majority (77%) of mothers reported that they knew where they could access help and support if they experienced symptoms consistent with postpartum depression. About 87% (86.5%) of mothers thought infants and toddlers under 2 years of age noticed when their mothers experienced symptoms of depression. Nearly two-thirds, (62.8%) of mothers reported they believed a mothers' symptoms of depression would influence a child's acquisition of cognitive or social skills. Approximately two-thirds (68.2%) of mothers reported they would not be nervous about asking for help with symptoms of postpartum depression, or worried people would think they were not a good mother (66.2%) if they asked for help or support with symptoms consistent with postpartum depression. The majority of mothers (72.3%) indicated that they would be comfortable talking with or seeking help or support for symptoms consistent with postpartum depression from a variety of medical, mental health, or religious professionals. However, most mothers (83.1%) reported they would feel most comfortable and be most willing to receive help for symptoms of postpartum depression from a relative (see Table 14).

Table 14

Summary of Frequency Data Analysis, Mothers' Awareness and Barriers to Diagnosis of Postpartum Depression from the After a Baby Questionnaire

Questions	No % (n)	Yes % (n)	Maybe/Don't Know % (n)
After you had your baby did any of your family, friends or doctors tell you that all or most mothers get "the blues" after having a baby?	28.4(42)	70.9(105)	
Did you feel down or blue for a week or more after your baby was born?	41.2(61)	58.1(86)	
Do you think:			
A mother who feels down or blue after having a baby will feel better if she gets more sleep?	51.4(76)	45.3 (67)	1.4(3)
A mother who feels down or blue for more than a few weeks after having a baby should get help from someone such as a friend, a family member or a doctor?	4.1(6)	93.9(139)	
Babies or children less than 2 notice if their mother is down or blue?	12.2(18)	86.5(128)	1.4(2)
Babies or children less than 2 whose mothers feel down or blue learn social skills and thinking skills the same as children whose mothers do not feel down or blue?	62.8(93)	33.1(49)	
A mother can interrupt baby's sleeping or eating by worrying too much?	27.7(41)	69.6(103)	2 (3)
Women who feel down or blue after having a baby can still be a good mother?	20.9(31)	1.4(2)	76.4(113)
Do you know where mothers who feel down or blue can get help if they need help?	22.3(33)	77(114)	

Would you be :	**Not at all nervous**	**A little nervous**	**Very nervous**
Nervous about asking for help with feeling down or blue after having a baby?	68.2(101)	26.4(39)	4.7(7)
Worried about people thinking that you were not a good mother if you were to ask for help with feeling down or blue after having a baby?	66.2(98)	28.4(42)	4.7(7)

Table continues

If you needed help with feeling down or blue after having a baby, where would you want to go to get the help and support you needed?

	NO % (n)	YES % (n)
Your doctor, pediatrician or nurse…….	25 (37)	72.3 (107)
Psychologist, social work, therapist……..	8.2 (27)	79.7 (118)
Pastor, priest, your church, a church ……...	37.2 (5)	60.1 (89)
Relative (mother, father, aunt, sib.)…….	14.9 (22)	83.1 (123)

Where are you most willing to go?

Your doctor, pediatrician or nurse……25.7 (38)
Psychologist, social work, therapist…….19.7 (29)
Pastor, priest, your church, a church …….9.5 (14)
Relative (mother, father, aunt, sib.)……...44.6 (66)

Which services would you be most likely to participate in if you were feeling down or blue?

1. A Group with other parents:	38.5 (57)
2. A Home visit from nurse or social worker:	12.8 (19)
3. A Private meeting with social worker or counselor:	36.5 (54)
4. A faith based group at your church:	6.1 (9)
5. Other:	5.4 (8)

Chapter 5: Discussion

The United States spends more money on health care to achieve inferior health outcomes than other higher-income nations (Fraser, 2013; Institute of Medicine, Report Brief, 2013 www.iom.edu/intlmortalityrates). There is also growing evidence indicating that a national focus on improved maternal and child health outcomes would likely result in improved lifecourse health for mothers and children, which could substantially shift lifecourse health outcomes for the nation as a whole. A key objective for improving maternal and child health outcomes is to address the negative impact of postpartum/maternal depression on the health of mothers and children and family systems (Center on the Developing Child, 2009, 2015; Halfon et al., 2014).

In spite of the negative impact of postpartum and maternal depression on maternal and child health outcomes, as well as the economic burden to the larger society (Wachs, Black & Engle, 2009; Wisner, Chambers & Sit, 2006), fewer than 50% of mothers experiencing symptoms of postpartum depression receive a diagnosis, and fewer still receive any treatment to ameliorate their symptoms (Horowitz & Goodman, 2004). Addressing gaps in the literature and barriers associated with universal, periodic screening of mothers for risk for or resilience to postpartum depression is a necessary step toward improving maternal and child health outcomes (Gollan et al., 2017; Horowitz, Murphy, Gregory & Wojcik, 2011).

To address specific gaps in the literature and barriers to improved screening and detection of mothers at risk for or resilient to experiencing postpartum depression, the present study had two aims, (1) to identify factors that are strong predictors of risk / resilience for postpartum depression and explore the feasibility of developing a brief, easily administered measure that will identify mothers with significant risk/resilience

factors and; (2) to examine mothers' support seeking attitudes, behaviors and perspectives regarding possible barriers to receiving help or support for symptoms of postpartum depression in a sample of mothers of infants who required NICU hospitalization and extended developmental monitoring.

Much of the literature on postpartum depression includes studies with homogenous samples of White, middle-class, married mothers of infants born full-term, or low-income, urban, minority mothers of infants born preterm. Infants in these studies are typically no older than 4 months. However, there is growing consensus among researchers and clinicians that mothers are at risk for experiencing new onset episodes or remitting and recurring episodes of depression up to 12 months and possibly as many as 24-36 months postpartum (Leahy-Warren & McCarthy, 2007; McManus & Poehlmann, 2012). The present study is based on an ethnically and economically diverse sample of mothers (N = 148) of infants who were being treated in the NICU or being seen at the NICU Follow-Up clinic for ongoing developmental monitoring. This population of mother-infant dyads are thought to be a population who are at high-risk for experiencing negative outcomes. Mothers in the study were between 10 days and 23 months postpartum.

Overall, the findings were consistent with expectations. As expected, mothers reporting unhappiness regarding the index pregnancy, higher reliance on avoidance coping, and higher perceived stress were more likely to report higher levels of postpartum depression symptoms. Mothers who reported receiving higher levels of practical support, and who were more satisfied with their relationships with their significant other, reported experiencing fewer symptoms of postpartum depression. Contrary to expectations,

neither severity of infants' illness nor infants' failure on a developmental screen at follow-up was associated with mothers' postpartum depression symptoms. In addition, mothers' practical social support moderated the effects of stress on symptoms of depression but did not moderate the effects of stress on mothers' use of avoidance coping. More specific information about the key findings is discussed below.

