2018

# Parent Perceived Stress and Child Temperament: Qualities that Facilitate or Impede Child Developmental Outcomes

Rebekah Faith Klempin
*University of North Florida*

# Parent Perceived Stress and Child Temperament: Qualities that Facilitate or Impede Child Developmental Outcomes

by

Rebekah Klempin

A thesis submitted to the Department of Psychology

in partial fulfillment of the requirements for the degree of

Master of Science in Psychological Science

UNIVERSITY OF NORTH FLORIDA

COLLEGE OF ARTS AND SCIENCES

August, 2018

Acknowledgments

I would like to acknowledge and thank the following important individuals who have supported me throughout the development of this thesis and invested in me personally and academically throughout my time at the University of North Florida. First, I would like to express my gratitude to my advisor Dr. Leone for his unfailing support and invaluable guidance as a thesis mentee, student, and individual. Second, I would like to thank Dr. Nicholson for her selfless guidance, assistance, and generosity in sharing her time and data with me. I would also like to thank Dr. Marcon for the valuable mentoring, research skills, and theoretical knowledge she shared with me. Finally, I would like to thank my loving husband James for his unwavering patience, support, encouragement, and care throughout my education and our life together. You have all selflessly invested in me and I could not be more grateful for the growth you have brought to my life.

TABLE OF CONTENTS

## Abstract

Effective parent-child relationships contribute to the development of well-adjusted children. Taxing personal and situational factors encumber a caregiver's capacity for responsivity with his or her child. The purpose of the present study was to identify interpersonal factors that impact child outcomes in low socioeconomic status family populations. Data was collected in northeast Florida Head Start centers from 219 low income, at-risk caregivers and their children ages one and a half through almost five. Parents completed questionnaires on parent perceived stress, child temperament, and child developmental outcomes. Hierarchical regression was used to assess the influence of child temperament and parent perceived stress independently and interactively on child developmental outcomes. Although parent stress and negative child temperament significantly influenced child developmental outcomes, there was no significant interaction effect. Policies aimed at ameliorating negative child temperaments or subjective parent stress may serve families and improve child developmental outcomes. Researchers should investigate the potential moderating influence of parent sensitive responding on the relationship between parent stress and child developmental outcomes.


*Keywords:* child development, parent perceived stress, developmental child outcomes, negative child temperament

# Parent Perceived Stress and Child Temperament: Qualities that Facilitate or Impede Child Developmental Outcomes

Effectual parent-child relationships significantly encourage the development of socially, emotionally, and temperamentally well-adjusted children. Parent sensitive responding within a relationship fosters children who display greater emotional competency, healthier temperament, and improved social skill development (Dodici, Draper, & Peterson, 2003; Wakschlag & Hans, 1999). Taxing personal and situational dynamics encumber a caregiver's capacity for sensitive responding behaviors especially in a low income, at-risk Head Start population (Davidov & Grusec, 2006). Identifying biological, environmental, and personal factors that have the most significant impact on parent stress and negative child temperament in low socioeconomic status family populations can help improve policy and intervention development for growing families (Mesman, van Ijzendoorn, & Bakermans-Kranenburg, 2012). In the proposed study, the role of negative child temperament and parent perceived stress will be examined as these factors relate to children's developmental outcomes.

## Parent Perceived Stress

**Maladaptive parenting.** The environment of Head Start parents and their exposure to stressful events may significantly influence child outcomes through the perceived stress of the parent. In a study by Crnic, Gaze, and Hoffman (2005), life stress and hassles associated with parenting were found to remain stable across the preschool years. In the same study, parents who experienced stress tended to remain stressed and that stress continued to accumulate across periods of development and created an increased risk for maladaptive parenting and dysregulated child development. Parents who are stressed have fewer positive feelings towards their children, are less able to appropriately respond, display lower levels of positive emotion, and are more

likely to perceive their child's behavior negatively (Molfese et al., 2010). High levels of maternal sensitivity during early childhood have been established as a predictor for higher levels of prosocial behaviors and lower levels of aggressive behaviors in children by the age of 3 (Harmeyer, Ispa, Palermo, & Carlo, 2016). In this same study, mothers' stress when their children were 15 months old was negatively correlated to their child's vocabulary and academic skills upon entry into kindergarten. In addition, paternal and maternal sensitive responding positively correlated with child cognitive and language outcomes at 18 and 36 months (Malmberg et al., 2016).

Parent perceptions of their own stress relate to how parents interact and connect with their children. When parents experienced high levels of psychological distress, their ability to respond sensitively and effectively to their child's emotional needs was adversely affected (Zaidman-Zait et al., 2014). Decreased responsivity, in turn, impeded parents' ability to promote self-regulation and resulted in reports of more frequent or more intense child temperament problems. Parent withdrawal also impacted child developmental outcomes by decreasing the frequency of parents' joint attention, communication, and activity with their child (Pesonen et al., 2008). Parent stress has been associated with more negative and intrusive parenting behaviors which has been further associated with a reported increase in negative child temperament (Neece, 2014). Overall, research on parenting stress suggests that stress influences child outcomes directly and lessens positivity in the parent-child relationship (Crnic, Gaze, & Hoffman, 2005).

Consistent with the research reviewed above, interventions aimed at reducing stress and promoting early nurturing behaviors have been found to significantly promote infant brain development. Parents who participated in mindfulness-based stress reduction intervention

reported significantly lower levels of stress and depression and an increase in appropriate responding to their child (Lefmann & Combs-Orme, 2014). Children of parents who successfully participated in mindfulness-based stress reduction were reported to have fewer temperament problems and improved social development (Deater-Deckard, Ivy, & Petrill, 2006; Neece, 2014). Evidence of the efficacy of stress reduction therapies further highlights the important role of parent stress and child temperament in child development.

**Socioeconomic influence.** Infants are passively exposed to an environment that is strongly influenced by a parents' biological and socio-economic characteristics (Finegood, Blair, Granger, Hibel, & Mills-Koonce, 2016). Parents and children in low socioeconomic environments are exposed to a variety of risky conditions (e.g., aggression, crime, food insecurity) which may be responsible for other negative outcomes such as increased mortality rates (Lefmann & Combs-Orme, 2014). During periods of increased stress, fathers engaged in poorer communication exchanges with their sons and their sons engaged in poorer communication exchanges in return (Besemer, Loeber, Hinshaw, & Pardini, 2016). With respect to parent stress and the socioeconomic status of the family (in the context of family income to needs ration, marital status, and household density) poverty comprises maternal cumulative risk which is negatively and moderately related with a decrease in appropriate parenting behaviors (Finegood, Blair, Granger, Hibel, Mills-Koonce, et al., 2016). In summary, the socioeconomic setting of Head Start parents may place them at an increased risk for subjective stress and maladaptive parenting.

**Biological influence.** Pregnant women in low socio-economic status conditions have an overactive stress response system which significantly imposes a prenatal, negative influence on their offspring's developmental path (Lefmann & Combs-Orme, 2014). High levels of parent

stress during sensitive periods of development (e.g., the stress hyporesponsive period that spans the first two weeks of life) may negatively influence physical development of the hypothalamic-pituitary adrenocortical axis and induce dysregulation of its vital response system in a growing child (Fisher & Stoolmiller, 2008). With respect to developmental outcomes, the hypothalamic-pituitary adrenocortical axis regulates production of cortisol which increases energy, suppresses immune functions, enhances cardiovascular tone, stimulates critical features of the stress response by increasing threat vigilance, increases motivation for self-defense, and amplifies emotional arousal (Fisher & Stoolmiller, 2008). Basal level hypothalamic-pituitary adrenocortical axis function helps maintain our ability to appropriately regulate emotions and cope with stress (Thompson, 2014). In short, repeated exposure to stressors within a parent-child relationship can interfere with the sensitivity of a child's hypothalamic-pituitary adrenocortical axis system and negatively influence emotional, social, physical, and cognitive development.

