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Effects of Temperament, Attachment, and Parental Sensitivity on the Development of ADHD

Danielle C. Rubinic

EFFECTS OF TEMPERAMENT, ATTACHMENT, AND PARENTAL SENSITIVITY

ON THE DEVELOPMENT OF ADHD

A Dissertation

Submitted to the School of Education

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In partial fulfillment of the requirements for

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By

Danielle C. Rubinic

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EFFECTS OF TEMPERAMENT, ATTACHMENT, AND PARENTAL SENSITIVITY
ON
THE DEVELOPMENT OF ADHD

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ABSTRACT

EFFECTS OF TEMPERAMENT, ATTACHMENT, AND PARENTAL SENSITIVITY

ON THE DEVELOPMENT OF ADHD

By

Danielle C. Rubinic

August 2013

Dissertation supervised by Kara E. McGoey, Ph.D.

Attention deficit/hyperactivity disorder (ADHD) is one of the most common and well-researched childhood disorders. Despite extensive knowledge, there remains a demand to understand ADHD from a developmental psychopathology perspective. Even more important than recognizing symptoms, it is necessary to determine how biological and environmental factors in a child's life play a role in the development of ADHD. In the proposed study, three significant factors were examined in relation to ADHD: attachment, temperament, and parental sensitivity with an emphasis on goodness of fit. Regression analyses were utilized to examine data from the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) to determine how these variables contribute to a diagnosis of ADHD and how temperament and parental sensitivity affect attachment style in relation to ADHD. A significant relationship between the variables and ADHD

was found, although the relationship was not very strong. However, when examining

attachment, results revealed that temperament is more of a significant predictor of

attachment style than parental sensitivity. Implications for practice and future research

recommendations based on these results are discussed along with a review of the extant

literature base.

DEDICATION

I would like to dedicate this dissertation to my Mom, Dad, and brothers Brandon and Cody. You have been there since the beginning, and I cannot thank you enough for the unwavering love and support you have provided throughout my educational career. Your absolute trust in my decisions and abilities was critical, especially during those tough times when I doubted them. Not only did you accept and support the goals I set for myself, but you embraced them as part of your own, doing everything in your power to ensure my achievement of those goals. This dissertation would not exist without you, so I truly thank you with the utmost sincerity and feel blessed to be a part of such an amazing family.

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The graduate school and dissertation process was one of the most difficult challenges I ever had to face, both personally and professionally. However, it was also one of the most rewarding. I am so thankful I had the opportunity take on such a demanding experience that allowed me to grow and change in ways I never expected. I would not be the strong, independent, and confidant woman and professional I am today without the struggles I endured along the way.

I truly believe it takes a village to write a dissertation, because I could not have made it to this point without the knowledge, guidance, and support of many different people. In saying that, I would first like to acknowledge my family, who supported me from beginning to end, through good and bad. I can never thank you enough for the love and encouragement you consistently provided without question. I would also like to acknowledge my friends that stuck by me and always responded with patience and understanding when my schoolwork had to take priority. I will never be able to make up for all the things I missed, but I can promise I will always keep trying. Joseph Dean, my love; you may not have been there from the beginning, but your love, patience, humor, spiritual guidance, and support at the end gave me the motivation and strength I needed to persevere and finish my dissertation. You are an amazing man, and I love you with every single part of me.

To my cohort; at times you were the only thing keeping me from going insane, because you were the only ones who truly knew what I was going through. From our study sessions to venting sessions, from our celebrations to frustrations, we supported

each other and everything seemed a little more manageable with you ladies by my side. Despite the effects of time and distance, you will always have a special place in my heart.

I would also like to acknowledge my dissertation committee, Dr. McGoey, Dr. Schmitt, and Dr. Schreiber, for their knowledge, expertise, assistance, and guidance throughout this process. I would especially like to acknowledge Dr. McGoey, my committee chair. Words cannot express my gratitude for everything you have done since my start at Duquesne University. You have been my professor, my mentor, and my guiding light. I attribute a lot of my professional growth during my time at the University to your constant support and genuine care for my education and well-being. I also cannot emphasize your genuineness enough; even during your busiest moments, you always made time for me when I needed it and made me feel cared for as an individual, not just another student. I will never quite understand how you always seemed to know me better than I knew myself, but I think that is what makes you the extraordinary professor that you are, and I am glad that even during times of frustration I could trust that you knew what was best for me.