Aim 1: Risk and Resilience Factors and Postpartum Depression

Postpartum depression. In the present study**,** mothers' mean postpartum depression symptoms score was 6.00 (*SD* = 5.00), suggesting that overall, these mothers were not experiencing levels of postpartum depression symptoms consistent with a diagnosis of major depressive disorder. The mean score reported in this study is consistent, however, with mean EPDS scores reported from multiple large studies of pregnant and postpartum women (see Chiu et al., 2017; Evans et al., 2001; Gollan et al., 2016). Prevalence for postpartum depression in this study was 18.2%. This prevalence rate is consistent with rates reported in the literature for mothers of infants who required NICU hospitalization (8.5% - 40%, see Vigod et al., 2010; Henderson, Carson & Redshaw, 2016).

Perceived stress and postpartum depression. As hypothesized**,** higher perceived stress was associated with higher symptoms of postpartum depression. In this sample of mothers, perceived stress is associated with a large effect on mothers' likelihood of experiencing symptoms of postpartum depression. This finding is consistent with the results reported by Gao et al. (2009) who reported that higher perceived stress predicted higher postpartum depression symptoms in a sample of 130 first-time, Chinese mothers of full term infants, and those reported by Poehlmann et al. (2012) and Reichman

et al. (2000) who also examined linkages between a NICU hospitalization, perceived stress, and mothers' psychological distress. This finding is also consistent with qualitative studies in which parents report marked stress and distress associated with their infants' births and NICU hospitalization (Lasiuk et al., 2013; Redshaw, 2005).

Overall, mothers in the present study were moderately to highly stressed, with 50.7% of mothers' mean PSS scores falling within the moderately stressed range (14 - 26) and 11.5% of mothers' scores falling in the high (27- 40) perceived stress range. This finding is consistent with the Gao et al. (2009) study in which both the EPDS and the PSS were used to examine the linkages between perceived stress, and symptoms of postpartum depression. In the Gao et al. sample at 6-8 weeks postpartum mothers' mean PSS scores. Mothers' mean perceived stress scores were also consistent with those reported by Ares, Lebel and Bielajew (2014), who examined perceived stress in young breast cancer survivors with and without children, a population also presumably exposed to stressful or adverse life events. In the Ares et al. sample mean PSS scores for mothers of children under five.

Contrary to the finding from this study and the findings from Poehlmann et al. (2012) and Reichman et al. (2000), Schappin, Wijnroks, Venema, & Jongmans, (2013) posit that the evidence does not support the conclusion that parents of infants born preterm and requiring NICU hospitalization experience higher levels of stress associated with the NICU hospitalization of their infants. Schappin et al. base their conclusions on results from a meta-analysis of 38 studies that included 3025 parents of preterm and low birth weight infants. The authors further proposed that the evidence suggests that stress levels have been declining markedly among parents of infants who require NICU

hospitalization, since the 1980's. Schappin et al. suggested that beginning in the early 1980's dramatic progress was observed in reducing mortality, though not morbidity, for infants born preterm. This trend was observed with the introduction of steroid and surfactant replacement therapies. In addition, the model of treating infants in virtual isolation shifted to a family-centered model of care for infants requiring NICU hospitalization. The authors suggested that this is the likely explanation for the declining levels of perceived stress in parents of infants requiring NICU hospitalization.

There are a number of issues to be considered in interpreting the results reported from the Schappin et al. (2013) meta-analysis. The majority of studies used measures of parenting specific stress. Some measures of parenting specific stress may be subject to missing data when used with parents of infants in the NICU who are not actively involved in their infant's care. In addition, the transition to parenthood is a period of significant stress for all parents (Bowlby, 1988; Keeton-Perry 2008). It is possible that, in the Schappin et al meta-analysis, the lack of significant differences in perceived stress between parents of infants requiring NICU hospitalization and parents of full-term infants is due to ceiling effects at the upper limit of measuring parent stress during the transition to parenthood. Also, some studies report that parents of infants requiring NICU hospitalization do experience less parenting specific stress related to child difficulty while their infants are in the NICU due to high levels of support in caring for their infant provided by nurses and other professionals (Reichman et al., 2000). Finally, many qualitative studies reporting interviews with parents regarding the lived experience of their infants' NICU hospitalizations suggest that parents do find the experience highly stressful (Jackson et al., 2003; Redshaw, 2005). Therefore, the findings from the

Schappin et al. meta-analysis, suggesting that the NICU hospitalization of one's infant is not associated with higher levels of parenting specific stress should be interpreted with some caution.

In the present study, the PSS, a measure of global versus parenting specific stress was used to measure mothers' level of perceived stress. Therefore, mothers' perceived stress cannot be attributed specifically to the NICU hospitalization or need for extended developmental monitoring of their infant or toddler. However, in keeping with the concepts of allostatic load, allostatic accommodation and allostatic overload, the brain as the primary organ of sensation and perception perceives or determines what is threatening or stressful based on current events and experiences accumulated across the life course (Ganzel et al., 2010; McEwen & Gianaros, 2010). Therefore, the evidence suggests that it is individuals' perception of global stress that contributes to their allostatic load, the need to muster the resources for allostatic accommodation or coping and the risk for experiencing allostatic overload. The finding from this study that perceived stress exerted a large effect on the likelihood that mothers would experience higher levels of symptoms of postpartum depression is consistent with the work of Ganzel et al. and McEwen and Gianaros and the pathway between stress and negative health outcomes they describe.

For many parents, the pre-term birth, NICU hospitalization, and extended developmental monitoring of one's child is associated with multiple acute stressors in the form of repetitive infant health crises during the NICU hospitalization as well as chronically high levels of stress associated with caring for an infant or toddler with special health needs after NICU discharge (Busse et al., 2013; Lasiuk et al., 2013; L.T. Singer et al., 2010). Longitudinal studies conducted by Poehlmann et al. (2009) and L.T.

Singer et al. (2010) further suggest that this group of mothers may experience elevated levels of perceived stress and symptoms of depression not only during infants' NICU hospitalization but for as many as 24-36 months after their infant is discharged from the NICU.

In the present study, there were no statistically significant differences in mothers' mean postpartum depression symptoms scores or mean perceived stress scores. Mean stress scores were slightly though not significantly higher among mothers of infants/toddlers older than 4 months while mean depression symptoms scores fluctuated, though not significantly across the infant/toddler age groups. The finding that neither mean depression nor mean stress scores differed significantly across infant/toddler age groups indicates that in this sample, mothers of toddlers being seen for developmental monitoring were experiencing similar levels of depression and stress to mothers of neonates still in the NICU. Findings from the present study were broadly consistent with findings reported by Poehlmann et al. (2009) and L.T.Singer et al. (2010) from studies which followed mothers of infants born preterm prospectively for 36 months and 14 years respectively.