**Gene-environment interaction**. Parent perceived stress influences child outcomes through gene x environment interactions as the genetic component of child temperament imposes significant effects on parent stress and parent stress in turn influences child behavior (Newton, Laible, Carlo, Steele, & McGinley, 2014). This interaction manifests itself through children's exposure to the same environmental stressors as their parents, a genetic predisposition to process these stressors in a similar manner as their parents, and expression of increasingly negative temperaments in response to their parents increased stress and vice versa (Pederson, Bailey, Tarabulsy, Bento, & Moran, 2014). Exposure to adult distress, frustration, or anger directly affects child temperamental dysregulation and inhibits emotional security (Cummings, 1998). Researchers found that the quantity and quality of parent-provided in-home treatment decreased with increases in reported challenging child temperaments (Mills-Koonce et al., 2007). Parents

of children with difficult temperaments reported more parenting problems as a direct result of child temperament effects on parent stress and parent stress on child temperament (Coplan, Bowker, & Cooper, 2003).

## Child Temperament

**Effects on later development**. In addition to parental influences on children's outcomes, children's temperament also affects their subsequent academic, personal, and social development. Deater-Deckard (1998) has suggested that previous studies that incorporated measures of subjective parent distress and child development may have been confounded with children's temperament which has a biological basis. According to longitudinal research, temperamental problems in children reliably predicted overall dysregulation of health and social functions in adulthood (Kaminski et al., 2013). Previous research has found significant relationships between biologically determined child affect and the sensitivity with which their parents respond to them. Children who are kinder, more compassionate, and helpful in childhood are more likely to elicit sensitive parenting from their mothers (Newton, Laible, Carlo, Steele, & McGinley, 2014). With respect to a possible interaction between parent stress and child temperament, Eisenberg et al. (1999) noted that negative child temperament was particularly salient in parent-child relationships where parents were unsupportive and intolerant of their child’s expression of negative emotions.

**Reactions from environment**. The temperamental phenotype of children predisposed them to varying responses from their environment. Children who acted more impulsively, engaged in more frequent tantrums, and were aggressive with peers and adults displayed lower levels of self-regulation than their peers (Boyce & Ellis, 2005). In this same study, teachers and peers were less likely to engage with these children which led to fewer academic and social

learning opportunities. These differences appeared cumulative as a widening gap was observed between children with more frequent maladaptive temperaments and their self-regulating counterparts on math and literacy ratings over the course of 6 months (Finn, Pannozzo, & Voelkl, 1995). In longitudinal research on behavior ratings, child behaviors related to negative affect (such as defiance or anger) led to inferior test scores across three years (Alexander, Entwisle, & Dauber, 1993). Researchers noted an early "window of opportunity" which maladaptive temperaments in the first three years of life may have interfered with classroom adjustment, early learning patterns, and ultimately led to unfavorable developmental trajectories. Students rated by their teachers as disruptive, inattentive, or noncompliant reported significantly lower scores on achievement tests, with inattentive students had the poorest achievement scores (Finn et al., 1995). Cumulatively, these findings suggest that children who express more negative temperament and engage more frequently in maladaptive behaviors may benefit less in classroom and interactional opportunities.

**Effects on information processing.** Children who are biologically predisposed to negative temperament and maladaptive patterns of behavior are likely to impact and process stimuli from their environment in unique ways. Kagan (1983) posited that children's behavioral inhibition and attentional control play a role in children's reactivity to stress and their environment. Coplan, Bowker, and Cooper (2003) found that children who were more resistant to authority often engaged in less socially appropriate behaviors like reduced attentiveness and displayed reduced social competence, especially in environments that were characterized by increased parent stress. A child's ability to regulate his or her own behaviors upon entry to kindergarten also significantly related to improved vocabular and academic capacities reported 10 months later (Harmeyer et al., 2016). Montroy et. al (2014) found that negative temperament

in children played a mediating role between self-regulation and literacy growth. These studies collectively indicate that children's negative temperament may interfere with their ability to learn and grow beyond the influence of decreased opportunity.

**Efficacy of interventions**. Interventions aimed at ameliorating maladaptive temperaments and negative affectivity in young children have indicated that improved child temperaments positively relate to improved child outcomes. In a 6 month longitudinal study, children receiving behavior modification interventions displayed improved growth in academic achievement, emotional comprehension, emotion regulation, and executive function compared to children not receiving intervention (Graziano & Hart, 2016). Even in at-risk populations, improvement of self-regulation and social skills significantly related to improved literacy and social skills (Montroy, Bowles, Skibbe, & Foster, 2014). There is evidence that child temperament plays a significant role in the trajectory of child developmental outcomes and further investigation of behavior interventions is warranted.

## Child Outcomes

**Intergenerational transmission**. At-risk, Head Start parents' diminished physical and emotional resources as well as parenting skills have been reliably linked to negative child outcomes. In a prenatal context, maternal stress and consequential elevation of the stress hormone cortisol was significantly related to negative effects on offspring cognition, health, and academic skills (Aizer, Stroud, & Buka, 2016). Potential mechanisms behind intergenerational relationships in economic standing and cycles of maladaptive parenting were suggested. Mothers with inhibited ability to perform labor or produce economic value, known as human capital, faced an increased rate of stressors but were also less equipped to combat the negative influence of stress. Interventions aimed at reducing stress for parents with lower levels of human

capital may particularly beneficial in decreasing those intergenerational correlations in economic status and parenting behaviors and may better equip at-risk children and ameliorate some of the negative effects of parent stress on their developmental outcomes (Aizer et al., 2016).

**Genetic transmission**. The influence of parent stress on child developmental outcomes may also operate though passive genetic transmission. Developmental outcomes of temperamentally difficult children may be especially vulnerable to the influence of parenting quality. In one study, more difficult child temperaments were associated with increased parental stress and poor childhood outcomes, but only one temperament was measured objectively rather than by parental self-report (Molfese et al., 2010). While parent stress negatively influenced cognitive faculties like receptive language and mental states, parent stress imposed a stronger negative influence on child outcomes related to parent-child exchanges such as expressive language and adaptive skills (Strauss et al., 2012). Chronic exposure to irritation and fewer positive behaviors from a parent produced dysregulating effects associated with temperament problems reported in children (Cole, Dale, & Mills, 1991). Harmeyer et al. (2016) found that maternal parenting stress was predictive of mother-child closeness and ultimately the child's academic outcomes. Children's self-regulation skills at 25 months also mediated the relationship between parent stress and child developmental outcomes. Zaidman-Zait et al. (2014) found evidence of a significant relationship between parenting distress and their children's internalizing behaviors such as withdrawal, anxiety, and fearfulness as well as externalizing behavior such as aggression, tantrums, non-compliance, and self-injury from 12 months to age 6. There is evidence from multiple studies that both parent stress and child temperament significantly contribute to variance in child developmental outcomes.

