

PERINATAL STRESS AS A PREDICTOR OF MATERNAL SELF-EFFICACY BELIEFS

by

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(Under the Direction of Kristen L. Bub)

ABSTRACT

Research suggests that maternal self-efficacy (SE) beliefs are related to a variety of parenting practices. Additional work is needed to understand the child and family variables that may contribute to the development of SE. Stressful experiences during the perinatal period may impact how mothers feel about their parenting abilities. The purpose of this study was to examine variables known to be markers of stress and their relationship with SE during early infancy among a sample of mothers (N = 1,364). Mothers' reports of their perinatal stress were dichotomized to create a risk index, such that the higher the risk index, the more stress a mother experienced perinatally. Multiple regression models revealed a significant association between the number of stressors a mother experienced perinatally and her SE when her child was 6-months such that women who experienced more stress perinatally exhibited poorer SE beliefs. Implications for practice and interventions are discussed.

INDEX WORDS: maternal self-efficacy, perinatal stress, parenting practices

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CHAPTER 1

INTRODUCTION

Maternal self-efficacy (SE), defined as a mother's beliefs about her ability to manage the different tasks of parenthood effectively, has been identified as a critical component of child and family functioning (Chau & Giallo, 2015; Jones & Prinz, 2005; Mouton & Roskam, 2015; Sanders & Woolley, 2005). Maternal SE beliefs are important for mother's parenting behaviors and adaptive coping, as well as for children's behavior and development (McDonald et al., 2016; Page et al., 2010). Although progress has been made in understanding the importance of maternal SE, important gaps remain in our knowledge of which specific child and family variables may contribute to the development of maternal SE in infancy. Pregnancy and the transition to parenthood can be a time of great change and stress for mothers. These stressful experiences, both prior to and immediately after a child's birth, may contribute to the way mothers feel about their parenting abilities. To help understand the precursors of maternal SE during infancy, we used various experiences related to the transition to parenthood to explore whether perinatal (meaning both the prenatal and postnatal time periods) stress predicts later maternal SE.

Maternal Self-Efficacy

The thoughts and feelings that parents have about their parenting can affect how they parent their children. The theory of self-efficacy (SE) was first introduced by Bandura (1977) to explain how a person's expectation and perception of mastery can influence his or her actions in order to produce a desired outcome. This theory has been applied to parenting to help understand

how parental expectations can impact parenting behaviors. Parental SE is defined as parents' perceived competence and ability to positively influence the behavior and development of their children (Coleman & Karraker, 2003). These parental cognitions and beliefs are important for understanding parenting practices because they can help explain how parents acquire and exercise effective parenting skills. Although the definition refers to parental SE, much of the research in this area has been done with mothers (Murdock, 2013); thus, the term maternal SE will be used throughout the remainder of this paper.

When applying the principles of social learning theory (Bandura, 1989) to our understanding of maternal SE, the expectations mothers have about their ability to personally affect their child originate from different informational sources. Mothers' mastery expectations are impacted by their personal history of successes and failures along with vicarious experiences that can help mothers make estimations pertaining to their own efficacy and mastery in certain situations. For example, mothers may rely on any previous experiences they have had related to children and caregiving to form their own self-perceptions of mastery for parenting. Mothers also receive verbal feedback from others that helps to develop and influence their own beliefs of potential for success in certain situations. Finally, when mothers experience failure or success, they experience positive or negative emotional arousal that can be associated with various levels of success expectancies, or experiences where mothers feel capable in their parenting abilities. Although the ways in which maternal SE can develop are not particularly well-understood, the existing research illustrates the important correlation between beliefs of competency and the adjustment to parenthood (Bloomfield & Kendall, 2007; Coleman & Karraker, 1998; Whittaker & Cowley, 2012). Understanding variables that may challenge the development of maternal SE

is an important avenue of research because of the potential for intervention to help mothers develop strong SE beliefs, and one that will be addressed in the current study.

Maternal SE has been found to be a key correlate of various parenting practices (Bornstein et al., 2018; Tazouti & Jarlégan, 2019). Bloomfield and Kendall (2012) noted that parents of children aged 10 and younger who felt less efficacious in their parenting experienced higher levels of stress and parents who experienced higher levels of SE experienced less stress. Giallo and colleagues (2013) found that mothers with high self-reported maternal SE were more likely to engage in activities with their children aged 0-4 years old. Maternal SE has also been associated with positive child outcomes, including academics. Ardelt and Eccles (2001) found that the children of mother's who reported high SE were more likely to have high SE themselves, which in turn was found to be positively and significantly related to their academic success. Maternal SE has also been linked to self-regulation and inhibitory control in toddlerhood (Gärtner et al., 2018). A mother with poor SE beliefs about her ability to parent effectively may experience more difficulties with parenting that can lead to frustration, which may in turn lead to poor co-regulation skills that help children develop self-regulatory behaviors (Jones & Prinz, 2005). Many researchers have examined the links between maternal SE and outcomes for both parent and child; however, few researchers have investigated the predictors of maternal SE, especially early in life.