The evidence from the present study, consistent with the literature, indicates that exposure to high levels of perceived stress are strongly associated with the likelihood that mothers will experience symptoms of postpartum depression. In addition, the findings from the present study suggest that mothers may experience chronically high levels of stress and thus be at increased risk for experiencing persistent or remitting and recurring postpartum depression for as many as 24 months after delivery. The extended period of risk for experiencing higher levels of perceived stress and higher levels of postpartum

depression has important implications for health care providers caring for this population of mothers and children.

The strength of the effect of perceived stress on mothers' risk for experiencing postpartum depression, and the evidence that mothers continue to experience persistently elevated levels of perceived stress lends further emphasis to the importance of screening mothers early and often. Screening mothers for symptoms of depression, as well as for factors which indicate they are at increased risk for experiencing depression, soon after delivery as well as periodically during the NICU hospitalization and throughout the period of extended developmental monitoring, would allow healthcare providers to identify and implement targeted interventions with mothers at higher risk for negative outcomes (Beck, 2003).

Avoidance coping and postpartum depression. As hypothesized, higher reliance on avoidance coping was associated with higher postpartum depression symptoms. This finding is broadly consistent with the results reported by Reichman et al. (2000) who examined stress appraisals, use of avoidance coping, and psychological distress in mothers of infants requiring NICU hospitalization. In the present study, mothers' higher reliance on avoidance coping was strongly associated with mothers being more likely to experience more symptoms of postpartum depression.

The serious illness or threat of loss of one's infant is widely accepted to be a highly stressful, highly threatening situation (Redshaw, 2005; Thoits, 1995). Further, the NICU hospitalization of one's infant is a situation in which there is little that parents can control and therefore does not lend itself to active problem solving, a coping strategy that has been linked to more positive mental health outcomes (Taylor & Stanton, 2007). In

such high stress, low control situations, mothers may struggle to come up with stress reducing strategies resulting in a reliance on avoidance coping (Taylor & Stanton, 2007; Thoits, 1995; 2011). How well mothers are able to maintain, or return to physiological and psychological or emotional regulation when exposed to this stressful experience, is critical to whether they will be more likely to experience disorders such as depression or anxiety (Ganzel et al., 2010).

The work of Ganzel et al. (2010) examining the neurobiological underpinnings of exposure to stress, coping or allostatic accommodation and health outcomes, supports the suggestions of Taylor and Stanton (2007) and Thoits (1995, 2010) that in highly threatening situations and situations associated with exposure to chronic stress individuals' ability to deploy adaptive coping strategies may become disordered. Both the prefrontal cortex and amygdala are areas that are strongly influenced by exposure to stress, resulting in disruptions in executive function and emotion regulation which have implications for how individuals perceive events and how they deploy coping resources and strategies (Ganzel at al., 2010; McEwen & Gianaros, 2010). Individuals whose coping capacities have become overwhelmed are more likely to default to avoidance coping strategies such as behavioral disengagement. Results reported by Lasiuk et al. (2013) from their qualitative study with parents of infants requiring NICU hospitalization lend further support to the validity of this phenomenon in mothers of infants requiring NICU hospitalization. Parents in the study reported that they had experienced considerable disorientation after the admission of their infants to the NICU and had initially been unable to muster efforts or strategies for coping with their shock and distress.

Thrust into the foreign setting of a NICU after the births of their infants, mothers' ability to deploy adaptive coping strategies may be compromised due to limited access to adequate coping resources or because they have become stuck in an avoidance coping pattern (Kozlowska et al., 2015; Lasiuk et al., 2013; Shaw, Bernard, Storfer-Isser, Rhine, & Horwitz, 2013). There were no studies using the same specific scales of the BriefCope enabling comparisons of mothers' mean coping scores across studies. However, there is a significant corpus of work linking stressful situations to increased risk for avoidance coping and negative outcomes such as postpartum depression (Honey et al., Terry et al., 1996). The finding that higher reliance on avoidance coping was strongly associated with the likelihood that mothers would experience symptoms of postpartum depression in the context of an adverse experience such as the NICU hospitalization and extended developmental monitoring of one's child also has important implications for healthcare providers caring for this population of mothers and children.

Taken together, the findings from the present study and the literature suggest that perceived stress and coping strategies may be two strong, important predictors of risk/resilience for postpartum depression among mothers of infants who require NICU hospitalization. The primary strategy through which the brain and stress-response-system ameliorate the effects of stress on health is allostatic accommodation or coping. Research suggests that coping strategies are amenable to intervention (Dennis et al., 2009; Melnyk et al., 2006). Thus, screening mothers for levels of perceived stress, coping strategies, and coping resources is crucial to implementing interventions for mothers most at risk for becoming overwhelmed and reliant on avoidance coping.

Practical and relational social support and postpartum depression. In the present study, two social support constructs were examined: practical social support and relationship satisfaction. As hypothesized, mothers who reported receiving more practical social support, including more help with tasks of daily living such as cooking, transportation or childcare, advice or help with finances, had fewer symptoms of postpartum depression. Also, as hypothesized, mothers reporting higher relationship satisfaction had fewer symptoms of postpartum depression. Finally, social support buffered the effects of stress on mothers' symptoms of depression. Mothers with higher perceived stress and higher social support experienced fewer symptoms of postpartum depression than mothers with higher perceived stress and less social support. Practical social support and relationship satisfaction were each strongly associated with postpartum depression, with both exerting a large negative effect on the likelihood of mothers experiencing symptoms of postpartum depression.

Thoits (1995, 2006, 2010, 2011) and Cobb (1976) propose that social support is a key coping resource, and there is a substantial body of research supporting their conclusion. The findings from the present study lend further evidence that social support is linked to positive health outcomes such as a decreased risk for experiencing symptoms of postpartum depression in mothers of infants who required NICU hospitalization. In the present study the findings that higher social support was associated with fewer symptoms of postpartum depression and that higher relationship satisfaction was also associated with fewer symptoms of postpartum depression are consistent with those reported by Gao et al. (2009), Dennis and Letourneau (2007) and Michelson, Riis and Johnson (2016). In

the present study mothers' mean social support scores, measured by the FSSQ were comparable to the mean FSSQ scores reported from the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) study with mothers of young children as well as the mean FSSQ scores reported in the Michelson et al. study.

In addition, the mean CSI-4 score for mothers in this study is consistent with the mean CSI-4 score reported by Goff et al. (2016) in their study of parents of children diagnosed with Trisomy 21. Funk and Rogge (2007), authors of the CSI-4, indicate that scores below 13.5 are suggestive of significant relationship dissatisfaction. Seventy percent of mothers in the present study had CSI-4 scores above 14; suggesting that most mothers, in relationships with a significant other, were satisfied with and derived happiness, warmth and reward from their relationships with their significant other.