Lastly, I would like to acknowledge what I call my dissert-angels. These are people that I may have lost touch with or only knew for a short while, but whose purpose was clear during my time in the doctoral program. While they may go unnamed, their serendipitous presence did not go unnoticed and will never be forgotten. Thank you.

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CHAPTER I

Introduction

Attention deficit/hyperactivity disorder (ADHD) is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequent and severe than that observed in typically developing peers (APA, 2000). The disorder is usually diagnosed during the course of childhood or early adolescence and occurs in about 3-7% of the population, with males being three times more likely than females to receive the diagnosis (Barkley, 2003). Diagnosis is categorized into one of three subtypes: Predominately Inattentive Type, Predominately Hyperactive-Impulsive Type, or Combined Type (APA, 2000).

In general, problems associated with ADHD can create significant and persistent impairments in daily activities throughout the lifespan. Demands in social, academic, familial, and vocational realms require a consistent, predictable, independent, and efficient approach to life and failure to develop, maintain, and use such abilities can lead to detrimental outcomes (Barkley 2006; Goldstein & Naglieri, 2008).   Many biological and environmental factors contribute to a diagnosis of ADHD. It is important to understand and recognize the influence of these different factors early in a child's life, especially since those who do not warrant a clinical diagnosis may still be at risk for psychosocial adversity and functional impairment (Bird et al., 1990; Cho et al., 2009).

Three factors that have been identified as playing a role in the development of ADHD are attachment, temperament, and parental sensitivity. Research has demonstrated that ADHD is often linked with insecure attachment (Clarke, Ungerer, Chahoud, Johnson, & Steifel, 2002; Niederhofer, 2009). Likewise, secure attachment has a positive

effect on the development of specific areas of competence in which children with ADHD have difficulty such as attention span, persistence, flexibility, resourcefulness, and impulse control (Arend, Gove, & Sroufe, 1979; De Wolff & van IJzendoorn, 1997; Jacobsen, Huss, Fendrich, Kruesi, & Ziegenhain, 1997; Maslin-Cole & Spieker, 1990; Olson, Bates, & Bayles, 1990). Certain temperamental traits are related to ADHD symptoms, such as difficulty with attentional and inhibitory control and inhibition to novelty (Rothbart & Posner, 2006; Bacchini, Affuso, & Trotta, 2008; Auerbach et al., 2008). In terms of parental sensitivity, children with parents that exhibit poor and inconsistent sensitivity to their needs are at higher risk for developing ADHD (Ellis & Nigg, 2009; Campbell, 1991; Johnston, Hommersen, & Seipp, 2009).

Significance of the Problem

Developmental psychopathology can be defined as "the study and prediction of maladaptive behaviors and processes across time" (Lewis, 2000, p.3). Maladaptive behaviors inhibit a person's ability to adjust to particular situations and effectively deal with the demands placed on them on a regular basis. In order to predict, prevent, or better inform treatment of maladaptive behaviors, it is necessary to understand the underlying factors and processes that affect their course from a developmental perspective.

While there are many biological and environmental factors known to contribute to the development of ADHD, the developmental psychopathology of the disorder still requires greater understanding. Specifically, it is important to understand the sequence of how and when these factors play a role in the development of ADHD, and due to the many contributing factors in a diagnosis of ADHD, it becomes important to recognize and understand their presence early in a child's life. Three factors of particular interest

that may play a role in the development of ADHD are attachment, temperament, and parental sensitivity.

While previous research has examined some elements of parental sensitivity, attachment, and temperament in relation to ADHD, the current research literature has not fully examined the combined effects of all three in the development of ADHD. The directional influence of parental sensitivity, temperament, and attachment needs to be understood so that early individualized interventions for both parent and child can be developed in order to improve children's cognitive, social, and emotional experiences in both formal and informal settings.