**Neurological development**. On a physiological level, prenatal maternal anxiety and stress leads to poor neurodevelopment and disrupted hypothalamic-pituitary adrenocortical axis functioning in infants (Tu, Grunau, Petrie-thomas, et al., 2007). Cognitively, increased cortisol inhibits children's capacity to concentrate, recall, and focus their own thought processes. Physically, symptoms of increased stress on a child include increases in autonomic nervous system activity and influence functioning of cortical systems, limbic structures, and the hippocampus (Tu et al., 2007). Thompson (2014) noted that disruptions in these physical structures lead to increased blood pressure and altered cognitive processes, motivational processes, emotions, and memory formation and recollection. Cortisol levels also directly influence the immune system by suppressing defense against infectious agents, increasing response to cytokines (inflammatory agents), and encouraging pro-inflammatory tendencies (Thompson & Haskins, 2014). Long term, these effects can be taxing on the body and mind. When neuroendocrine, cardiovascular, and immunological systems are chronically activated, this wear and tear leaves the individual more susceptible to mental and health complications (Thompson, 2014). Parent-child relationships burdened with psychophysiological stress and limited in parent sensitivity may impair child development and predispose children with a mind and body that is insufficiently equipped for a happy, healthy future.

## Hypotheses of Interest

Evidence on parent stress and child temperament indicate a potentially interactive relationship. A current gap in research literature is an understanding of the relationships between parent perceived stress and maladaptive child temperament independently and interactively on child developmental outcomes in a low-income, at risk population. It is clear from the evidence reviewed that the children's outcomes are influenced both by features of the parent as well as the

child. However, there has been relatively little evidence of the way these two factors operate in low income, at risk populations. Based on the evidence reviewed so far, the following predictions were derived.

**Research hypothesis 1.** It was predicted that as negative temperament in children increased, these children would have diminished developmental outcomes.

**Research hypothesis 2.** It is expected that as parent perceived stress increases, reported child development outcomes will decrease.

**Research hypothesis 3.** It is expected that the effects of parent perceived stress and negative child temperament interactively will impose a joint effect beyond the effects of each influences. Children who are reported to engage more frequently in negative temperaments and have parents who report higher levels of perceived stress are expected to report significantly lower ratings on overall developmental outcomes.

## Method

### Participants

Data was collected from three northeast Florida Head Start centers from low income, at-risk children and their families ($N$ = 219 parent-child dyads). This parent population was predominantly female (77%) and consisted primarily of Caucasian (40%), African American (25%), and Hispanic (11%) parents who ranged in age from 19 to 71years ($M$ = 30.40, $SD$ = 9.89). This parent sample was composed of English speaking (90%) and Spanish speaking (10%) parents. Head Start parents and children in this sample resided in primarily metropolitan and urban communities. Most parents reported attaining an education of at least a high school (47%) or some college (27%), with other parents reporting having reached grade school (2%), middle school (6%), General Equivalency Diploma (4%), vocational (4%) or a college degree

(10%) level of education. A majority of this parent sample reported that they were either not currently in a relationship (38%) or were married (36%), and the remaining parents reported to be in a relationship (2.5%), in a relationship and living with partner (9%), separated (5.5%), widowed (1.5%), or divorced (7%). Child participant age ranged from 1.5 years to 4.8 years old ($M$ = 3.02, $SD$ = 0.75). There was an even number of male and female children.

**Procedure**

Participant recruitment was conducted on the Head Start Summer Health Screening days. Research assistants and parents' Head Start Family Advocates informed interested parents about the purpose and design of this study, and research assistants were made available to answer more detailed questions. Parents had the opportunity to sign up for a time to complete the questionnaires in this study at Summer Health Screening day and at the front desk of their local center.

Upon the arrival of a parent and child at their Head Start center for their chosen time, research assistants provided a single form detailing parent consent for themselves as well as permission for their child to participate. A copy of the form was also made available for the parent's records. After parents returned their signed consent forms, research assistants administered a parent questionnaire containing the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1984), the Early Childhood Behavior-Parent Short Version (Conners, 2009), and the Ages and Stages Questionnaire (Bricker & Squires, 1999). The questionnaire portion of this study took approximately 20 minutes. All measures were administered at the family's Head Start center by trained research assistants. At the end of each day, data was assigned the child's pre-existing Head Start numerical identification code and transferred to a secure, password-

protected computer in Dr. Nicholson's locked lab at the University of North Florida to ensure the security of participant information and responses.

**Child temperament.** The Conner's Early Childhood Behavior-Parent Short Version is a parent-report measure on child functioning utilized to assess the degree of problematic behavior of child participants as they relate to child temperament with higher scores indicating greater concern. This questionnaire is composed of 47 items accompanied by a 4-point answer format in which response options ranged from 0 (*not true at all*) to 3 (*very much true*) and evaluated how often a child engaged in maladaptive behaviors across nine domains of child behavior: inattention/hyperactivity, defiance, aggression, social functioning, atypical behaviors, anxiety, mood/ affect, physical symptoms, and sleep. Child inattention/hyperactivity was measured by questions regarding how often parents felt their child was "inattentive" or "easily distracted" and how "restless" or "overactive" they are. Assessment of aggression was determined by questions regarding how frequently they felt their child "was rude" or "destroys things on purpose", whereas defiance measures included questions about how often a child was "defiant" or "bossy". Questions posed about social functioning concerned how frequently their child "gets along with other children" or if they were "liked by other children". Atypical behaviors were assessed according to how frequently a child seems to be "in his or her own world" or "is odd or unusual". Questions regarding how often a child "worries" or "seems overly clingy or attached to parents" were utilized to measure child anxiety. Mood and affect were measured by questions posed regarding how easily the child "is irritated" or "has temper outbursts". Physical symptoms were measured via questions regarding how often a child "complains about stomach aches" or being "sick when nothing is wrong". Finally, sleep concerns were addressed by questions about how

often a child “has trouble falling asleep” or how frequently they “wake up during the night and experience difficulty returning to sleep”.

The Conner’s Early Childhood Behavior-Parent Short Version is a widely accepted measure (Fischer & Newby, 1991; Horn, Ialongo, Popovich, & Peradotto, 1987). In this sample, there is evidence of internal consistency for total scores on this measure ($\alpha$=.71). Analysis of subscales yielded primarily low internal consistency values as indicated in Table 1 and were not considered appropriate for analyses. There is evidence of convergent validity for the total scores on this measure. That is, total scores on this measure are correlated with scores on the Child Behavior Checklist and Kiddie-Schedule for Affective Disorders and Schizophrenia (Morales-Hidalgo, Hernández-Martínez, Vera, Voltas, & Canals, 2017).

**Parent perceived stress**. Parent perceived stress was measured with the Perceived Stress Scale. This 14-item measure was used to assess the degree to which individuals appraise the situations in their lives as stressful. The Perceived Stress Scale contains seven positively worded items and seven negatively worded items to which parents indicated answers on a 4-point Likert scale to assess the degree to which parents feel that their life has been unpredictable, uncontrollable, and overloaded in their last 30 days. Positively worded items included questions regarding how often parents “felt they were effectively coping with important changes occurring in their life” or how often they “felt confident about their ability to handle personal problems”, whereas negatively worded items included questions about how often they have “been angered because of things that happened that were outside their control” or “felt difficulties were piling up so high that they could not overcome them.” Positively worded items were reverse scored to form an overall score that indicated degree of perceived stress. Within this sample, there was evidence of internal consistency for total scores on this measure ($\alpha$ =.75). There is evidence of

convergent validity for scores on this measure. That is, responses to this measure are related to responses to other measures of stress as well as measures of depression, anxiety, and negative affect (Ezzati et al., 2014).