The findings from the present study, that social support and relationship satisfaction each exerted a large negative effect on mothers' likelihood of experiencing symptoms of postpartum depression and that social support, at higher levels, buffered the effects of stress on the severity of mothers' symptoms of depression are consistent with the extensive body of literature linking social support as a coping resource to better mental health outcomes (Uchino, Cacioppo & Kiecolt-Glaser, 1996; Thoits, 2010). Social support has been identified as a key mediator of the intersection between exposure to stress, an individuals' threat appraisal, and how an individual will cope with the exposure to stress. The social support literature suggests that social support exerts an influence on well-being through promoting a sense of mattering to others, a sense of being valued and loved, as well as being supported by others and having something to offer others in return (Cobb, 1976; Thoits, 1995).

Unique predictors of risk/resilience for postpartum depression. In the inclusive model that included the interaction term and the risk/resilience factors which were significant in individual hierarchical regression analyses, avoidance coping, relationship satisfaction and the social support x stress interaction term each contributed uniquely and significantly to predicting the likelihood that mothers would experience symptoms of postpartum depression. Pregnancy unhappiness, which exerted a small effect on mothers' postpartum depression risk in individual analyses, was not significant when the other significant factors were included. In addition, the covariate, a history of depression, which was associated with an increased likelihood that mothers would experience postpartum depression in each of the individual analyses, was also no longer significant when all the other significant factors were included together.

Taken together, the findings from the individual analyses and the inclusive model from present study converge with the principles of the LCHD framework (Ganzel et al 2010; Halfon et al., 2014; Thoits, 1995, 2010). This body of work suggests that exposure to high levels of perceived stress is linked to negative health outcomes, such as an increased risk for experiencing depression. However, humans have evolved with the capacity to cope, or to engage in allostatic accommodation in the effort to maintain physiological and psychological regulation when exposed to adverse or stressful events. As previously reviewed, an individual's capacity for allostatic accommodation or coping is heavily influenced by their access to and ability to deploy intrinsic and extrinsic coping resources.

The work of Kozlowska, Walker, McLean and Carrive (2015) and Roelofs (2017) on the *defense cascade* lends support for the concept of avoidance coping as a default

response to highly stressful or threatening situations in the absence of adequate coping resources. Kozlowska et al. and Roelofs suggest that "freezing" is an adaptive, initial response to highly threatening situations. Freezing allows the brain to process all available sensory information and determine which subsequent adaptive strategy will render the best possible chance of survival. However, some individuals appear to be prone to becoming stuck in the freeze response pattern and are unable to move to the next phase of the threat response.

The work of Ganzel et al. (2010), Thoits (2006), and Halfon and colleagues also converge in positing that cumulative life experience, and current contextual factors influence individuals' current coping capacities and how individuals will perceive and cope with a specific stressor or adverse event. Contextual factors, such as social isolation, poverty, previous exposures to adversity, systematic discrimination, or minority status, are all situations or circumstances in which an individual's coping options are mildly to severely constrained. The preponderance of evidence from the literature indicates that when coping resources are severely limited and an individual cannot physically or cognitively access or deploy some or any specific coping strategies, the individual has little recourse but to default to avoidance coping.

Individuals' subjective perception of a stressful or adverse event plays a significant role in what constitutes a toxic versus a tolerable event (McEwen & Gianaros, 2010; McEwen et al., 2015). When individuals perceive themselves as having access to adequate coping resources, they are more likely to employ more adaptive versus avoidant coping strategies. When exposure to adverse events overwhelm an individual's coping capacities and resources the evidence suggests they are more likely to default to avoidant

coping.

In keeping with the positive, tolerable or toxic taxonomy recommended by The National Scientific Council for the Developing Child (2014) and Shonkoff (2010), social support is a key a mediator of individuals' appraisal of events or stressors as positive, tolerable, or toxic. Experiencing toxic stress is strongly influenced by individuals' subjective perceptions of the stressful or adverse event (McEwen & Gianaros, 2010; McEwen et al., 2015). When individuals perceive themselves as having access to adequate coping resources, particularly warm nurturing relationships, they are more likely to employ adaptive coping strategies (Thoits, 1995, 2006). When exposure to adverse events overwhelm an individual's coping capacities and resources, they are more likely to default to avoidant coping and less likely to exhibit resilience (Center on the Developing Child, 2015; Ganzel et al., 2010).

The findings from the present study are consistent with this proposed intersection between stress, social support, coping and mental health outcomes in this group of mothers. Given the strength of the associations between stress, avoidance coping, and social support, findings from the present study provide evidence that these factors are strong predictors of the likelihood that mothers will experience symptoms of postpartum depression. Further, the findings from the present study suggest that perceived stress, avoidance coping and social support should be included in further research with the aim of developing a brief, easily administered yet accurate and consistent tool for evaluating mothers risk/resilience for developing symptoms of postpartum depression.

Pregnancy unhappiness and postpartum depression. Consistent with the results reported by Blake et al (2007) and McQuillan et al (2011), pregnancy unhappiness

exerted a small but significant effect on the likelihood that mothers would experience symptoms of postpartum depression when examined as an isolated risk factor for postpartum depression. Blake et al. reported that women who were unhappy about their pregnancies were more likely to experience elevated symptoms of depression during pregnancy than women who reported that they were happy about their pregnancies. In addition, some mothers who reported that their pregnancy was not planned nevertheless reported that they were happy about their pregnancies. In addition, McQuillan et al (2011) propose that a growing body of research in the emerging field of fertility intention indicates that nearly one-quarter (23%) of childbearing women appear to be ambivalent or "okay either way" (McQuillan et al., 2011) with becoming pregnant and becoming a mother. Therefore, the findings from the present study support the evidence that pregnancy unhappiness is likely to capture some measure of the psychological impact or "wear and tear" of pregnancy on a woman's mental health. However, in the present study, pregnancy unhappiness did not prove to be a strong predictor of the likelihood that mothers would experience symptoms of postpartum depression. Therefore, given the need for brief, easily-administered measures of risk/resilience for postpartum depression, including pregnancy unhappiness as a risk factor may not be merited.