Attachment

Attachment represents the idea of a lasting psychological connectedness to other human beings characterized by a tendency to seek and maintain proximity to specific people (Ainsworth, 1973; Bowlby, 1969). John Bowlby (1988) believed that attachment has an evolutionary component in that the inclination to make strong emotional bonds to particular individuals is a basic component of human nature. The concept of attachment theory asserts that early experiences in childhood have an important influence on development and behavior later in life, and that our early attachment styles are established in childhood through the infant/caregiver relationship. However, this is not simply a unidirectional relationship provoked by the parents. Instead, it is created by both parent and child in an ongoing reciprocal relationship over time (Levy & Orlans, 2000).

In conjunction with the ideas set forth by John Bowlby (1969), Mary Ainsworth developed a system for identifying and classifying attachment patterns in early childhood. This system was based off laboratory experiments involving the Strange Situation

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procedure, which stemmed from the idea of the secure base (Ainsworth, Blehar, Waters, & Wall, 1978). In essence, the secure base is one who provides physical and emotional comfort and nourishment by being available, ready to respond when called upon to encourage and assist but intervene only when necessary. The way in which an attachment figure adheres to such standards becomes encoded in the child's mind and is referred to as their internal working model of attachment. The more confident a child is that their base is secure, the more confident they will be to venture from that base and explore on their own (Bowlby, 2003). The four different types of attachment identified and used in current research consist of secure attachment, anxious-ambivalent attachment, anxious-avoidant attachment, and disorganized attachment with the latter three categorized as insecure or disordered attachment. However, disorganized attachment was not added by researchers until later (Main & Solomon, 1990).

Secure attachment is the ideal adaptive bond between a child and their caregiver. This disposition serves as a foundation that helps promote healthy cognitive and social development (Morris, 1994; van der Kolk, 1996; Werner & Smith, 1992). The anxious-ambivalent attachment style is associated with hesitancy in reciprocation of attention, largely due to the experience of inconsistent caregiver responsiveness, in which the child is unsure of whether or not their needs will be met. Anxious-avoidant attachment is characterized by a self-sufficiency spawned from a virtually non-existent relationship with the caregiver, in which it is believed that communicating needs to a caregiver is futile. The disorganized attachment style was created to describe children who "lack a consistent strategy for organizing their comfort-seeking behaviors" (Ladnier &

Massanari, 2000, p. 34). This attachment style is of most concern due its threatening and variable nature on a child's development.

These types of attachment become important in evaluating a child's development. Knowledge of attachment theory grants one an improved capability in understanding factors leading to adaptive or maladaptive behaviors. It has been proposed that attachment theory may even offer an important perspective on ADHD (Clarke, Ungerer, Chahoud, Johnson, & Stiefel, 2002; Erdman, 1998; Stiefel, 1997). In particular, it has been suggested that symptoms of ADHD may be fostered in the context of an insecure attachment relationship.

Temperament

Temperament can be defined as "constitutionally based individual differences in emotional, motor, and attentional reactivity and self-regulation" (Rothbart & Bates, 1998). In an effort to understand temperament, Thomas and Chess' (1977) conducted a longitudinal study that examined infant behaviors. The researchers began this study by thoroughly and repeatedly interviewing a sample of parents about their infants' specific behaviors. In order to reduce the possibility of bias from the parents, the researchers asked parents to provide detailed descriptions of their infant's behavior rather than interpretive characterizations.

Based on these interviews, Thomas and Chess (1977) identified nine categories of behavior in children. These behaviors consisted of activity level, rhythmicity (regularity), approach or withdrawal, adaptability, threshold of responsiveness, intensity of reaction, quality of mood, distractibility, and attention span and persistence. In examining these behaviors, Thomas and Chess (1977) determined that even though all children show the

same behaviors at some point or another, some children were more likely than others to show certain behaviors. They found that sixty-five percent of children were likely to fall into one of three groups: The Easy Child, The Difficult Child, or the Slow-To-Warm-Up Child. In their initial study, forty percent were classified as easy, ten percent as difficult, and fifteen percent as slow-to-warm-up.