**Child outcomes.** Child developmental outcome data were gathered with the Ages and Stages Questionnaire for their local Head Start. This measure is composed of 38 questions concerning the following five domains of child development: communication, gross motor, fine motor, problem solving, and personal-social. Higher scores on this measure indicate that a child is doing well while lower scores reflect potential developmental delay. Domains of physical and social development were considered crucial outcomes to consider (in addition to communication and problem solving subscales) in the context of parent stress and child temperament and prior findings regarding stress contagion theory and the influence of child temperament on subsequent social learning opportunities (Boyce & Ellis, 2005; Waters, West, & Mendes, 2014). The domain of communication was measured by assessment of a child's ability to follow receptive instructions, to point to objects identified by administrator, to produce three to four-word phrases, to imitate functional behaviors (e.g., zipping a zipper), or to respond to simple questions appropriately (e.g., "what is your name?"). Gross motor development was measured by observation of a child's ability to stand on one foot for one second, to throw a ball overhand, to jump forward six inches with both feet, to kick a ball, and to walk up a set of stairs. Fine motor tasks included a child being able to imitate drawing a straight line, thread shoelaces, imitate drawing a circle, cutting paper with child safe scissors, and appropriately holding a pencil. Problem solving skills included imitating an arrangement of objects, finding alternative means of reaching a goal (e.g., using a box to reach an object out of reach), imitating specific pattern of building blocks, and appropriately imitating a sequence of numbers in order. Last, personal-

social development was measured by assessment of children's ability to feed themselves with a spoon and appropriately play with a push toy as well as navigate their environment. As evidenced by correlations between scores on this measure and scores on the Pediatric Developmental Impression and Bayley Scales of Infant Development II (Singh, Yeh, & Boone Blanchard, 2017), there is evidence of convergent validity for Ages and Stages Questionnaire scores. Singh, Yeh, and Boone-Blanchard (2017) noted evidence of internal consistency for total scores on this measure ($\alpha$=.86), and further analysis reflected test-retest reliability ($r$ = 0.92; $N$ = 1380) over the course of 5 years. Squires, Bricker, and Potter, (1997) calculated Cronbach coefficient alphas across Ages and Stages Questionnaire domains with a sample of 248 children at 36 months old. Cronbach's alpha values were reported as follows: communication was $\alpha$ = 0.77, gross motor was $\alpha$ = 0.77, fine motor was $\alpha$ = 0.78, problem solving was $\alpha$ = 0.83, and personal-social at $\alpha$ = 0.73. Internal consistency information for the overall Ages and Stages Questionnaire score within sample was reported in Table 1. The raw scores for this measure were not available for reliability analyses and indices of the reliability of subscale scores was not calculable.

## Results

### Preliminary Analyses

**Descriptive statistics.** In Table 1, scores for many of the measures of the variables of interest were negatively skewed and notably leptokurtic. The distributions of scores on the Perceived Stress Scale suggest that most parents in this sample were experiencing high rates of stress. The skewness and kurtosis of scores on the Ages and Stages overall as well as subscale scores indicate that parents were reporting relatively few concerns with their children's overall development and development in communication, gross motor, problem solving, and personal-

social domains. Conner's Behavior Total scores were normally distributed but scores on subscales of aggression, atypical behavior, mood/affect, physical symptoms, and sleep were positively skewed and leptokurtic. These distributions indicate that parents in this sample were also reporting minimal concern for maladaptive child behaviors that specifically relate to aggression, atypical behavior, negative mood/affect, physical symptoms, and sleep. Transformations were not utilized to accommodate for skewness and kurtosis because there is evidence that transformations often have little impact on analyses (Cohen, Cohen, West, & Aiken, 2003). Taken together, these non-normal distributions reflect restriction of range and must be considered in interpreting the results of our main analyses.

Table 1.
*Descriptive Statistics of Continuous Predictor and Criterion Variables*

| | *M* | *SD* | Range | Skewness | Kurtosis | $\alpha$ |
|---|---|---|---|---|---|---|
| **Parent Perceived Stress** | 30.27 | 5.53 | 6-45 | -1.14 | 2.85 | 0.75 |
| **Child Behavior Total** | 22.95 | 12.53 | 2-71 | 0.80 | 0.39 | 0.71 |
| Inattention | 6.41 | 4.29 | 0-14 | 0.11 | -1.08 | 0.74 |
| Aggression | 0.71 | 1.10 | 0-6 | 2.01 | 4.60 | 0.70 |
| Defiance | 3.09 | 2.44 | 0-9 | 0.47 | -0.75 | 0.63 |
| Social Functioning | 1.86 | 1.74 | 0-7 | 0.74 | -0.20 | 0.45 |
| Atypical Behavior | 0.68 | 1.01 | 0-6 | 1.92 | 4.41 | 0.35 |
| Anxiety | 4.30 | 2.95 | 0-13 | 0.61 | -0.05 | 0.63 |
| Mood/Affect | 2.51 | 2.49 | 0-13 | 1.62 | 3.11 | 0.69 |
| Physical | 0.79 | 1.23 | 0-6 | 1.86 | 3.41 | 0.62 |
| Sleep | 1.00 | 1.51 | 0-9 | 2.18 | 5.93 | 0.66 |
| **ASQ Total** | 255.82 | 28.30 | 150-300 | -0.93 | 1.38 | 0.70 |
| ASQ Communication | 53.01 | 7.45 | 10-60 | -1.71 | 5.50 | |
| ASQ Gross Motor | 54.56 | 6.67 | 25-60 | -1.66 | 3.24 | |
| ASQ Fine Motor | 41.98 | 12.58 | 0-60 | -0.68 | 0.24 | |
| ASQ Problem Solving | 51.91 | 8.27 | 10-60 | -1.54 | 3.40 | |

| | | | | | |
|---|---|---|---|---|---|
| ASQ Personal Social | 54.46 | 6.14 | 25-60 | -1.55 | 3.13 |

Note: Individual ASQ item scores were not available. Reliability was assessed by external sources noted in the method section.

**Reliability analysis.** Reliability analysis of the Perceived Stress scores produced Cronbach alpha values greater than 0.70. Reliability analysis of the Conner's Early Childhood Behavior-Parent Short Version also produced Cronbach alpha values equal to or greater than 0.70 for the total score as well as two of the subscales as shown in Table 1. Questionable Cronbach's alpha values (< 0.70) were observed for Conner's Early Childhood Behavior-Parent Short Version subscales of social functioning and atypical behavior. Given that internal consistency was insufficient for many subscale scores but sufficient for all three measures' total scores, total scores for the predictor variables of perceived stress and child behavior as well as the criterion variable of child developmental outcomes were used in subsequent analyses. The use of total scores also seems appropriate given the inter-correlations of scores on the subscales for measures of child behavior and child developmental outcomes (Helton, Corwyn, Bonner, Brown, & Mulhern, 2006; Singh, Yeh, & Boone Blanchard, 2017). Finally, subscales of the child behavior measure were important to consider in the context of the composition of child temperament and what that contributes to both child developmental outcomes. After review of literature indicating a significant relationship between overall child temperament and developmental outcomes as they relate to parent stress as well as the low reliability of subscales within this sample, overall child temperament was considered the most appropriate construct to include in model being tested and subscales were removed from subsequent analyses(Boyce & Ellis, 2005; Coplan et al., 2003; Newton et al., 2014; Pederson, Bailey, Tarabulsy, Bento, & Moran, 2014).

**Potential confounds.** Preliminary analyses were conducted to ensure that demographic variables were not confounded with predictor variables and thereby serving as a threat to internal validity. Analyses were not conducted with parent language or parent sex given the disproportional cell sizes for these variables as only 33% of the sample reported to be male and only 10% of the sample reported to be Spanish speaking. To ensure a sufficient distribution of subjects across categories, the levels of remaining demographic variables were modified accordingly (Norman, 2010). Several ANOVAs were conducted to assess the relationship between categorical demographic variables of parent age (2 levels; 25 years old or less ($n$ =66) and 26 years old or more ($n$ = 59)), child age (3 levels; 1.5-2.5 ($n$ = 53), 2.5-3.5 ($n$ = 87), and 3.5-4.8 years old ($n$ = 56)), parent education (2 levels; high school education or less ($n$ =112) and post high school education ($n$ =75)), marital status (2 levels; not in a relationship ($n$ = 105) and in a relationship ($n$ = 96)), ethnicity (2 levels; Caucasian ($n$ = 88) and Persons of Color ($n$ = 90)), and child sex (2 levels; male ($n$ = 102) or female ($n$ = 102)) with continuous variables of parent perceived stress, child behavior, and child developmental outcomes.