Evidence suggests that parental SE begins to develop as early as the prenatal period, specifically for mothers, yet longitudinal studies examining the link between prenatal and postnatal variables and later SE are limited (Leahy-Warren & McCarthy, 2011; Wernand et al., 2014). Understanding the precursors to maternal SE can be helpful in understanding how parenting behaviors evolve. Moreover, knowing what factors contribute to the development of

high or low maternal SE, even before the infant is born, can help inform practice by allowing for screeners to be implemented based on variables that may put a woman at risk for developing poor SE beliefs. This research can guide the development of targeted interventions that could be used for increasing the competency beliefs in mothers who may be at risk for developing low maternal SE in infancy. Because we know very little about the predictors of SE in the perinatal period (meaning both the prenatal and postnatal time periods), our goal was to examine the direct associations between perinatal stress and maternal SE during this understudied developmental period.

Perinatal Stress

Researchers have begun to investigate the role that perinatal stress plays in child development. The term “perinatal” is unclear in the literature. The definition of perinatal often encompasses time during pregnancy and after birth; however, there is some debate about the specific time frames of the perinatal period. Most researchers use a prenatal period starting 1 year before birth and a postpartum period ranging from 4 weeks post-delivery to 3 months post-delivery to define the perinatal period (Garcia & Yim, 2017; O’Hara & Wisner, 2014). For the current study, the perinatal period will be defined as the period from 1 year prior to birth to 4 weeks after delivery. Although stress can be a generic term, perinatal stress is a term that encompasses a wide range of different experiences, such as personal and environmental characteristics and events. It can be seen as a multi-dimensional concept that combines measures of acute and chronic stress with subjective perceptions of stressful stimuli (Beydoun & Saftlas, 2008). Perinatal stress can be defined as stress experienced both prenatally and postnatally within the first month of life and can encompass a broad range of negative emotional and physical experiences that occur during the transition to parenthood (Rallis et al., 2014).

Prenatal stress may have a long-lasting impact on the physical and psychological development of offspring, but much of the work done to examine these associations has been done in animal models (Charil et al., 2010; Harris & Seckl, 2011; Welberg & Seckl, 2001). In human studies, prenatal stress is often measured using two sets of factors: stress-provoking factors (e.g., life events such as job loss) and stress-resulting factors (e.g., perceived stress such as pregnancy anxiety) (Huizink et al., 2004). Research has shown that both of these factors are related to child outcomes. For example, prenatal stress is often associated with lower gestational age and lower birth weight (Merklinger-Gruchala & Kapiszewska, 2019; Rice et al., 2010). Prenatal stress experienced by mothers has also been shown to predict motor development in infants; Buitelaar and colleagues (2003) found that pregnancy-specific anxiety predicted lower motor development scores at 8 months. Prenatal stress has also been shown to impact children's social-emotional development. Women who exhibited more perceived stress during pregnancy were more likely to have toddlers who had more behavior problems and more externalizing problems (Gutteling et al., 2005). In a review of studies that focused on prenatal stress and self-regulation during the first 2 years of life, Korja and colleagues (2017) found that almost 72% of studies included in the review identified an association between maternal prenatal stress and a child's negative reactivity or self-regulation. This association was found regardless of how prenatal stress was measured or which trimester the prenatal stress was measured in (Korja et al., 2017).

Another potential way that prenatal stress can impact child development is via its effects on parenting. Prenatal stress has been examined in relation to its impact on mothers and parenting behaviors. Women who experience distress during pregnancy are more likely to have symptoms of depression and anxiety in their child's early life (Austin et al., 2007; Kingston et

al., 2012). Depression and anxiety can be associated with negative maternal behaviors that lead to lack of engagement, more hostility, and less emotional warmth (Field, 2010; Turney, 2011) and these parenting behaviors can negatively impact child development. Goldstein and colleagues (1996) found that women who reported more anxiety during pregnancy were observed as being less expressive in mother-child interactions when their infants were 3 months old (Goldstein et al., 1996). Additionally, one study showed that women who experience more self-reported stress during pregnancy are more likely to have higher levels of parenting stress in the infancy period (Misri et al., 2010). Although some work has been done to examine the relationship between prenatal stress and its impact on mothers and their parenting behaviors, there are still a relatively small number of studies that have analyzed how prenatal variables relate to outcomes specific to the mother, mother-child relationships, and parenting.

The postnatal time for a mother is often a stressful time that may involve difficulties in adapting to the new roles of parenting. Postnatal stress is similar to the conceptualization of prenatal stress; however, it is distinguished as a separate aspect of maternal psychological functioning due to the developmental timing. Postnatal stress can be conceptualized as mothers' experiences of stress during the first month following birth. Examples of postnatal stressors include health complications after delivery and postpartum depression. Researchers have investigated the links between maternal postnatal stress and child outcomes in a number of domains. Using measures of concept formation, visual permanence, and sensorimotor development at 16-months old, McManus and Poehlmann (2012) found that postnatal stress in mothers was associated with poorer cognitive development in children (McManus & Poehlmann, 2012). Perra and colleagues (2015) found that the infants of mothers who reported increased levels of postnatal stress were significantly less likely to imitate modelled actions, showing a

72% decrease in imitation during the experimental procedure (Perra et al., 2015). Researchers have also found associations between maternal postnatal stress and emotional development. Lin and colleagues (2017) found that maternal postnatal stress had a significant effect on children's temperamental development, such that women who reported higher levels of stress also reported higher levels of less-than-optimal temperamental characteristics in their children, meaning they were more reactionary (Lin et al., 2017). Exposure to maternal postnatal stress has also been found to be a predictor of health outcomes for children; children of mothers who reported higher levels of postnatal stress in the first year of life were more likely to have increased inflammation markers at age 49-52, which are associated with cardiovascular disease (Pedersen et al., 2018).