The Easy Child can be considered the ideal child temperament. These children present with regular biological cycles, a positive approach and response to novel situations, and accept frustration with minimal fuss. Contrary to The Easy Child, The Difficult Child often presents with irregular biological cycles and exhibits a negative approach and response to novel situations. The Slow-To-Warm-Up Child falls somewhere in between The Easy Child and The Difficult Child. This child shows negative responses of mild intensity when exposed to novel situations, but then slowly comes to accept them with repeated exposure.

In more recent years, Rothbart and Bates (1998) suggested that temperament can actually be captured in six dimensions, consisting of fearful distress, irritable distress, attention span and persistence, activity level, positive affect, and rhythmicity. Fearful distress can be characterized as the amount of time it takes a child to adjust in new situations in conjunction with amount of distress and withdrawal the child exhibits in those scenarios. Irritable distress is considered to be signs of anger, fussiness, and frustration. The duration of orienting toward objects or events of interest describes attention span and persistence. Activity level is simply how much an infant or child moves. Lastly, rhythmicity is the regularity and predictability of a child's bodily functions, such as sleeping and eating. The first five of these characteristics of

temperament are particularly significant in classifying and predicting children's behavior (Rothbart & Bates, 1998).

Parental Sensitivity

According to the definition of Ainsworth, Bell, and Stayton (1974), a parent is said to display sensitive behavior if they perceive the child's behaviors and everyday signals in an appropriate way, interpret them correctly, and act adequately and promptly. This includes alertness to infant signals, appropriate interpretation of response, promptness of response, flexibility of attention and behavior, appropriate level of control, and negotiation of conflicting goals (Ainsworth et al., 1978). While carrying out these behaviors will be beneficial for a child, what might be equally important is the fit between the child and the parent. In other words, the parent's reaction to the child's behavior, rather than the nature of the child's behavior itself, may be more important in examining the development of maladaptive behavior.

When the environmental demand does not match the child's characteristics, or similarly, when the child's characteristics do not match the environmental demand, this creates a mismatch between parent and child. When this mismatch is present, it can create conflict according to the goodness-of-fit model, which suggests that the psychopathology is the result of the mismatch between trait and environment (Lerner, 1984; Thomas & Chess, 1977). In addition, similar to the idea of traits such as low harm avoidance, high novelty-seeking, and behavioral disinhibition serving as predispositions for externalizing and psychopathological disorders, the caregiving environment can be equally as important in the development of externalizing disorders, including those such as ADHD

(Shaw, Owens, Giovannelli, & Winslow, 2001). Following is a review and discussion of parental sensitivity's role in temperament and attachment.

ADHD: Temperament, Attachment, and Parental Sensitivity

Campbell (1991) demonstrated the additive effects of temperament and parenting. In the study, the researcher reported results from two longitudinal samples. The first included 3-year-olds referred by parents while the second sample included a 3-year-old group rated by their teachers as inattentive, overactive, and impulsive, and a matched control group from the same class. Data was collected longitudinally by home visits, laboratory, and preschool classrooms. Ratings of externalizing behavior problems were consistent across parents and teachers of preschool, first-grade, and fourth-grade children. Relationships were found between early inattention, hyperactivity, and the development of poor impulse control, as well as aggression and noncompliance. In addition, higher levels of externalizing problems in preschool children were found to be related to both higher levels of stress in the family and the mother's use of more negative control strategies.

Ellis and Nigg (2009) corroborated an association between parenting practices and ADHD symptoms and diagnoses. They assessed 181 children for ADHD and non-ADHD status via clinical interview with the parents and teacher standardized ratings and separated groups into controls, ADHD Inattentive type, ADHD Combined type, and not otherwise specified. Parents also completed interviews and parenting questionnaires about themselves and any of their own symptoms of ADHD. Similar to Campbell (1991), Ellis and Nigg found that inconsistent maternal discipline was associated with ADHD diagnosis. However, the researchers actually found that this construct was related

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specifically to ADHD Combined type, even after child Oppositional Defiant Disorder (ODD) diagnosis, Conduct Disorder (CD) diagnosis, and parental ADHD symptoms were statistically controlled for. They also revealed that low paternal involvement was associated with ADHD regardless of subtype, even when ODD and CD were covaried. While low and inconsistent paternal involvement and discipline was exclusively related to child inattention, inconsistent maternal discipline was related to all behavior domains. Along the lines of maternal parenting, research has also suggested mothers' attributions of child oppositional behavior to internal, stable, and global causes may contribute to the maintenance of child problems over time (Johnston, Hommersen, & Seipp, 2009).