With the exception of parent's marital status, none of the demographic variables were confounded with either the predictor variables or outcome variable of interest in this study. That is, a significant association was identified only for parent marital status with child behavior $F(3, 192) = 3.57$, $p = .015$, $\eta^2 = 0.05$, 95% CI [ -0.92, 1.04], and parent perceived stress $F(3, 192) = 3.05$, $p = .030$, $\eta^2 = 0.05$, 95% CI [ -1.21, 1.22]. These relationships had a small effect size ($\eta^2 = 0.05$), and confidence intervals included the null value which indicates there was no robust difference between groups for either relationship. Consequently, parent marital status was excluded from subsequent analyses. In addition to the results of these analyses, demographics were not included as covariates to avoid the appearance of $p$-hacking (Gildersleeve, Haselton, &

Fales, 2014; Simonsohn, Nelson, & Simmons, 2014). Following the recommendations of Cohen, Cohen, West and Aiken (2003), the squared correlation between our predictors was used as an index of multicollinearity. This statistic for scores on our measures of parent perceived stress and child temperament was .76. Although this figure is strong, the VIF (variance inflation factor) for the regression coefficients representing these two measures was 4.33. Given that this value was far less than 10, a cutoff for serious multicollinearity (Cohen et al. 2003), we treated perceived stress and child temperament as separate predictor variables in subsequent analyses.

**Child Developmental Outcomes**

The first proposed hypothesis was that increases in difficult child behavior would lead to a decrease in developmental outcomes. For this hypothesis, an increase Conner's Early Childhood Behavior-Parent Short Version scores were expected to be associated with a decrease in Ages and Stages Questionnaire scores. The second hypothesis was that parent perceived stress would significantly predict child developmental outcomes. In other words, increases in parent perceive stress were expected to be associated with decreases in child development outcomes. Finally, the third proposed hypothesis was that parent perceived stress and negative child temperament would reliably interact to produce a negative influence on developmental child outcomes. That is, the worst developmental outcomes were expected when high levels of parental stress were accompanied by high levels of negative child behavior.

These three hypotheses were tested in model one and two of the hierarchical regression presented in Table 2. Parent perceived stress and child behavior served as predictor variables of child developmental outcomes in the first model. Following recommendations in statistical analysis literature, parent perceived stress and child behavior were controlled for in the second model which was used to assess an interaction effect of parent perceived stress and negative

child behavior beyond independent effects on child developmental outcomes (Shadish, Cook, & Campbell, 2002).

The first model with child behavior and parent perceived stress as predictors reliably accounted for variance in child developmental outcomes, $F(2, 206) = 3.87$, $p = .022$, $R^2 = 0.04$. Child behavior significantly predicted child developmental outcomes, $t(2, 206) = 2.00$, $p = .046$, $\beta = 0.54$. The first hypothesis was not supported, however, because the positive relationship suggests that an increase in negative child behaviors significantly improves child developmental outcomes. With respect to the second hypothesis, a significant relationship was observed between parent stress and developmental child outcomes, $t(2, 206) = -2.43$, $\beta = -0.65$, $p = .016$. The second hypothesis was supported and the negative relationship indicates that as parent perceived stress increased, child developmental outcomes decreased.

The second model of the hierarchical regression included the interaction effect and did significantly account for variance in child developmental outcomes, $F(3, 205) = 2.66$, $p = .049$, $R^2 = 0.02$. The change of $R^2$ between the first and second models ($\Delta R^2 = 0.001$, $p = .596$) was not statistically significant. The interaction term did not significantly predict child developmental outcome scores ($t(3,205) = 0.53$, $p = .596$, $\beta = 0.04$) which indicates that parent perceived stress and child behavior do not reliably interact to predict developmental child outcomes beyond their separate and individual effects.

Table 2.
*Regression Analyses of Children's Outcomes as a Function of Children's Temperament and Parental Stress*

| | Model 1 | | | | Model 2 | | | |
|---|---|---|---|---|---|---|---|---|
| Variables | *B* | *SE B* | β | *p* | *B* | *SE B* | β | *p* |
| Child Temperament | 2.16 | 1.08 | 0.54 | .046 | 2.25 | 1.09 | 0.56 | .041 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Parent Perceived Stress | -2.13 | 0.88 | -0.65 | .016 | -2.24 | 0.90 | -0.68 | .014 |
| Interaction | | | | | 0.02 | 0.04 | 0.04 | .596 |
| $R^2$ | | 0.04 | | | | 0.02 | | |

Note: Parent Perceived Stress and Child Temperament were centered at their means.

**Exploratory Analysis**

Exploratory analyses were conducted to determine how various domains of negative child temperament impact children's developmental outcomes. In the linear regression analysis presented on Table 3, the predictor variable was child temperament domains and the criterion variable was child developmental outcomes. Preliminary analysis of original subscales yielded acceptable internal reliability values for aggregated subscales of inattention ($\alpha$=.74), aggression/defiance ($\alpha$=.74), and anxiety and negative affect ($\alpha$=.79) while unacceptable internal reliability values were calculated for physical/sleep ($\alpha$=.69) and social function/atypical behaviors ($\alpha$=.49). Preliminary analyses were also conducted for reliability of aggregated domains of communication and personal social ($\alpha$=.58) and physical (gross motor and fine motor; $\alpha$=.41) development. Scores on this measure were also considered insufficient for subsequent analyses.

With prior research in mind, regression analyses were conducted with inattention as the predictor variable and communication *(*$F(1, 206) = 0.40$, $p = .528$, $R^2 = 0.04$) and socioemotional*(*$F(1, 206) = 3.63$, $p = .058$, $R^2 = 0.13$) development as the outcome variables. A second set of regression analyses were conducted with aggression/defiance as the predictor variable and communication *(*$F(1, 206) = 0.04$, $p = .837$, $R^2 = 0.02$), problem solving*(*$F(1, 206) =$

1.85, $p$ = .176, $R^2$= 0.10), and socioemotional ($F$(1, 206) = 0.28, $p$ = .600, $R^2$= 0.04) development as outcome variables. A final set of regression analyses were conducted with anxiety/negative affect as the predictor variable and communication ($F$(1, 206) = 1.07, $p$ = .302, $R^2$= 0.08), problem solving($F$(1, 206) = 2.78, $p$ = .098, $R^2$= 0.13), and socioemotional ($F$(1, 206) = 3.77, $p$ = .054, $R^2$= 0.15) development as outcome variables. The results indicated that no aggregated domain of negative child temperament independently and significantly predicted a decreased in developmental child outcomes. While prior analysis indicated that the total scores for child temperament significantly predicted child developmental outcomes, aggregated domains did not.

## Discussion

In this study, child developmental outcomes were examined in the context of parent-child relationships. In particular, the role of parents perceived stress and negative child temperament were used as predictors of children's outcomes. As predicted, an increase in parent perceived stress related to a significant decrease in child developmental outcomes. There was also a significant relationship between negative child temperament and developmental child outcomes. However, this relationship was positive rather than negative. That is, as parents reported greater degrees of maladaptive child temperament, they also reported higher ratings of child development. This would suggest that negative child temperament lead to an improvement in outcomes. There was no interactive effect of parent stress and negative child temperament on children's developmental outcomes. Regression analyses were utilized to ensure that no variance in domains of negative child temperament and developmental child temperament could have been explained by third variables which included parent and child age, parent and child gender, parent ethnicity, and marital status. No significant relationships were observed. These results are

interesting and while an overall concern for child temperament related to improved child outcomes, reported impairment in individual domains of child temperament did not.