Postnatal stress can have additional impacts on child development through the impact it has on mothers' mental and physical health and on their parenting behaviors. For example, parenting stress in the first 6-months of life has been associated with increases in depressive symptoms, somatization symptoms, and a perceived lack of social support among mothers (Anderson & Hildingsson, 2016). When investigating the link between mother's perceived stress postnatally and the development of ADHD in childhood, Mulraney and colleagues (2019) found that mothers who experienced more postnatal distress when their child was 3-12 months old were more likely to have a child with a diagnosis of ADHD or have elevated ADHD symptoms at age 8-9 but only when their parenting was rated as more hostile. This study highlighted the correlation between maternal postnatal stress and the development of hostile parenting practices (Mulraney et al., 2019). Other researchers have found similar correlations between mothers' experiences of stress in the postnatal period and negative parenting behaviors and outcomes (Giallo et al., 2014; Mah, 2016).

Despite studies linking stress experienced during the perinatal period with both child and mother outcomes, there is no real consensus in the literature about how to measure stress during pregnancy or in the postnatal period. Studies often use limited definitions of stress involving self-reported anxiety and depression and do not consider other areas of stress, external to the mother, such as environmental, social, or relational stress (Keeton et al., 2008; Kern & Laurent, 2019; Leahy-Warren & McCarthy, 2011). Although the definition of perinatal stress takes into account various experiences of stress, from chronic to acute, many studies do not typically look at the combination of various domains of stress. Thus, identifying multiple variables that may induce the experience of stress in mothers at various levels of the individual and environment is important in our understanding of perinatal stress and how it may be associated with different outcomes. To begin to address these limitations, we investigated both individual and environmental perinatal stressors and their relation to maternal SE in infancy.

Perinatal Stress Indicators

There is evidence to suggest that a variety of factors may be considered stressors during the perinatal period. For example, demographic factors (e.g., maternal age, employment status, marital status, relationship quality, child birth order) may be a source of stress to mothers throughout their pregnancy and the first month following delivery (Birmingham et al., 2015; Braithwaite et al., 2015; Coralan & Frankowska, 2011; Fall et al., 2013; Patel & Sen, 2012). Birth order, for example, has been found to have a negative correlation with educational attainment; due to a decrease in parental resources given to each subsequent child, children who are not the first born are more likely to not attain as much education as first born children (Booth & Lee, 2009). There is also evidence to suggest that the overall health, both physical and mental, of a mother may be a contributing factor to the amount of stress they experience in the perinatal

period (Graham et al., 2007; Laurent et al., 2011). The health of their infant (e.g., birth weight, gestational age) can also be a stressor for mothers (Hack et al., 1995; Hutchinson et al., 2013). Additionally, some have suggested that the birthing experience (e.g., type of delivery, time spent in the hospital following birth) itself can be associated with stress in mothers during the perinatal period (Bansal & Joon, 2019; Pires-Menard et al., 2019). The type of delivery, for example, can be stressful for mothers because of the link between emergency deliveries and an increase in maternal and fetal complications (Yang & Sun, 2017). Feelings about parenting, feelings about being pregnant, and child temperament may also be an important component of mother's experiences of stress (Coplan et al., 2003; Gipson et al., 2008; Molfese et al., 2010). Unintended pregnancies, for example, have been found to be correlated with maternal depression (Abajobir et al., 2016). These broad categories of risk may be important to the development of maternal beliefs about parenting, but little is known about how these stressors may combine to create an overall level of risk.

The Current Study

Existing research on child development has demonstrated links between maternal SE and a wide range of parent and child outcomes. Nevertheless, numerous gaps remain in our understanding of the predictors of maternal SE, especially perinatally. To begin to address these gaps, we investigated the associations between perinatal stress and maternal SE at 6 months. More specifically, we tested whether a risk index, created from variables related to maternal stress assessed retrospectively at birth and again at 1 month, predicted maternal SE at 6 months. We hypothesized that there would be a direct effect of perinatal stress on maternal SE such that mothers who experience more perinatal (i.e., prenatal and postnatal stress combined) stress would exhibit lower levels of maternal SE when their infant was 6-months old.

Support for our hypotheses would be consistent with existing research in this area; nevertheless, our study offers multiple contributions to the existing literature. First, most studies examine parental SE in the toddler years or adolescence, with relatively few studies examining the predictors of SE in the prenatal and infancy period. Second, studies investigating the role of perinatal stress on child and parental outcomes have been methodologically limited. More specifically, many have relied primarily on a few self-reported measures of stress related to anxiety and depression in mothers and have not been able to adequately test more complex stress factors involved in the transition to parenthood. We begin to address these limitations by testing a set of diverse and comprehensive variables related to multiple facets of perinatal stress. Third, studies examining perinatal stress are often unable to quantify the amount of stress women experience which makes it difficult to directly translate findings into practice. In this study, we create an index for perinatal stress to create opportunities for practitioners to use as a possible screening tool to identify mothers at risk for developing poor maternal SE. Finally, because much of the existing work in the field of maternal SE does not examine the predictors of SE, the present study further advances our knowledge about the importance of the prenatal and post-delivery period in the development of maternal SE.