In terms of temperament and attachment, there is still debate on the directional influence. Some attachment theorists postulate that temperament may affect the way in which an infant indicates distress. However, the caregiver's response, or parental sensitivity, has traditionally been thought to be the driving force in determining the quality of attachment (Belsky & Rovine, 1987; Sroufe, 1985). Other theorists, however, believe that temperament, either directly or indirectly, plays the bigger role in determining attachment style (Vaughn & Bost, 1999; Zeanah & Fox, 2004). Regardless, it has been demonstrated that there are associations between the two constructs at all ages (Vaughn et al., 1992). In fact, Seifer and Schiller (1995) assert that there are two important ways in which temperament and attachment might be related. One is that temperamental variability among infants might influence interpretation of attachment assessments. The other is that infant temperament during the first year of life might influence the parent-child interactions central to shaping the development of attachment patterns. That latter is of particular interest for the purposes of this study.

For example, Mangelsdorf, Gunnar, Kestenbaum, Lang, and Andreas (1990) examined the relations between infant proneness-to-distress temperament, maternal sensitivity, and mother-infant attachment. One might expect that if infant temperament influences attachment quality it does so through affecting how the mother responds to the infant. If so, this relates back to the goodness-of-fit model (Thomas & Chess, 1977) in that it might be because of the fit between the mother's personality and the infant's temperament. Regardless, the results from the researchers' study indicated that there was not support for arguments that proneness-to-distress temperament plays a significant, direct role in determining the security division of attachment classifications. However, they did find evidence for a link between maternal behavior and infant temperament. Despite that the analyses were essentially post hoc, the results support the need to consider goodness of fit in relating temperament traits to attachment security as well as considering parental sensitivity in examinations of temperament.

Seifer, Schiller, Sameroff, Resnick, and Riordan (1996) took parental sensitivity into consideration in their study of attachment and temperament during the first year of life. Specifically, in a longitudinal study the researchers examined families at 6, 9, and 12 months on infant attachment, infant temperament, and maternal parenting sensitivity measures. Their research questions of interest consisted of determining whether maternal sensitivity is related to attachment status, if infant temperament is related to attachment status, and what the relation is between the infant temperament and maternal sensitivity. Analyses revealed that maternal sensitivity was only weakly related to attachment status, infant temperament was more strongly related to attachment status, and observed infant temperament and maternal sensitivity were related to each other. This further supports the

need to consider temperament, attachment, and parental sensitivity together. While this study should be interpreted with caution due to the statistical power and sample size, results concerning a primary relationship between maternal sensitivity and attachment are also reflected in the De Wolff and van IJzendoorn (1997) meta-analysis discussed previously.

In taking goodness of fit into consideration for temperament and attachment, there are several things to keep in mind. Theoretically, parent-child dyads that either fit well together by efficiently maintaining set goals or that adapt well to distress during interactions will likely attain a system of sensitive parenting, a suitable balance of proximity and exploration, and therefore a secure attachment. In this regard, parent-child dyads that accomplish a high degree of fit for difficult temperaments may be the most sensitively mutually regulated pairs. In contrast, parent-child dyads that do not regularly acquire adequate fit may instead be defined by insensitive parenting, creating a greater tendency towards a disturbance in the quality of attachment (Seifer & Schiller, 1995).

Olson, Bates, and Bayles (1990) conducted a longitudinal investigation of early mother-child interaction as a predictor of children's later self-control capabilities. These self-control capabilities consisted of impulse control, which is an important component to consider in the development of ADHD. The researchers used several assessments of mother-child relationships during the first two years, which focused mostly on observed relationship qualities in the home. These relationships, along with cognitive competence and temperament, were assessed during the second year and related to later impulsivity as determined by follow-up assessments at age six. The researchers' main purpose was to identify the relative contributions of different parent-child interaction antecedents to

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children's later self-regulatory abilities. Of particular interest were research questions about qualities of early parent-child interaction predicting individual differences in children's impulsivity over a long time span. Also of interest was the extent to which observed relationships between early social interaction and later impulsivity are a function of variations in children's cognitive competence or temperament.