In consideration of the unexpected results of the second hypothesis, the positive relationship between negative child temperaments and developmental outcomes may have some unique implications. Molfese et al. (2010) conducted a similar study on the relationship between difficult infant temperament and subsequent academic scores and found a significant and positive relationship that deviated from findings in prior research (Finn et al., 1995; Lerner, Lerner, & Zabski, 1985; Martin & Holbrook, 1985). Molfese proposed that this effect may have existed because children that presented more difficult temperaments were likely to receive more attention and support from their mothers. Moreover, this relationship was significant for infants at 12 months old but not at 18 months, and Molfese suggested that potential third variables which fluctuate across time must be considered in future longitudinal studies.

Another plausible alternative explanation for the counterintuitive findings concerning children's negative temperament might be the way in which their behavior was assessed. The parent perceived stress measure utilized in this study may more accurately reflect feelings of distress, while the parent-report measure of negative child temperaments may be tapping into a potential source of eustress or parent concern for their child. Zaidman-Zait et al. (2014) noted that negative stress may deteriorate a parent child relationship whereas, positive stress may act as a motivating factor for the parent to invest in their child. In their study, general life stress was less predictive of child temperament in the first 12 months after a developmental diagnosis and was related to parents' increased prioritization of appropriate treatment.

**Limitations**

Several limitations should be considered in interpretation of the results of this study. First, this study was non-experimental. All data was collected as total scores collected across the 2014-2015 school year with no experimental control. As such, no causal relationship can be inferred and issues temporal precedence must be considered (Shadish et al., 2002). Variables of interest, parent stress and negative child temperament, could not be manipulated and a correlational design was the only plausible design.

Second, this study drew from a homogenous population from Head Start centers and it is possible that results would have varied if a more diverse population were sampled. With respect to external validity, failure to gather a sufficiently randomized sample that is representative of the population inhibits generalizability of findings (Torgerson & Sibbald, 1998). The homogeneity of this sample may also relate to the observed skewness and kurtosis of the variables of interest and constitutes a potential threat to statistical validity. This sample was still appropriate considering the specified interest in the at-risk Head Start population. However, findings from this study or future studies may be more appropriately applied to a wider population if a more heterogeneous sample were gathered.

Third, the measures utilized for child temperament and child developmental outcomes relied only on parent report. Some observed effects may relate to shared method variance beyond the influence of the relationships in question. Parent reports may also capture potentially biased information related to both child temperament and parents' perceptions of concern for their child (Shadish et al., 2002). Internal validity of these results may have been bolstered if direct observation of child temperament and developmental skills were applied.

Finally, data was noted to be missing at random and was considered an acceptable candidate for multiple imputation though this statistical tool may lead to underestimation of standard errors. Sinharay, Stern, and Russell (2001) concluded in their simulation study that multiple imputation is an improvement over alternative methods for dealing with missing data by accounting for uncertainty in missing values. This method also assumes that these missing values are missing at random which cannot be verified. This method was still preferable than removal of participants containing missing data because multiple imputation has proven to produce estimates with minimal bias and a smaller sample size could have led to insufficient statistical power.

**Future Directions**

In consideration of prior findings on parent stress and the nature of the perceived stress measure in this study, future investigations on children's developmental outcomes, researchers should examine various forms of parent stress. Eustress, distress, and workplace stress may impose unique implications on the parent-child relationship. For example, parent job-related stress was predictive of parents' emotional and behavioral withdrawal from interaction with their children (Crnic et al., 2005). The effects of work related stress may also be moderated by other factors. Moderating effects collectively indicated that an increase in subjectively negative parent stress led to dysregulated child development while subjectively neutral or positive stress had no negative influences on development. Pesonen et al. (2008) found that the positive or negative subjective emotional experience of stress moderated the effects of a heavy workload on parenting behavior. The subjective appraisal of work related stress may be more potent than objective assessments of such stress when it comes to predicting children's developmental outcomes. The relationship observed in this study between parent stress and child outcomes may

relate to other theories that speak to the subjectivity of stress such as the Lazarus stress theory and implicit stress theory to name a few (Fernandez & Perrewe, 1995; Lazarus, 1991).

Parent sensitive responding may be another factor to consider within the context of parent perceived stress and children's developmental outcomes. A review of Ainsworth's work from a relational perspective supported the assertion that children's temperament contributed significantly to interactions with their parents (Pederson et al., 2014). Biologically based child characteristics such as oppositional behavior and difficult temperament are not only affected by parent behavior but are also an influence on parent behavior. More specifically, biologically established child negative emotionality was positively related to parents' negative reaction to their child (Eisenberg et al., 1999). In that longitudinal study, oppositional, aggressive, and turbulent behavior problems in preschool children significantly predicted harsh and negative parenting behaviors a year and a half later. Furthermore, inattention and hyperactivity at 41 months predicted later binge alcohol use by parents (Pagani & Fitzpatrick, 2018). Collectively these findings indicate it would be beneficial to further investigate how parenting behaviors vary in relation to parents' subjective levels of stress.

Finally, future research aimed at these dynamics within low-socioeconomic status families should account for potential moderating and mediating variables. It has been reported that parent attitudes and behavior showed only moderate stability across various situations and time which highlighted the importance of gathering information about which environmental and personal factors may affect this instability (Aizer, Stroud, & Buka, 2016; Håkansson, Axmon, & Eek, 2016; R. A. Thompson, 1997). Poverty-related cumulative risk factors (level of education, income, parent depression, marital status, etc.) are uniquely related to maternal cortisol dysregulation and decreased maternal sensitivity in the context of adversity (Finegood et al.,

2016). Ogbu's (1981) cultural ecological perspective highlights the magnitude of influence that parent background imposes on a child. In his work, Ogbu noted that the origins of human competence are derived from the nature of an individual's cultural tasks (those tasks that are deemed by a culture to be appropriate for one's age, sex, etc.), that those competencies directly influence a parent's child-rearing techniques as theories and models of success in child-rearing are handed down, and that these ideas of what is socially appropriate within a specific culture are organized in a manner that facilitates the most efficient development of individual competence and optimal survival. For some cultures, techniques in child rearing will vary greatly. Ogbu's theory suggests that behaviors, roles, and attitudes prioritized by one's culture will directly influence parenting practices. With these propositions in mind, demographic variables that associate with a parent's ability, capacity, and motivation to sensitively respond to their child should be considered in future study on parenting stress and child outcomes.

**Conclusions**

This study attempted to add to the existing literature by providing a better understanding of how parent and child qualities influence child developmental outcomes in at-risk, low socio-economic status families. Consistent with previous investigations, subjectively negative parent stress seemed to have imposed a negative influence on child developmental outcomes in at-risk Head Start population (Crnic et al., 2005; Fernandez & Perrewe, 1995; Lazarus, 1991; Pesonen et al., 2008). The positive relationship between negative child temperament and child developmental outcomes obtained in this study has also been observed in a minority of similar studies which suggests the importance of identifying more specific mechanisms linking child temperament to child outcomes. The observed relationship between parent perceived stress and child developmental outcomes also support the proposition that interventions aimed at reducing

parent stress above and beyond child behavior modification should significantly improve the trajectory of developmental child outcomes.

Several future hypotheses may be suggested as a result of these findings. Future research should investigate a potential moderating role of parent stress on the observed relationship between child temperament and child outcomes. With respect to the positive relationship between negative child temperaments and child developmental outcomes, moderating effects of eustress versus distress may also be a beneficial distinction to explore. Finally, mediation of the relationship between parent stress and child outcomes by parent sensitive responding in relation to difficult child temperament should be explored.