CHAPTER 2

METHOD

Sample

Data from Phase I of *The National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD)*, a comprehensive, longitudinal study on various aspects of children's development, was used for this study. The dataset includes a sample of more than 1,300 children and their families from 10 locations across the United States: Little Rock, Arkansas; Irvine, California; Lawrence, Kansas; Boston, Massachusetts; Philadelphia, Pennsylvania; Pittsburgh, Pennsylvania; Charlottesville, Virginia; Morganton, North Carolina; Seattle, Washington and Madison, Wisconsin. Of the 8,986 women who gave birth during the sampling period, 5,151 met eligibility requirements (i.e., mother healthy, over 18 years of age, and conversant in English; infant a singleton and healthy; family not planning to move within the next year and living in a neighborhood considered safe for visits), and agreed to be contacted in two weeks. Using a conditional random sampling method, 2,352 families were called and 1,364 participated in the one-month home visit (NICHD ECCRN, 2001).

Families in this study do not comprise a nationally representative sample. Nevertheless, participating families were similar to other families in the catchment areas at the time of recruitment on many demographic variables with two exceptions: mothers in the sample were slightly more educated and families had slightly higher income levels. Of the final sample, 53% of children were male, 24% were ethnic minorities (13% African American, 6% Hispanic, and

5% Asian, Native American or other ethnicities), 11% of mothers had not completed high school, 14% were single mothers, and the average family had an income more three times the poverty threshold (NICHD ECCRN, 2001).

Procedures

Demographic data were collected via maternal report during the original hospital recruitment visit and at home visits when the study child was 1 and 6 months of age. Mothers' reports of their perinatal stress variables were collected when the study children were first born and at 1 month. When children was 6-months old, a maternal report of self-efficacy was gathered. For a detailed description of the SECCYD, see NICHD ECCRN (2001) or visit the study website at <http://www.nichd.nih.gov/research/supported/seccyd.cfm>. The current study was approved by the Institutional Review Board (IRB) of the University of Georgia.

Measures

Outcome Variables

Self-efficacy. The Parenting Stress Index (PSI; Abidin, 1983) was used to assess the mother's feelings about their new baby. Although the PSI is traditionally used to indicate the stress parents feel about parenting, their children, and life experiences, the questionnaire is also appropriate for determining the level of SE parents feel in regard to their parenting. The PSI measured mother's views related to the demands of parenting and these thoughts and feelings can be viewed as perceived competence in each mother's own ability to influence the behavior and development of their child. Parents completed a 25-item, modified version of the 101-item PSI at six-month interviews. Mothers were asked to respond on a 5-point Likert scale (1=*strongly disagree* to 5=*strongly agree*) to the degree to which they agree or disagree with statements about their feelings about parenting. Sample items include: being a parent is harder

than I thought it would be, I often have the feeling that I cannot handle things very well, and I often feel that my baby's needs control my life. The items on this questionnaire encompass feelings of parenting competence, which is important for the topic of maternal SE. The modified version of the PSI used in this study has not been previously used to measure self-efficacy directly; however, the questions included in this modified version do encompass feelings of perceived SE. For this analysis, some responses were reverse-coded so that higher scores reflected a higher degree of concerns with SE beliefs. The PSI has well-established psychometric qualities and has been found to be appropriate for use with parents of infants. Alpha coefficients for the scale were moderate to strong ($\alpha = .50-.79$).

Predictor Variables

Perinatal variables. A total of 20 mother-reported variables were used to create a risk composite representing total perinatal stress (i.e., prenatal and postnatal stress combined). Each variable was dichotomized based on the nature of the question, past literature on the variable, and/or established cutoffs based on the measure. For each variable, participants were coded as a 0 if they did not meet the criteria for risk and a 1 if they did. Dichotomized indicators were summed to create a risk index such that higher total scores were indicative of more risk. For detailed descriptive statistics of these variables, see Table 1.

Demographic stressors. *Maternal age* at birth was assessed at the one-month home interview. Participants under the age of 20 or over the age of 35 were coded as 1 while all other ages were coded as 0. These ages were used in the dichotomization based on research including teenage and advanced maternal age pregnancies using these ages as cutoffs (Kenny et al., 2013; Kirby, 2001; Kohler et al., 2008; Laopaiboon et al., 2014; Smith et al., 2018).

Maternal employment status during pregnancy was assessed by asking mother's if they were employed the year before having their baby. This variable was combined with *maternal relationship status* to create a proxy for mothers' financial status during pregnancy. Mothers who indicated that they were not employed the year before having their baby and who were not in a relationship at the time of birth were coded as 1, while mothers who were employed a year before the birth of their baby and/or were in a relationship were coded as 0.

Mother's relationship quality was assessed using a 25-item questionnaire about the interpersonal character of relationships. Mothers were asked to respond to questions about their relationship on a 7-point scale that ranged from *not at all* to *very much*. This is not a formally standardized measure, but it has been used in research on couples during the transition to parenthood. Belsky, Lang, and Rovine (1985) found strong internal consistency ($\alpha = .61-.90$ for the subscales) and moderate to strong test-retest reliability ($\alpha = .51-.81$ across the subscales) when used in a sample of 167 couples who were transitioning to parenthood. The conflict and ambivalence subscale totals were used for this analysis. Due to the nature of the data, scores one standard deviation below and above the mean were coded as 1 while scores within one standard deviation below and above the mean were coded as 0.

Baby's birth order was assessed at the one-month home interview by asking mothers if the study baby was their first or if they had other children. Any child that was not the first was coded as 1.

Maternal health stressors. Maternal chronic health problems were assessed by asking participants if they had any chronic health problems. Participants were asked to respond with a yes or no, with yes coded as 1 and no coded as 0 for the current study. *Health during pregnancy*

was assessed by asking mothers if they had any health problems during their pregnancy.