Results of the Olson, Bates, and Bayles (1990) study indicated that the qualities of caregiver-child interaction assessed at 13 and 24 months were modestly predictive of later self-regulatory competence. The researchers also found that the ability to delay gratification and remain task-focused was predicted by maternal responsiveness to the child's verbal communications at age two. In addition, analyses revealed that cognitive competence at age two was consistently correlated with children's later self-regulatory skills, with both child cognitive competence and caregiver-child interaction making significant contributions to the variance in later child impulsivity. In terms of temperament as a precursor of children's later impulse control capabilities, the study found that measures of difficult temperament failed to predict indexes of impulsivity at age six, either alone or in combination with caregiver-child interaction measures. Essentially, this study provides support for the hypothesis that responsive, sensitive, and cognitively enriching mother-child interactions are important precursors of child impulse control. Calkins and Fox (1992) also demonstrated similar results with attachment and behavioral inhibition.

While compliance and self-control play a large part in the development of ADHD, there is a broader range of traits and factors that encompass the disorder. Since the Olson, Bates, and Bayles (1990) study did not specifically investigate the role of parental

sensitivity, attachment, and temperament in the development of ADHD, such examination remains necessary. In addition, the small sample size was a limitation to their study. Also noteworthy is the fact that temperament measurements were not collected until age two. In order for temperament to be fully considered, it would be worthwhile to examine temperament from earlier points in the child's life.

If an infant is considered to have a difficult temperament, the infant may elicit a lesser quality of care from caregivers than if they are considered to have an easy temperament. The differences in temperament may then act indirectly on the level of attachment security, resulting in problematic interactions with the caregiver environment (Vaughn & Bost, 1999). It might then be difficult for a parent to be sensitive to the temperamentally difficult child, who may be at risk for developing ADHD. If the parent does not adapt to these attributes and fit the child's needs, it may become difficult to instill in the child the ability to self-soothe and inhibit inappropriate responses (Fonagy & Target, 2002). This may then interfere with the development of attachment security (Belsky, 1999). As discussed previously, insecure attachment is a strong precursor for the development of ADHD.

Taking this into consideration, Finzi-Dottan, Manor, and Tyano (2006) conducted a study that investigated the impact of temperament and parenting styles on attachment patterns in children with ADHD. The researchers wanted to investigate how the attachment patterns of children diagnosed with ADHD related to the emotional capability of parents to regulate the child's temperament. Specifically, the researchers focused on the parents' promotion or restriction of autonomy in the child. Results indicated that in terms of temperament, the activity dimension contributed to the prediction of attachment

in that the higher the child's activity level, the less likely he or she was to have an anxious attachment pattern. In addition, the higher the emotionality level, the more likely the child displayed an avoidant pattern of attachment. Interestingly, the interaction of parental autonomy with each of these temperament dimensions contributed significantly to the variance of type of attachment.

The interactions discovered in the Finzi-Dottan, Manor, and Tyano (2006) study suggest that inadequate parenting might exacerbate the child's difficulties in self-regulation and lead to an insecure attachment pattern. However, if children with ADHD who have a difficult temperament have supportive and organized parenting to fit their needs, the potential for developing less-than-optimal skills may diminish. This particular study focused on children who already had a diagnosis of ADHD, therefore it would be difficult to determine whether the parents' style was brought on by the child's difficult temperament or if the parents' style increased the child's development of those characteristics. In addition, the children who participated in this study were aged seven through fifteen. Therefore, it is believed that it is necessary to examine these factors among an early childhood population who have not yet been diagnosed with ADHD. In this manner it may then be possible to see if a goodness of fit between parent and child can decrease the likelihood of developing a diagnosis of ADHD.

Problem Statement

In summary, if parent-child interactions, including parental sensitivity and goodness of fit, during the months prior to the full behavioral expression of the attachment system do influence its development, then understanding how temperament might play a role in shaping these interactions is necessary. In addition, it would be

valuable to determine if there is a directional influence of parental sensitivity, temperament, and attachment based on goodness of fit and see how these components then affect the potential development of ADHD in children. By advancing knowledge of the potential developmental and sequential pathways to ADHD, we can better understand how to develop early, individualized interventions for both parent and child to foster optimal cognitive, social, and emotional experiences in both formal and informal settings.