## References

Aizer, A., Stroud, L., & Buka, S. (2016). Maternal stress and child outcomes: Evidence from siblings. *Journal of Human Resources*, *51*(3), 523–555. https://doi.org/10.3368/jhr.51.3.0914-6664R

Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1993). First-grade classroom behavior: Its short- and long-term consequences for school performance, (64), 801–814.

Besemer, S., Loeber, R., Hinshaw, S. P., & Pardini, D. A. (2016). Bidirectional associations between externalizing behavior problems and maladaptive parenting within parent-son dyads across childhood. *Journal of Abnormal Child Psychology*, *44*(7), 1387–1398. https://doi.org/10.1007/s10802-015-0124-6

Boyce, W. T., & Ellis, B. J. (2005). Biological sensitivity to context: An evolutionary–developmental theory of the origins and functions of stress reactivity. *Development and Psychopathology*, *17*(02), 271–301. https://doi.org/10.1017/S0954579405050145

Bricker, D., & Squires, J. (1999). Ages & stages questionnaires': A parent-completed, child monitoring system 2nd ed. Paul H. Brooks Publishing Co.

Cohen, S., Kamarck, T., & Mermelstein, R. (1984). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–396.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Cole, K. N., Dale, P. S., & Mills, P. E. (1991). Individual differences in language delayed children's responses to direct and interactive preschool instruction. *Topics in Early*

*Childhood Special Education*, *11*(1), 99–124. https://doi.org/10.1177/027112149101100110

Conners, C. J. (2009). *Conner's Early Childhood BEH-Parent Short Version [Measurement instrument]*. North Twonawanda, NY: Multi-Health Systems Inc.

Coplan, R. J., Bowker, A., & Cooper, S. M. (2003). Parenting daily hassles, child temperament, and social adjustment in preschool. *Early Childhood Research Quarterly*, *18*(3), 376–395. https://doi.org/10.1016/S0885-2006(03)00045-0

Crnic, K. A., Gaze, C., & Hoffman, C. (2005). Cumulative parenting stress across the preschool period: relations to maternal parenting and child behaviour at age 5. *Infant and Child Development*, *14*(2), 117–132. https://doi.org/10.1002/icd.384

Cummings, E. M. (1998). Stress and coping approaches and research. *Journal of Aggression, Maltreatment & Trauma*, *2*(1), 31–50. https://doi.org/10.1300/J146v02n01_03

Davidov, M. (2006). Untangling the effects of parental warmth and responsiveness to distress on child outcomes. *Child Development*, *77*(1), 44–58. https://doi.org/10.1111/j.1467-8624.2006.00855.x

Deater-Deckard, K. (1998). Parenting stress and child adjustment: Some old hypotheses and new questions. *Clinical Psychology Science and Practice*, *5*, 314–332.

Deater-Deckard, K., Ivy, L., & Petrill, S. A. (2006). Maternal warmth moderates the link between physical punishment and child externalizing problems: A parent – offspring behavior genetic analysis. *Parenting Science and Practice*, *6*(1), 59–78.

Dodici, B. J., Draper, D. C., & Peterson, C. A. (2003). Early parent–child interactions and early literacy development. *Topics in Early Childhood Special Education*, *23*(3), 124–137.

Eisenberg, N., Fabes, R., Shepard, S., Guthrie, I. K., Murphy, B. C., & Reiser, M. (1999). Parental reactions to children's negative emotions: Longitudinal relations to quality of children's social functioning. *Child Development*, *70*(2), 513–534. https://doi.org/10.1111/1467-8624.00037

Ezzati, A., Jiang, J., Katz, M. J., Sliwinski, M. J., Zimmerman, M. E., & Lipton, R. B. (2014). Validation of the Perceived Stress Scale in a community sample of older adults: Perceived Stress Scale in older adults. *International Journal of Geriatric Psychiatry*, *29*(6), 645–652. https://doi.org/10.1002/gps.4049

Fernandez, D. R., & Perrewe, P. L. (1995). Implicit stres theory: An experimental examination of subjective performance information on employee evaluations. *Journal of Organizational Behavior*, *16*(4), 353–362.

Finegood, E. D., Blair, C., Granger, D. A., Hibel, L. C., Mills-Koonce, R., & Family Life Project Key Investigators. (2016). Psychobiological influences on maternal sensitivity in the context of adversity. *Developmental Psychology*, *52*(7), 1073–1087. https://doi.org/10.1037/dev0000123

Finn, J. D., Pannozzo, G. M., & Voelkl, K. E. (1995). Disruptive and inattentive-withdrawn behavior and achievement among fourth graders. *The Elementary School Journal*, *95*(5), 421–434. https://doi.org/10.1086/461853

Fischer, M., & Newby, R. F. (1991). Assessment of stimulant response in ADHD children using a refined multimethod clinical protocol, *20*(3), 232–244.

Fisher, P. A., & Stoolmiller, M. (2008). Intervention effects on foster parent stress: Associations with children's cortisol levels. *Developmental Psychopathology*, *20*(3), 1003–1021. https://doi.org/10.1017/S0954579408000473.Intervention

Gildersleeve, K., Haselton, M. G., & Fales, M. R. (2014). Meta-analyses and p-curves support robust cycle shifts in women's mate preferences: Reply to Wood and Carden (2014) and Harris, Pashler, and Mickes (2014). *Psychological Bulletin, 140*(5), 1272–1280. https://doi.org/10.1037/a0037714

Graziano, P. A., & Hart, K. (2016). Beyond behavior modification: Benefits of social–emotional/self-regulation training for preschoolers with behavior problems. *Journal of School Psychology, 58*, 91–111. https://doi.org/10.1016/j.jsp.2016.07.004

Håkansson, C., Axmon, A., & Eek, F. (2016). Insufficient time for leisure and perceived health and stress in working parents with small children. *Work, 55*(2), 453–461. https://doi.org/10.3233/WOR-162404

Harmeyer, E., Ispa, J. M., Palermo, F., & Carlo, G. (2016). Predicting self-regulation and vocabulary and academic skills at kindergarten entry: The roles of maternal parenting stress and mother-child closeness. *Early Childhood Research Quarterly, 37*, 153–164. https://doi.org/10.1016/j.ecresq.2016.05.001

Helton, S. C., Corwyn, R. F., Bonner, M. J., Brown, R. T., & Mulhern, R. K. (2006). Factor analysis and validity of the Conners parent and teacher rating scales in childhood cancer survivors. *Journal of Pediatric Psychology*, *31*(2), 200–208. https://doi.org/10.1093/jpepsy/jsj010

Horn, W. F., Ialongo, N., Popovich, S., & Peradotto, D. (1987). Behavioral parent training and cognitive-behavioral self-control therapy with ADD-H children: Comparative and combined effects, *16*(1), 57–68.

Kagan, J. (1983). Stress and coping in early development. *McGraw-Hill*.

Kaminski, J. W., Perou, R., Visser, S. N., Scott, K. G., Beckwith, L., Howard, J., … Danielson, M. L. (2013). Behavioral and socioemotional outcomes through age 5 years of the Legacy for Children Public Health approach to improving developmental outcomes among children born into poverty. *American Journal of Public Health, 103*(6), 1058–1066. https://doi.org/10.2105/AJPH.2012.300996

Lazarus, R. S. (1991). *Emotion and adaptation*. New York, NY: Oxford University Press.