Infant illness and postpartum depression. Although the illness or threat of the loss of a child or loved one has been linked to general symptoms of distress in the literature (Bowlby, 1980; Reichman et al., 2000), this study did not find that mothers of infants who had more severe illness were more likely to experience symptoms of postpartum depression. This result contradicts the findings of Holditch-Davis et al. (2009), who reported that mothers of more severely ill infants are more likely to

experience symptoms of depression and PTSD. However, it is consistent with results reported from McManus and Poehlmann (2012), Belanger (2007) and R. Feldman et al. (1999). The discrepancy across studies could be attributed to the differences between how mothers' responses to infant illness are measured. Holditch-Davis et al. measured mothers' parenting stress and their responses to the appearance of their infants and the NICU environment. Mothers' perceived global stress in the present study was measured through self-report and a severity of infant illness score derived solely from data abstracted from infants' medical charts. While a strength of objective measures of infant illness derived from infants' medical charts is the ability to accurately predict children's subsequent developmental outcomes, there is growing evidence that such objective measures of the severity of infant illness fail to capture mothers' emotions and concerns about the illness of their children. Therefore, evidence suggests that the most appropriate use for severity of illness scores generated from infant chart data may be as a control variable for intervention programs targeting infant health and developmental outcomes.

Developmental delay and postpartum depression. It was also hypothesized that a child's developmental delay, as determined by the Best Beginnings Developmental Screen (Hussey-Gardner, 2006), would exhibit a main effect on mothers' symptoms of postpartum depression. Few studies have examined this link. In a meta-analysis examining the effects of stress-management interventions for parents of children with developmental disabilities, G.H. Singer et al. (2007) concluded that mothers of children with developmental disabilities experience more stress and depression than mothers of typically developing children. In addition, they reported that, in general, parent distress is associated with higher reported child problem behaviors, rather than the child's diagnosis

of DD/ID in this group of mothers. Evidence from the literature suggests that children's scores on measures of child behavioral problems (not measured in the present study) are the stronger, more consistent predictor of maternal mental health rather than children's performance on a developmental screen (Bhutta et al., 2002; Families Special Interest Research Group, 2013; M. Feldman et al., 2007). Further, it is plausible that mothers were not significantly concerned about the results of the single screening. Mothers are informed that experiencing delays in development associated with a NICU hospitalization are not uncommon and that experiencing a developmental delay is not the same as receiving a diagnosis of DD/ID. Mothers were also informed, as appropriate, that infants or toddlers who are found to have a developmental delay and are referred for early intervention services often *catch up* and meet expected developmental milestones at a future screening. Finally, in the present study, infants' developmental status and mothers' symptoms of depression were measured at the same clinic visit therefore, it is plausible that the impact of the child's delay on maternal distress was not adequately captured.

Aim 2: Barriers to Receiving Diagnosis or Treatment for Postpartum Depression

The primary objective for Aim 2 was to understand mothers' perspectives regarding barriers to receiving a diagnosis or treatment for symptoms of postpartum depression. In contrast to the conclusions of Sobey (2002), the majority (77%) of mothers in the study sample knew where they could access supports or services for symptoms of postpartum depression. Also of importance, the majority (86.5%) reported that they believed that children ages 2 and younger notice when mothers are experiencing symptoms consistent with postpartum depression. Most mothers indicated that seeking help or support for symptoms consistent with postpartum depression would be important.

In addition, the majority of mothers not only indicated that they would be comfortable with seeking help or support if feeling "down or blue", symptoms consistent with postpartum depression, but that they also would be comfortable receiving support from doctors, nurses, social workers, psychologists, mental health counselors, or clergy. Finally, two-thirds of (62.8%) of the mothers believed that mothers' symptoms of postpartum depression would exert a negative influence on children's acquisition of language and other skills.

Taken together, the results from Aim 2 of the study are not consistent with those reported in previous studies evaluating mothers' awareness of where they can access services for symptoms of depression, as well as their concerns regarding the stigma associated with diagnosis or treatment for postpartum depression. Many researchers have reported that stigma is a concern, and thus a barrier to mothers' receiving care for symptoms of postpartum depression (Bilszta, Ericksen, Buist & Milgrom 2010; Gjerdingen & Yawn, 2007). Therefore, the findings from the present study are somewhat surprising. In this study, approximately two-thirds of (68.2%) mothers reported that they would (1) not be at all nervous about asking for help with feeling down or blue after having a baby, or (2) (66.2%) would not be worried about people thinking that they were not a good mother if they asked for help with feeling down or blue after having a baby.

However, it is quite possible that how the questions for the present study were worded contributed to mothers' level of comfort. Mothers were asked if they were nervous or worried about seeking support or help with "feeling down or blue" and not about seeking support or help with feeling depressed. The wording of the questions was chosen based on literature review and previous experience with African American

mothers who are lower-income. In a previous study (Belanger, 2007) many mothers spoke of feeling "low", "down" or "blue" but mothers' BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) scores did not reflect their vocalized experiences. Aim 2 of the study was intended to explore and examine barriers associated with language, labels and stigma. The findings from the present study must be interpreted with caution; mothers' willingness to talk about feeling "down or blue" may not reflect their willingness to talk about being depressed.

Other possible explanations for these contradictory findings include the problem of social desirability. Mothers whose infants were being cared for in the NICU or being seen for developmental follow-up may have been concerned about admitting that they were not comfortable talking with doctors, nurses, social workers or hospital chaplains about their symptoms of depression. There were no social desirability checks as components of questionnaires administered, nor were any separate checks for social desirability included in the present study. Therefore, it is not possible to tease out whether social desirability played a confounding role in mothers' responses to the research questions for Aim 2.

In contrast to social desirability as an explanation for the unexpected findings for the Aim 2 research questions, it is also plausible that this group of mothers were very comfortable talking with doctors, nurses and other medical professionals. Infants whose mothers were in the study were hospitalized for a mean of 47 days and were subsequently being seen by one or more specialists approximately every three months suggesting that this group of mothers had extensive contact with multiple healthcare providers. In addition, approximately 21% (20.9%) reported having already received a diagnosis of

depression during pregnancy, postpartum, or at another time in their life. Further, the family-centered model of care implemented in the NICU incorporates aspects of parent well-being through access to support from social workers, nurses and clergy. Therefore, it is possible that mothers of infants who require NICU hospitalization face fewer barriers to receiving supports for symptoms of postpartum depression. Further research examining mothers' access to information, support, diagnosis and treatment for symptoms of postpartum depression in this population of mothers is warranted.

Limitations

There are five limitations to this study. First, the correlational design precludes drawing causal conclusions. Second, the design was not prospective and did not include multiple assessments of symptoms of postpartum depression across the first 24 months postpartum. This diminishes the ability to make inferences about whether mothers' symptoms of depression began during pregnancy and continued into the postpartum period or whether the onset of symptoms occurred in the postpartum period. Third, the study lacked a comparison group of mothers of infants born full term. Thus, it is not possible to definitively determine whether NICU mothers had higher rates of postpartum depression symptoms than mothers of typically developing, infants born full term. Fourth, there was no measure of mothers' satisfaction with their infants care team or how well their infants' care team communicated information to them. There is some evidence that mothers' who are dissatisfied with their infants care or communication style of the care team may be at higher risk for experiencing postpartum depression (Beck, 2003). Fifth, the study did not include fathers. Fathers are a primary source of support for mothers and are also at risk for experiencing depression during the transition to

parenthood, thus it is extremely important that future risk/resilience research include the fathers as well as mothers of infants who required NICU hospitalization. Nevertheless, this study does make important contributions to the postpartum depression literature.