Participants who responded yes were coded as 1 while those who responded no were coded as 0.

Maternal depression was assessed postnatally using the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is one of the most widely used and validated measures of symptoms of depression. This 20-item questionnaire asked mothers to report how frequently in the past week they have felt about themselves. Responses ranged from 1 (*rarely or none of the time*) to 4 (*most or all of the time*). Scores ranged from 0-60, with higher scores indicating more symptoms of depression. For the purpose of this analysis, scores of 16 and above were coded as 1 because this cutoff suggests potential referral for further postpartum depression assessment (Radloff, 1977).

Baby health stressors. *Baby's gestational weight* was also assessed at the hospital during recruitment and any baby born <5 lbs, 8 oz or >8 lbs, 13 oz was coded as 1. These weight cutoffs were based on established measures already used in the study of low and high birth weight (Almeida et al., 2018; Goetz et al., 2018; Jeanne et al., 2018; Kuciene et al., 2018).

Baby's gestational age was assessed at the hospital during recruitment and any baby born before 37 weeks gestational age was coded as 1 due to national and research standards (Almeida et al., 2018; James et al., 2018).

Baby's health was assessed by asking mothers how they would rank their baby's health on a 4-point scale (1=*poor* to 4=*excellent*). Any response other than 4 (*excellent*) was coded as 1 for risk because baby's health may cause maternal stress if it is anything less than excellent.

Breastfeeding was assessed by asking mothers if they were currently breastfeeding and Yes responses were coded as 0 while No responses were coded as 1. There are a variety of reasons why mothers do not breastfeed, including physical limitations, work constraints, and

personal decision; nevertheless, the health benefits of breastmilk have been examined in the literature (Kramer et al., 2008; Smith, 2015).

Birth experience stressors. *Type of delivery* was assessed by asking the participants what type of delivery they had with vaginal, planned c-section, or an emergency c-section being the answer options. Vaginal and planned c-sections were coded as 0 and emergency c-sections were coded as 1. The *time in the hospital after delivery* was assessed by asking participants how long they were in the hospital after their baby was born. Following national averages of time in the hospital after birth during the 1990s (Martell, 2000), mothers who reported spending more than 2 days in the hospital after birth were coded as 1.

Maternal problems with delivery was assessed with a yes or no response to gain insight on stress associated with delivery. Yes responses were coded as 1 while no responses were coded as 0. *Baby's complications after delivery* was assessed by asking mothers if they experienced any complications after the delivery of their child. Yes responses were coded as 1 and No responses were coded as 0 for the purposes of creating the postnatal risk index.

Parenting stressors. Mothers were asked if their *pregnancy was planned or unplanned* and unplanned pregnancies were coded as 1. Mothers were asked *how they feel about their pregnancy* and were asked to respond on a 5-point scale (1=*very unhappy* to 5=*very happy*). Every response except 5 (*very happy*) was coded as a 1 due to the nature of the question indicating some amount of unhappiness or hesitation for every answer option other than *very happy*.

Maternal thoughts about her baby at 1 month old were collected by asking mothers to rate their thoughts on a 5-point scale (1=*very unhappy*, 3=*mixed happy and unhappy*, 5=*very*

happy). Any response other than *very happy* were coded as 1 due to the nature of the responses indicating some unhappiness in all options other than *very happy*.

Child's global temperament was assessed by asking mothers to respond to the question of "My baby's temperament is" on a 3-point scale (1=*about average*, 2=*more difficult than average*, 3=*easier than average*). Mothers who reported their baby's temperament as *more difficult than average* were coded as 1 while all other responses were coded as 0.

Control Variables

Child Sex. Maternal reports of children's sex were collected when children were one month old. Females were coded as 1 and males were coded as 2.

Maternal Race/Ethnicity. Maternal reports of race/ethnicity were collected when study children were one month old. Dummy codes were used to reflect whether the mother was White, African American, Hispanic, or Other.

Income. Family income was collected via maternal report when children were 6 months old. An *income-to-needs ratio* at each age was computed by taking a family's total income, not including federal aid, and dividing it by the federal poverty threshold for a family of that size (US Bureau of the Census, 2004).

CHAPTER 3

RESULTS

Preliminary Analyses

We began by examining descriptive statistics and bivariate correlations for all outcome, predictor, and control variables. Sample means, standard deviations, and ranges for all variables can be found in Table 1. For correlations between study variables and outcomes, see Table 2. Sample means and standard deviations for self-reported SE at 6 months suggest moderate variability in mother's beliefs about their parenting efficacy. Mothers generally reported low levels of perinatal stressors, as evidenced by a mean value for total perinatal stress of 5 stressors out of a possible 20. Maternal SE at 1 month was correlated with SE at 6 months suggesting that maternal SE in infancy is somewhat stable ($r = .199, p < .01$). Perinatal stress was positively correlated with maternal SE at 6 months ($r = .192, p < .01$) such that the more perinatal stress mothers reported, the more concerns they reported with their SE at 6 months. These findings provide some preliminary support for our hypothesis that reports of perinatal stress may predict maternal SE.