Lefmann, T., & Combs-Orme, T. (2014). Prenatal stress, poverty, and child outcomes. *Child and Adolescent Social Work Journal*. https://doi.org/10.1007/s10560-014-0340-x

Lerner, J. V., Lerner, R. M., & Zabski, S. (1985). Temperament and elementary school children's actual and rated academic performance: A test of a "goodness-of-fit" model. *Journal of Child Psychology and Psychiatry, 26,* 125–136.

Malmberg, L. E., Lewis, S., West, A., Murray, E., Sylva, K., & Stein, A. (2016). The influence of mothers' and fathers' sensitivity in the first year of life on children's cognitive outcomes at 18 and 36months. *Child: Care, Health and Development, 42*(1), 1–7. https://doi.org/10.1111/cch.12294

Martin, R. P., & Holbrook, J. (1985). Relationship of temperament characteristics to the academic achievment of first-grade children. *Journal of Psychoeducational Assessment, 3*, 131–140.

Mesman, J., van Ijzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2012). Unequal in opportunity, equal in process: parental sensitivity promotes positive child development in ethnic minority families. *Child Development Perspectives, 6*(3), 239–250. https://doi.org/10.1111/j.1750-8606.2011.00223.x

Molfese, V. J., Rudasill, K. M., Beswick, J. L., Jacobi-vessels, J. L., Ferguson, M. C., & White, J. M. (2010). Infant temperament, maternal personality , and parenting stress as contributors to infant developmental outcomes. *Merrill-Palmer Quarterly-Journal of Developmental Psychology*, *56*(1), 49–79.

Montroy, J. J., Bowles, R. P., Skibbe, L. E., & Foster, T. D. (2014). Social skills and problem behaviors as mediators of the relationship between behavioral self-regulation and academic achievement. *Early Childhood Research Quarterly*, *29*(3), 298–309. https://doi.org/10.1016/j.ecresq.2014.03.002

Morales-Hidalgo, P., Hernández-Martínez, C., Vera, M., Voltas, N., & Canals, J. (2017). Psychometric properties of the Conners-3 and Conners Early Childhood Indexes in a Spanish school population. *International Journal of Clinical and Health Psychology*, *17*(1), 85–96. https://doi.org/10.1016/j.ijchp.2016.07.003

Neece, C. L. (2014). Mindfulness-based stress reduction for parents of young children with developmental delays: Implications for parental mental health and child behavior problems. *Journal of Applied Research in Intellectual Disabilities.* https://doi.org/10.1111/jar.12064

Newton, E. K., Laible, D., Carlo, G., Steele, J. S., & McGinley, M. (2014). Do sensitive parents foster kind children, or vice versa? Bidirectional influences between children's prosocial behavior and parental sensitivity. *Developmental Psychology*, *50*(6), 1808–1816. https://doi.org/10.1037/a0036495

Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Advances in Health Sciences Education, 15*(5), 625–632. https://doi.org/10.1007/s10459-010-9222-y

Ogbu, J. U. (1981). Origins of Human Competence: A Cultural-Ecological Perspective. *Child Development*, *52*, 413–429.

Pagani, L. S., & Fitzpatrick, C. (2018). Children's early disruptive behavior predicts later coercive behavior and binge drinking by mothers. *Journal of Pediatric Nursing*, *39*, 15–20.

Pederson, D. R., Bailey, H. N., Tarabulsy, G. M., Bento, S., & Moran, G. (2014). Understanding sensitivity: Lessons learned from the legacy of Mary Ainsworth. *Attachment and Human Development*, *16*(3), 261–270. https://doi.org/10.1080/14616734.2014.900094

Pesonen, A. K., Raikkonen, K., Heinonen, K., Komsi, N., Jarvenpaa, A. L., & Strandberg, T. (2008). A transactional model of temperamental development: Evidence of a relationship between child temperament and maternal stress over five years. *Social Development*, *17*(2), 326–340. https://doi.org/10.1111/j.1467-9507.2007.00427.x

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.

Simonsohn, U., Nelson, L. D., & Simmons, J. P. (2014). P-curve: A key to the file-drawer. *Journal of Experimental Psychology: General*, *143*(2), 534–547. https://doi.org/10.1037/a0033242

Singh, A., Yeh, C. J., & Boone Blanchard, S. (2017). Ages and Stages Questionnaire: A global screening scale. *Boletín Médico Del Hospital Infantil de México, 74*(1), 5–12. https://doi.org/10.1016/j.bmhimx.2016.07.008

Sinharay, S., Stern, H. S., & Russell, D. (2001). The use of multiple imputation for the analysis of missing data. *Psychological Methods*, *6*(4), 317–329.

Squires, J., Bricker, D., & Potter, L. (1997). Revision of a parent-completed developmental screening tool: Ages and Stages Questionnaires. *Journal of Pediatric Psychology*, *22*(3), 313–328.

Strauss, K., Vicari, S., Valeri, G., D'Elia, L., Arima, S., & Fava, L. (2012). Parent inclusion in Early Intensive Behavioral Intervention: The influence of parental stress, parent treatment fidelity and parent-mediated generalization of behavior targets on child outcomes. *Research in Developmental Disabilities*, *33*(2), 688–703. https://doi.org/10.1016/j.ridd.2011.11.008

Thompson, R. A. (1997). Sensitivity and security: New questions to ponder. *Child Development*, *68*(4), 595–597.

Thompson, R. A. (2014). Stress and child development. *The Future of Children*, *24*(1), 41–59.

Thompson, R., & Haskins, R. (2014). Early stress gets under the skin: Promising initiatives to help children facing chronic adversity, *24*(1), 1–6.

Torgerson, D., & Sibbald, B. (1998). Understanding controlled trials; what is a patient preference trial? *British Medical Journal*, *316*(360).

Tu, M. T., Grunau, R. E., Petrie-Thomas, J., Haley, D. W., Weinberg, J., & Whitfield, M. F. (2007). Maternal stress and behavior modulate relationships between neonatal stress, attention, and basal cortisol at 8 months in preterm infants. *Developmental Psychobiology*, *49*(2), 150–164. https://doi.org/10.1002/dev.20204

Tu, M. T., Grunau, R. E., Petrie-thomas, J., Haley, D. W., Weinberg, J., Whitfield, M. F., & Weinberg, J. (2007). Maternal stress and behavior modulate relationships between neonatal stress, attenttion, and basal cortisol at 8 months in preterm infants. *Developmental Psychobiology*, *49*(2), 150–164.

Wakschlag, L. S., & Hans, S. L. (1999). Relation of maternal responsiveness during infancy to the development of behavior problems in high-risk youths. *Developmental Psychology, 35*(2), 569–579. https://doi.org/10.1037/0012-1649.35.2.569

Waters, S. F., West, T. V., & Mendes, W. B. (2014). Stress Contagion: Physiological covariation between mothers and infants. *Psychological Science, 25*(4), 934–942. https://doi.org/10.1177/0956797613518352

Zaidman-Zait, A., Mirenda, P., Duku, E., Szatmari, P., Georgiades, S., Volden, J., & Thompson, A. (2014). Examination of bidirectional relationships between parent stress and two types of problem behavior in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *44*(8), 1908–1917. https://doi.org/10.1007/s10803-014-2064-3

CERTIFICATE OF APPROVAL

The Thesis “Parent Perceived Stress and Child Temperament: Qualities that Facilitate or Impede Child Developmental Outcomes” submitted by Rebekah Klempin

Approved by the thesis committee: Date

_____ _____

Dr. Christopher Leone

_____ _____

Dr. Jody Nicholson

Accepted for the Psychology Department:

_____ _____

Dr. Lori Lange

Accepted for the College of Arts and Sciences:

_____ _____

Dr. George Rainbolt

Accepted for the University:

_____ _____

Dr. John Kantner