Conclusions and Future Directions

This study is one of the few conducted with the specific aim of identifying a set of robust or strong, accurate predictors of risk for or resilience to developing symptoms of postpartum depression in mothers of infants who required NICU hospitalization. Findings from the present study provide evidence that perceived stress, avoidance coping, and practical and relationship specific social support are strong predictors of risk for or resilience to developing postpartum depression in mothers of infants who required NICU hospitalization. Further, these findings lend support for the viability of developing a brief, easily administered tool to simultaneously screen mothers for risk and resilience factors. Evidence from the present study and the broader literature suggests that screening mothers for risk factors such as perceived stress, coping strategies, and practical and relational social supports could identify mothers who are at increased risk for negative outcomes. However, screening mothers and thus identifying those at risk for postpartum depression would be pointless without the probability that healthcare professionals could act upon the information screening will provide. Taylor and Stanton (2007) and Thoits (1995, 2006, 2010, 2011) suggested that coping strategies and coping resources may be amenable to interventions. Studies conducted by Melnyk et al. (2006), Dennis et al. (2009), and Preyde and Ardal (2003) provide preliminary evidence for the efficacy of intervention programs.

Postpartum depression contributes to significant suffering, diminished quality of life and negative health trajectories for mothers and fathers (Boath et al., 2005; Setse et

al., 2009). Postpartum depression also has significant implications for children's development and life course health trajectories (Halfon et al., 2014; Shonkoff et al., 2009). Mothers who suffer from untreated postpartum depression are more likely to experience symptoms that persist for as long as 24 months after the onset of symptoms (Josefsson & Sydsjo, 2007; Letourneau et al., 2012), are twice as likely to experience a recurrence of depression within 5 years, and up to 300 times more likely to experience depression after a subsequent pregnancy (Morrell et al., 2016). Thus, postpartum depression is a family affair (Letourneau et al., 2012) and a significant public health issue (Gollan et al., 2017).

Further research to develop a brief, easily administered measure to screen mothers for risk and resilience for postpartum depression is needed. Such a measure should evaluate mothers' (a) perceptions of access to practical social supports, (b) satisfaction or perceptions of warmth and nurturance from their significant other, family and friends, (c) perceived stress, and (d) coping strategies. Incorporating these factors into screening measures may significantly improve the ability to predict which mothers would benefit most from targeted prevention and intervention strategies, starting while infants are still in the NICU.

It is also extremely important to include fathers in future research. Fathers are not only at risk for postpartum depression themselves but are also a primary source of support for mothers. Because fathers may experience less support in the face of infant illness than mothers, assessing the availability of support from their social network and their satisfaction with the significant other relationship is crucial. Training for physicians, nurses and social workers should emphasize that both mothers and fathers are vulnerable

to experiencing high levels of perceived stress and symptoms of postpartum depression, either of which have substantial implications for life course health trajectories for the entire family. Incorporating screening for mothers and fathers as part of best practice protocols may significantly improve the ability of healthcare providers to identify those mothers or fathers who may benefit most from targeted prevention and intervention strategies. Efforts to bring screening to scale for this population of vulnerable parent-infant dyads are vital to addressing this significant public health concern (National Scientific Council on the Developing Child, 2010, 2012; Wachs et al., 2009).

Appendix A: Edinburgh Postnatal Depression Scale

As you are a mother and have an infant or young child, we would like to know how you are feeling lately.

Please check the answer that comes closest to how you have been feeling IN THE PAST 7 DAYS, not just how you feel today.

Here is an example, already complete.

I have felt happy:
_____Yes, all of the time
_x___Yes, most of the time
_____No, not very often
_____No, not at all

This would mean: "I have felt happy most of the time" during the past 7 days
Please complete these questions in the same way.

<u>In the past 7 days:</u>

1. I have been able to laugh and see the funny side of things

   _____As much as I always could

   _____ Not quite so much now

   _____ Definitely not so much now

   _____ Not at all

2. I have looked forward with enjoyment to things
   _____ As much as I ever did

   _____ Somewhat less than I used to

   _____ Definitely less than I used to

   _____ Hardly at all

3. I have blamed myself unnecessarily when things went wrong
   _____ Yes, most of the time

   _____ Yes, some of the time

_____ Not very often

_____ No, never

4. I have been anxious or worried for no good reason

   _____ No, not at all

   _____ Hardly ever

   _____ Yes, sometimes

   _____ Yes, very often

5. I have felt scared or panicky for no very good reason

   _____ Yes, quite a lot

   _____ Yes, sometimes

   _____ No, not much

   _____ No, not at all

6. Things have been getting the better of me

   _____ Yes, most of the time I haven't been able to cope at all

   _____ Yes, sometimes I haven't been coping as well as usual

   _____ No, most of the time I have coped quite well

   _____ No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping

   _____ Yes, most of the time

   _____ Yes, sometimes

_____ Not very often

_____ No, not at all

8. I have felt sad or miserable

_____ Yes, most of the time

_____ Yes, quite often

_____ Not very often

_____No, not at all

9. I have been so unhappy that I have been crying

_____ Yes, most of the time

_____ Yes, quite often

_____ Only occasionally

_____ No, never

10. The thought of harming myself has occurred to me

_____ Yes, quite often

_____ Sometimes

_____ Hardly ever

_____ Never

1 Source: Cox, J. L., Holden, J. M., & Sagovsky, R. R. (1987). Detection of postnatal depression: Development of the 10-item Edinburgh postnatal depression scale. *The British Journal of Psychiatry*, *150*, 782–786. doi:10.1192/bjp.150.6.782

2 Source: Wisner, K. L., Parry, B. L., & Piontek, C. M. (2002). Postpartum depression. *New England Journal of Medicine, 347,* 194–199. doi:10.1056/NEJMcp011542

Appendix B: Infant Demographic, NICU Health & Developmental Delay Scale

Gender Male = 1 Female = 2

Birth Weight: _____

0 = 2501 grams and over

1 = 1501–2500 grams

2 = 1001–1500 grams

3 = 1000 grams or less

4 = < 24 weeks

Gestational Age:

0 = > 36 weeks

1 = 32–35+ weeks

2 = 28–31+ weeks

3 = 24–27+ weeks

Length Of Stay (days):_____

Cardiac:

0 = No cardiac issues or events

1 = cardiac issues no tx or tx w/meds (PDA)

2 = cardiac issue tx w/ surgery

GI:

0 = No GI issues or events

1 = Noted medical GI issue/event (meds)

2 = Noted surgical GI issue/event (surg.)