Table 1
Descriptive Statistics for Perinatal Stress Variables

Variable	Mean/%	SD	Range
Maternal Age	20%	.402	18-46
Financial Status	2%	.144	-
Relationship Conflict	69%	.464	1-7
Relationship Ambivalence	13%	.340	1-6.8
Birth Order	55%	.497	1-7
Maternal Chronic Health	14%	.343	-
Health During Pregnancy	32%	.468	-
Maternal Depression	26%	.437	0-53
Baby's Gestational Weight (grams)	18%	.381	2000-5428
Baby's Gestational Age	4%	.196	33-43
Baby's Health	28%	.451	-
Breastfeeding	43%	.495	-
Type of Delivery	12%	.330	-
Time in Hospital After Delivery	29%	.456	0-10
Maternal Problems with Delivery	20%	.401	-
Baby's Complications after Delivery	23%	.418	-
Pregnancy Planned or Unplanned	45%	.498	-
Feelings about Pregnancy	44%	.497	-
Feelings about Baby at 1-month	8%	.278	-
Global Temperament	4%	.197	-
Total Perinatal Stress	4.99	2.24	0-14

Table 2
Pearson Correlations Among Key Study Variables

Variable	1	2
1. Perinatal Stress Index	-	
2. 6 mo Maternal Self-Efficacy	.192**	-

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

Direct Effects of Perinatal Stress on Maternal SE

To determine whether the perinatal stress index was predictive of maternal SE at 6 months, we fit a simple regression that only included our predictor (i.e., perinatal stress index). Regression results for all models can be found in Table 3. Results suggest that perinatal stress was positively and significantly associated with maternal SE at 6 months ($B = .833, p < .001$). Mothers who reported more perinatal stressors also reported more concerns with their SE when

their child was 6 months old. This uncontrolled model showed us that experiences of stress during the perinatal period was predictive of maternal SE at 6 months. To determine whether this association held true when controlling for various family and demographic variables, we fit a multiple regression model that included our predictor (i.e., perinatal stress index) and control (i.e. child sex, maternal race/ethnicity, and income) variables. Controlling for all else in the model, perinatal stress was positively and significantly associated with maternal SE at 6 months ($B = .800, p < .001$), such that mothers who reported more perinatal stressors reported more concerns with their parenting efficacy when their child was 6 months old. The perinatal stress index, along with our set of family controls, explained 4.5% of the variation in maternal SE. Thus, even after controlling for factors like child sex, maternal race/ethnicity, and income, perinatal stress index still predicts later maternal SE.

Although we were primarily interested in whether total cumulative risk predicted later maternal SE, we also wanted to investigate which of the perinatal stress variables were most strongly associated with maternal SE at 6 months so that stress variables that were not as relevant could be excluded from any potential screeners. To do this, we fit a regression model with each of our 20 dichotomized stress variables and our outcome variable of maternal SE. All standardized and unstandardized coefficients for this regression model can be found in the Appendix. Results showed that some variables were associated with maternal SE at 6 months and some were not. Specifically, when controlling for other risk factors, the following risk factors were significantly associated with maternal SE at 6 months: pregnancy being planned vs. unplanned ($B = -2.070, p < .01$), feelings about pregnancy ($B = 2.934, p < .001$), feelings about baby at 1-month ($B = 2.955, p < .01$), baby's health ($B = 1.584, p < .01$), maternal depression (B

= 5.191, $p < .001$), and ambivalence in maternal relationship ($B = 5.019$, $p < .001$). All other risk variables were not significantly associated with maternal SE in this model.

Of particular interest was the role of temperament in our perinatal stress index.

Temperament may play its own unique role in maternal SE (Verhage et al., 2015). It is possible that mother's perception of their SE may be compromised if they have a child with a difficult or negative temperament. To address this, we created a separate perinatal stress index that did not include the 1-month global temperament variable and we re-fit the model controlling for both 1- and 6-month global temperament. Results indicated that when controlling for maternal reports of global temperament at 1 and 6 months, along with other control variables (i.e. child sex, maternal race/ethnicity, and income), perinatal stress was still positively and significantly associated with maternal SE at 6 months ($B = .753$, $p < .001$). Again, mothers who reported more perinatal stressors reported more concerns with their parenting efficacy when their child was 6 months old above and beyond their child's temperament. When controlling for temperament, the perinatal stress index explained 9.3% of the variation in maternal SE. This finding is important to note because although controlling for temperament increased the variation explained, when temperament is included as a stress factor, we still see important associations between perinatal stress and maternal SE. This result indicates that above and beyond temperament, perinatal stress is important for the prediction of maternal SE.

Table 3
Regression Models of Perinatal Stress and Maternal SE

	B	β	R^2_{model}
Model 1 _a	.833	.192***	.037
Model 2 _b	.800	.185***	.045
Model 3 _c	.753	.172***	.093

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

Note: a = uncontrolled regression model of perinatal stress and maternal SE; b = regression model of perinatal stress and maternal SE with controls; c = regression model with global temperament at 1-month as a control

CHAPTER 4

DISCUSSION

The purpose of this study was to examine whether stress experienced by mothers during pregnancy and the first month of motherhood (i.e., perinatal stress) was predictive of maternal SE at 6 months. Results suggest that total perinatal stress, created from 20 prenatal and postnatal variables, was positively associated with maternal SE. Mothers who reported experiencing more stressors both prenatally and postnatally also reported lower feelings of SE at 6 months. This finding held even after controlling for child and mother demographics as well as when we removed child temperament at 1 month from the risk index and controlled for it separately.