Brain Other (Dandy Walker, HIE etc.)

0 = No "other" brain issues or events

1 = Brian Other w/o long term developmental consequences

2 = Brain Other with long term developmental

Medical Other (kidney, liver etc.)

0 = No medical other issues or events

1 = 1 noted issue/event (kidneys, liver etc.)

2 = More than one noted consequences issue/ event

3 = Medical issue requiring surgical intervention

Genetic: (concerns, test for syndromes, trisomy…..)	Days O2:
0 = No genetic concerns or testing	0 = No days O2
1 = Tests for syndromes etc. done, neg or results not back	1 = ≤ 7 days
2 = Trisomy 21, or other assoc. w/ longterm	2 = 8 – 28 days
Developmental or heath consequences	3 = 29 – 60 days
	4 = > 60 days

Health & Development Indicators: NICU Follow-Up Babies

Growth: (any parameter, head circ., length, weight = < less than 5%)

0 = No 1 = Yes

Hospitalized: 0 = No 1 = Yes

Specialists seen: 0 = No, 1 = 1, 2 = 2, 3 = 3, 4 = 4 or more specialists seen since last visit

Enrolled ITP: 0 = No 1 = Yes

Neurosensory: (response to bell etc.) Normal/ WNL : 0 = No 1 = Yes

Tone: Normal / WNL:0 = No (no hyper or hypotonia) 1 = Yes (hyper or hypotonia noted)

BBDS: 0 = Refer 1 = Suspect 2 = Pass

Appendix C: Mom— Demographics and Social History

About Me and My Baby

We would like to ask you some questions about your baby, and you. All of the answers you provide are confidential.

Mom:

1.) How old are you? _____

2.) Do you consider yourself___? Please Circle One.

Black / African American—A person having origins in any of the black racial groups of Africa.

White—A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

Hispanic / Latino—A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.

Non Hispanic / Latino.

Native American / Alaska Native—A person having origins in any of the original peoples of North and South America.

Asian—A person having origins in any peoples of the Far East, Southeast Asia, or the Indian Islands.

Native Hawaiian / Other Pacific Islander—A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

3.) What was the highest grade or degree that you completed?

_____ Some High School

_____ High School Diploma or GED

_____ Some College

_____ Associate's Degree or vocational school

_____ Bachelor's Degree

_____Master's Degree or other graduate degree

4.) What is your household income from all sources?

_____ $ 10,000 or less _____ $ 50,000 or less

_____$ 20,000 or less _____$ 60,000 or less

_____$ 30,000 or less _____$ 70,000 or more

_____$ 40,000 or less

5.) Please let us know everyone who lives with you, we only want to know whether they are male or female, how old they are and how they are related to you.

GENDER	AGE	RELATIONSHIP TO YOU
EX: Female	3	daughter

5.) At the present time, are you married? _____YES _____NO

5a.) Or are you_____? Please check all answers below that apply.

_____Single, not currently in a relationship

_____ Living with, but not married to my partner/significant other.

_____ Dating/ Involved with but not living with my significant other.

_____Separated or Divorced.

6.) Would you say that this pregnancy was:

_____ A total surprise. At this time I was not planning to get pregnant.

_____ The timing was off, I wanted a baby at some point but was not planning to get pregnant when I did.

_____ A planned event- I wanted to have a baby and was trying to get pregnant.

7.) Please circle the response that is closest to how you felt when you first found out you were pregnant for this baby.

Very Unhappy	Unhappy	Neutral	Happy	Very Happy
____	____ ___	____	____ ___	

8.) Please circle the response that is closest to how your baby's father responded when he first found out you were pregnant for this baby.

Very Unhappy	Unhappy	Neutral	Happy	Very Happy
____	____ ___	____	____ ___	

9.) I would like you to think about your pregnancy and your baby's birth. How involved would you say the baby's father was during your pregnancy and the baby's birth?

Some examples of involvement include: attending prenatal appointments, being at the hospital when the baby was born, participating in meetings with medical staff about the baby's health, visiting the NICU regularly?

Not at all Involved	A little Involved	Involved	Very Involved
_____	_____ _____	_____	_____

10.) How involved is the baby's father in the baby's life now?

Some examples of involvement now might include: spending time with the baby, helping care for the baby (feeding, diapers, bathing), taking the baby to childcare, taking the baby to or attending doctors appointments.

Not at all Involved	A little Involved	Involved	Very Involved
_____	_____ _____	_____	_____

11a.) Were you ever diagnosed with depression during a pregnancy?

_____YES _____NO (check one).

11b.) Were you ever diagnosed with depression after having a baby?

_____YES _____NO (check one).

11c.) Were you ever diagnosed with depression at any other time in your life?

_____YES _____NO (check one).

12.) Did your grandmother, mother, aunt(s) or sister(s) ever become depressed or receive a diagnosis of postpartum depression after they had a baby?

_____YES _____NO (check one)

Appendix D: Perceived Stress Scale (S. Cohen, Kamarck, & Mermelstein, 1983; S. Cohen & Williamson, 1988)

My Feelings and Thoughts

Instructions: The questions in this scale ask you about your thoughts and feelings in the last month. In each case, please indicate with a check how often you felt or thought a certain way.

1. In the last month, how often have you been upset because of something that happened unexpectedly?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

2. In the last month, how often have you felt that you were unable to control the important things in your life?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

3. In the last month, how often have you felt nervous and "stressed"?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

4. In the last month, how often have you felt confident about your ability to handle your personal problems?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

5. In the last month, how often have you felt that things were going your way?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

6. In the last month, how often have you found that you could not cope with all the things that you had to do?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

7. In the last month, how often have you been able to control irritations in your life?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

8. In the last month, how often have you felt that you were on top of things?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

9. In the last month, how often have you been angered because of things that were outside of your control?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
___never ___ almost never ___ sometimes ___ fairly often ___ very often

Appendix E: BriefCOPE (Carver, 1997; Carver, Scheier & Weintraum, 1989)

How I Deal With Things

These items deal with ways you've been coping with the stress in your life in the last month. Different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

1. I've been getting emotional support from others.

_____ I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

2. I've been giving up on trying to deal with the stress.

_____I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

3. I've been using alcohol or other drugs to make myself feel better.

_____I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

4. I've been getting comfort and understanding from someone.

_____I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

5. I've been blaming myself for things that happened.

_____I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

6. I've been trying to see things in a different light, to make things seem more positive.

_____I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

7. I've been looking for something good in what is happening.

_____I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

8. I've been giving up the attempt to cope.

_____I haven't been doing this at all

_____I've been doing this a little bit

_____I've been doing this a medium amount

_____I've been doing this a lot

9. I've been getting help and advice from other people.

_____I haven’t been doing this at all

_____I’ve been doing this a little bit

_____I’ve been doing this a medium amount

_____I’ve been doing this a lot

10. I've been using alcohol or other drugs to help me get through it.

_____I haven’t been doing this at all

_____I’ve been doing this a little bit

_____I’ve been doing this a medium amount

_____I’ve been doing this a lot

11. I've been criticizing myself.

_____I haven’t been doing this at all

_____I’ve been doing this a little bit

_____I’ve been doing this a medium amount

_____I’ve been doing this a lot

12. I've been trying to get advice or help from other people about what to do.

_____I haven’t been doing this at all

_____I’ve been doing this a little bit

_____I’ve been doing this a medium amount

_____I’ve been doing this a lot

Appendix F: Duke UNC Functional Social Support Questionnaire
(Broadhead, Gehlbach, de Gruy, & Kaplan, 199)

Help From My Family and Friends

Here is a list of some of some things that other people do for us or give us that may be helpful or supportive. Please read each statement carefully and place a check mark in the blank that is closest to your situation.

HERE IS AN EXAMPLE: Vacation time, I get_____ than I would like.

As much	Almost as much	Less	Much less
1_____	2__X_____	3_____	4_____

If you put an X where we have, it means that you get <u>almost</u> as much vacation time as you would like, <u>but not as much</u> as you would like.

HERE IS ANOTHER EXAMPLE: Money, I have _____than I would like.

As much	Almost as much	Less	Much less
1_____	2__X_____	3_____	4_____

If you put an X where we have, it means that you have some money but would like to have much more.

Please answer each item as best you can. There are no right or wrong answers.

1. People who care what happens to me. I have_____ I would like.

As many as	Almost as many as	Less than	Much less than
1_____	2__X_____	3_____	4_____

2. Love and affection. I get_____ I would like.

As many as	Almost as many as	Less than	Much less than
1_____	2__X_____	3_____	4_____

3. Chances to talk to someone about problems at work or with my housework. I have_____ I would like

As much as	Almost as much as	Less than	Much less than
1_____	2__X_____	3_____	4_____

4. Chances to talk to someone I trust about my personal and family problems. I have_____ I would like.

As much as	Almost as much as	Less than	Much less than
1_____	2__X_____	3_____	4_____

5. Chances to talk about money matters. I have_____ I would like.

As much as	Almost as much as	Less than	Much less than
1_____	2__X_____	3_____	4_____

6. Invitations to go out and do things with other people. I get_____ I would like.

As much as	Almost as much as	Less than	Much less than
1_____	2__X_____	3_____	4_____

7. Useful advice about important things in life. I get_____I would like.

As much as	Almost as much as	Less than	Much less than
1_____	2__X_____	3_____	4_____

8. Help when I need transportation. I have_____ I would like.

As much as	Almost as much as	Less than	Much less than
1_____	2__X_____	3_____	4_____

9. Help when I am sick in bed. I get_____ I would like.

As much as	Almost as much as	Less than	Much less than
1_____	2__X_____	3_____	4_____

10. Help with cooking and housework. I have_____ I would like.

As much	Almost as much	Less	Much less
1_____	2__X_____	3_____	4_____

For the next 2 questions we would like you to tell us more in your own words. (Added questions 11 & 12)

11. Please tell us about what is helping you the most right now.

_____
_____
_____
_____
_____

12. If you could choose one more thing that would be helpful for you now, what would it be?

_____
_____
_____
_____
_____

Appendix G: Couples Satisfaction Index 4-Item (Funk & Rogge, 2007)

If you are single and not currently in a relationship; check N/A (not applicable) you do not need to complete this survey. N/A _____

1. Please indicate the degree of happiness, all things considered, of your relationship?

Extremely Unhappy ____ Fairly Unhappy ___ A Little Unhappy ____

Happy ___ Very Happy ____ Extremely Happy _____ Perfect _____

2. I have a warm and comfortable relationship with my partner?

Not at All True _____ A Little True _____ Somewhat True _____

Mostly True ____ Almost Completely True _____ Completely True _____

3. How rewarding is your relationship with your partner?

Not at All _____ A Little ____ Somewhat ___

Mostly ___ Almost Completely ____ Completely _____

4. In general, how satisfied are you with your relationship?

Not at All _____ A Little _____ Somewhat ____

Mostly _____ Almost Completely ____ Completely ___

Appendix H: AFTER A BABY SURVEY

We would like to ask mothers about some of the thoughts; feelings or experiences mothers sometimes have around the time their baby is born or during the first 2 years of their child's life.

Please circle your answer.

1.) After you had your baby did any of your family, friends or doctors tell you that all or most mothers get "the blues" after having a baby?

YES NO

2.) Did you sometimes feel down or blue for a week or more after your baby was born?

YES NO

3.) Do you think that a mother who feels down or blue for more than a few weeks after having a baby, will feel less down or blue if she gets more sleep?

YES NO

4.) Do you think a mother who feels down or blue for more than a few weeks after having a baby should get help from someone, such as a friend, family member or a doctor?

YES NO

5.) Do you think babies or children less than 2 years old notice if their mother is down or blue?

YES NO

6.) Do you think babies or children under 2 years old, whose mother's feel down or blue for more than a few weeks, learn social skills and thinking skills the same as children whose mothers do not feel down or blue?

YES NO

7.) Do your think a mother can interrupt her baby's sleeping or eating by worrying too much?

YES NO

8.) Do you know where mothers who feel down or blue can get help if they need some help?

YES NO

9.) Do you think women who feel down or blue after having a baby can still be a good mother?

YES NO MAYBE

10.) Would you be nervous about asking for help with feeling down or blue after having a baby?

Not at all nervous _____ A little nervous _____ Very nervous _____

11.) Would you be worried about people thinking you were not a good mother if you were to ask for help with feeling down or blue after having a baby?

Not at all worried _____ A little worried _____ Very worried _____

12.) If you needed help with feeling down or blue after having a baby, where would you want to go to get the help and support you needed?

Your doctor, pediatrician, or nurse?	Yes	No
Psychologist, social worker or therapist ?	Yes	No
Pastor, priest or counselor at your church or a church?	Yes	No
Mother, aunt, father, sibling or other relative ?	Yes	No

13.) Which one of the people listed above (question 12), would you be most willing to go for help or supports if you were feeling down or blue after having your baby?

Please Check Only One Answer

Doctor or medical professional _____ Pastor or religious advisor _____

Psychologist or mental health professional _____ Relative/Friend _____

14.) Which service would you be most likely to participate in if you were feeling down or blue after having your baby? Please Check Only One Answer

A.) A group with other parents_____

B.) A home visit from a nurse or social worker_____

C.) A private meeting(s) with a social worker or counselor_____

D.) A faith based group at your church_____

E.) Other_____

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