This study highlights the important role that the perinatal period plays in the development of maternal SE. The results make an important contribution to our understanding of maternal SE because while there is some evidence showing that the perinatal period is associated with the development of poor maternal SE beliefs (MacArthur et al., 2002; Ngai et al., 2009; Salonen et al., 2009; Tarkka, 2003), the importance and conceptualization of stress in the perinatal period is less understood. This study builds upon the previous work of Razurel and colleagues (2017) and Shorey and colleagues (2015) who identified early predictors of maternal SE. Specifically, the finding that perinatal stress was associated with more concerns with maternal SE supports previous findings (Razurel et al., 2017; Shorey et al., 2015) and highlights the important role that stress can have in early parenting SE difficulties while adding to our understanding of what stressors are particularly important to maternal SE.

The current study used a holistic view of stress in the perinatal period, meaning that our definition of stress experienced in this time exceeded what previous studies have used as a conceptualization of stress (DeMier et al., 2000). Our conceptualization of stress included variables such as birth order, type of delivery, and maternal thoughts about their baby at 1 month. By creating a perinatal stress risk index that included a set of comprehensive and varied variables (e.g., demographic factors, maternal health, infant health, parenting factors, etc.), the current study added to the literature on the many different types of stress mother's experience in the transition to and early stages of parenthood and how these different stressors are important for the development of parenting beliefs in the first 6 months of life.

Notably, some perinatal stress variables appeared to be more highly associated with maternal SE beliefs at 6 months than others. The most significant associations were found between maternal SE and depression, feelings about their pregnancy, and ambivalence in their romantic relationships. No associations were found between maternal SE and variables related to mother and infant's physical health or birthing experience. It is no surprise that maternal depression was associated with later maternal SE; depression in the perinatal period has been found to be an important predictor of maternal SE in the first year of parenthood (Leahy-Warren et al., 2012).

More surprising are the associations between mothers' reports of ambivalence in their romantic relationship and mothers' reports of their feelings towards their baby at 1 month old and concerns with their SE at 6 months. These associations were both positive. Although there is some evidence that marital satisfaction and relational functioning are associated with SE beliefs (Reece & Harkless, 1998), there is little in the literature about the specific aspects of relationship quality that may be important for the development of SE. The positive correlation found in the

current study between maternal SE and reports of ambivalence in a mother's romantic relationship, meaning feelings of both positive and negative feelings and thoughts about one's partner (Windsor & Butterworth, 2010), sheds light onto the importance of assessing relationship satisfaction through multiple lenses rather than simply through an overall measure of satisfaction or through conflict alone. Additionally, to our knowledge, this is the first study to assess maternal feelings about her baby at 1 month as a stressor that may be important to SE development. Research suggests that unwanted children are more likely to experience negative parenting interactions (Gipson et al., 2008). Although negative feelings about a child during pregnancy and the first month of life has been investigated in relationship to some parent-child variables, they have not been considered for the role they may be playing in parenting SE beliefs. We found that many different and unexplored stressors can be important for the development of SE beliefs in mothers. These correlations further support the idea that stress experienced in the perinatal period should be measured in a comprehensive way to gain an understanding of the multiple facets of perinatal stress, rather than focusing on one avenue of stress, such as emotional stress.

The Role of Temperament in Maternal SE

Maternal reports of global temperament at 1 month were included in the perinatal risk index, due to research indicating that temperament is an important factor in mothers' perceptions of their child (Moon & Min, 2012; Verhange et al., 2013). Temperament is often used as a control variable and the inclusion of a report of global temperament as a predictor is a novel part of our study. It is encouraging that even when including temperament as a predictor variable, there was still a significant relationship between perinatal stress and maternal SE. Given the importance of temperament and how likely it is to color many aspects of parenting, many studies

about parental SE include temperament as a moderator or control variable (Albanese et al., 2019). The inclusion of temperament as a control variable is often utilized to lessen the impact it may have on outcomes of interest because of how pervasive it can be in influencing other variables related to parenting, family functioning, and maternal functioning. By including temperament as a stressor and risk variable, the current analysis is able to address the importance of temperament rather than ignoring the significance that it plays in the ways a mother perceives their child. This study also adds to our understanding of the importance of temperament in the development of maternal SE. It should be noted that additional analyses were run to control for global temperament at both 1 and 6 months, instead of including temperament as a risk variable, and results remained consistent. This indicates that our findings of the association between perinatal stress and maternal SE were not simply a function of temperament.

Implications for Practice

Mothers' experiences of stress in the perinatal period are associated with negative outcomes for both children and mothers. Understanding how these stressful experiences may be related to the development of a parenting perception like SE has important implications for practice. How a mother feels about her ability to positively influence the behavior and development of her child can impact how she parents and when negative parenting (i.e., hostile, unresponsive) is introduced within a child's developmental period, children can experience maladaptive development. These maladaptive developmental outcomes often first make themselves known when children get to school. Research has indicated that maternal SE is important for school readiness because SE impacts parenting behaviors in the home that are related to aspects of school readiness (Albarran & Reich, 2014; Bojczyk et al., 2018; Iruka, 2008). Understanding the processes of how SE develops before children get to school is an

important area of potential intervention to help mothers who may be at-risk for developing poor SE. The potential negative impact of poor SE on children's academic, social, and emotional outcomes may be lessened and even prevented if we have a better understanding of how SE develops.

Additionally, by measuring various experiences of stress across the perinatal period, and by including markers of stress from an individual and environmental perspective, the opportunity for screening for potential poor SE beliefs becomes stronger. The ability to screen for the possibility of poor SE development in mothers, especially those at-risk of having stressful experiences in the perinatal period, would influence how practitioners in many fields are able to intervene and help mothers develop strong feelings of competence surrounding their parenting. For example, during a child's first doctors visit after birth, a screener could be used to ask mother's which, if any, stressful experiences they have had during pregnancy and in the first few weeks postnatally to identify risk factors that may be associated with lower SE in the first year of parenthood. Our analysis of the various perinatal stress variables and their association with maternal SE can also impact the development of a screener to provide evidence for the use of certain stressful experiences over others. Because so little is known about the predictors of SE in mothers, the ability to develop a screener is a unique contribution of the current study. This screening tool can be implemented in practice to increase the opportunity for targeted interventions within families and for mothers.

Limitations and Future Directions

Although this study contributes to our understanding of the possible predictors of the development of maternal SE, several limitations must be noted. Perhaps the greatest limitation has to do with the fact that the variables included in the perinatal stress index were collected

retrospectively after study children had been born. Although the use of retrospective reporting is common in the literature on perinatal stress (Graignic-Philippe et al., 2014; Weinstock, 2008), it is important to note the potential dangers of this kind of reporting, such as memory biases. The fact that we identified associations between perinatal stress and maternal SE approximately 6 months later suggests that even retrospective reporting offers valuable information about how stress may impact mothers' self-perceptions of their parenting. Future studies would benefit from a more longitudinal battery of assessments all throughout pregnancy and the postnatal period to gain a better understanding of the implications of stress experienced perinatally on maternal parenting beliefs. There is also a concern of mono-reporter bias in our sample; because our measures of stress and our outcome measure of SE were both reported by mothers, it is possible that the more stressed a mother felt would lead to her also reporting less efficacy.

Additionally, the main purpose of the original NICHD SECCYD study was not about stress so the measure of perinatal stress had to be created by selecting different variables from multiple measures. There was no full measure of stress within the data; rather, specific questions were pulled from larger measures that each indicated some sort of stress during the perinatal period, which limited the scope of each domain of stressors because no in-depth information was available from participants regarding the perceived impact of each stressor. This process can inform future research because it sheds light on how important it will be for future studies to utilize a broader view of what stress is. Rather than focusing on measures of one type of stress, like emotional or financial, it is important for future work in the field to utilize multiple measures of stress to encompass multiple facets of stressful experiences during the perinatal period. Additionally, researchers should focus on including a fuller scope of measures to assess stress rather than individual questions meant to indicate a stressful experience. Understanding the

perceived stress associated with these various stressful experiences will help inform research, since different individuals may have a different perception of stress. These different perceptions may help explain individual differences in the negative outcomes that are associated with stressful experiences in the perinatal period.

The outcome variable of maternal SE was measured using the Parenting Stress Index (PSI), which is a stress scale, as there was no direct or full measure of maternal SE in the original NICHD SECCYD study. It is important to note that the PSI was not created to measure SE specifically. Nevertheless, the modified version of the PSI used in this study did include the Sense of Competence subscale, which has been used to measure SE in previous studies (e.g., Teti & Gelfand, 1991). The subscale was found to be reliable ($\alpha = .74$) and was associated with the authors' outcomes of interest (e.g., maternal depression and maternal perceptions of infant difficulty). The full, modified version of the PSI was used in this study as a measure of SE due to the perceived overlap in the concepts of stress that mothers feel about parenting and their beliefs about their competency as a parent. Future studies should aim to utilize a more comprehensive measure of maternal SE specifically.

Our study provides a snapshot of study participants' experiences of stress prenatally and postnatally but the participants in the study were relatively low risk. The collection of data in populations of people who may have more experiences of stress in their lives is an important future direction for research. These studies would provide a better understanding of whether there are differential effects in each population. Such knowledge is critical if we are to develop intervention programs that could target all mothers and their children.

Conclusions

This study examined the predictors of maternal SE and its relationship with perinatal stress variables in a large population of mothers in their first year of motherhood. The results show that perinatal stress was associated with increased concerns in maternal SE at 6 months. Screening and intervention services related to perinatal stress, which can have long-term consequences on both child development and parenting practices, is needed. When mothers experience stress during their pregnancy and in the first weeks of motherhood, they can be at-risk for developing poor SE beliefs. The results of this study further support the development of a tool that can be used for screening purposes. Intervention services can be implemented following a screener to prevent the development of poor SE beliefs and to encourage the development of positive parenting cognitions and behaviors.

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APPENDIX

Unstandardized regression coefficients (Standardized in parentheses) from the model predicting Maternal SE at 6 months from each perinatal risk variable

	Maternal SE at 6 months
	B (β)
Maternal Age	-.243 (-.010)
Financial Status	7.451 (.050)
Relationship Conflict	.143 (.007)
Relationship Ambivalence	5.019 (.173***)
Birth Order	-1.068 (-.054)
Maternal Chronic Health	-.685 (-.023)
Health During Pregnancy	-1.047 (-.050)
Maternal Depression	5.191 (.227***)
Baby's Gestational Weight	-.346 (-.014)
Baby's Gestational Age	.006 (.000)
Baby's Health	1.584 (.073**)
Breastfeeding	-.138 (-.007)
Type of Delivery	-1.245 (-.042)
Time in Hospital After Delivery	.110 (.005)
Maternal Problems with Delivery	.349 (.014)
Baby's Complications After Delivery	1.156 (.050)
Pregnancy Planned or Unplanned	-2.070 (-.105**)
Feelings about Pregnancy	2.934 (.148***)
Feelings about Baby at 1-month	2.955 (.084**)
Global Temperament	.222 (.007)

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