Research Questions and Hypotheses

Research Question 1:

To what extent do variables of temperament, parental sensitivity, and attachment contribute to a diagnosis of ADHD?

Hypothesis:

All variables of temperament, parental sensitivity, and attachment contribute to a diagnosis of ADHD with attachment as the most significant contributor.

Research Question 2:

When looking at temperament and parental sensitivity, which serves as a better predictor of attachment style?

Hypothesis:

Parental sensitivity will serve as a better predictor of attachment style regardless of temperament, such that higher parental sensitivity will be associated with a more secure attachment even with a more difficult temperament.

CHAPTER II

Literature Review

Attention deficit/hyperactivity disorder (ADHD) stands as a common and well-researched childhood disorder. However, the developmental psychopathology of ADHD still requires greater understanding as it remains necessary to determine how and when biological and environmental factors play a role in the development of ADHD. Due to the many contributing factors in a diagnosis of ADHD, it becomes important to recognize and understand their presence early in a child's life. Three factors of particular interest that play a role in ADHD are attachment, temperament, and parental sensitivity. In the present study, the combined effects of these factors on the development of ADHD are examined on a theoretical and empirical level.

Attention Deficit/Hyperactivity Disorder

Attention deficit/hyperactivity disorder (ADHD) stands as both one of the most common and well-researched childhood disorders, providing an extensive array of available knowledge (Campbell, 2000). Despite this knowledge, there is still a need to continue to understand ADHD from the perspective of developmental psychopathology. By understanding the underlying processes of the disorder, diagnosis and treatment can be better understood.

Researchers interested in ADHD among children generally approach the topic by referencing the tenets established by the American Psychiatric Association (2000) in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV-TR*), a widely-known and well-researched system for the classification of psychopathology. This system describes the disorder as a whole and then breaks it down into three different subtypes

from which individuals may suffer. The ADHD diagnosis in the *DSM-IV-TR* is summarized below.

The DSM-IV-TR (APA, 2000) purports that the essential feature of ADHD is characterized by a "persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and more severe than is typically observed in individuals at a comparable level of development" (p. 85). This disorder is usually first diagnosed during the course of childhood or early adolescence. The current diagnostic criteria contain five parts. Part A includes the 18 diagnostic symptoms. Part B states that hyperactive-impulsive or inattentive symptoms must cause impairment before the age of 7. Part C emphasizes that impairment must be present in two or more settings. Part D requires the presence of clear evidence that there is impairment of clinical significance in social, academic, or occupational functioning. Lastly, Part E states that symptoms should not occur exclusively during the course of other conditions or be better accounted for by other mental disorders. The disorder is then coded by subtype based on whether it is considered a Predominantly Inattentive Type, Predominantly Hyperactive-Impulsive Type, or Combined Type.

Due to the many contributing factors in a diagnosis of ADHD, it is important to recognize symptoms early in life, especially since those who do not warrant a clinical diagnosis may still possess characteristics that are associated with psychosocial adversity and functional impairment (Bird et al., 1990; Cho et al., 2009). The three main symptoms of ADHD in children are thought to be inattention, hyperactivity, and impulsivity (Ladnier & Massanari, 2000). Additional symptoms associated with ADHD often consist of high novelty seeking, extraversion, neuroticism, and negative emotionality and low

persistence, self-directedness, conscientiousness (or effortful control), reactive control, and agreeableness (Cho et al., 2009; Martel, Nigg, & von Eye, 2009; Nigg, 2006; White, 1999).

Prevalence and Etiology

ADHD occurs in about 3-7% of the childhood population, with males being more likely than females to be diagnosed at an average of roughly 3:1 (Barkley, 2003). Barkley also states that the disorder often continues into adolescence with a likelihood of 50-80%. In general, problems associated with ADHD can create significant and persistent impairments in daily activities throughout the lifespan. Demands in social, academic, familial, and vocational realms require a consistent, predictable, independent, and efficient approach to life and failure to develop, maintain, and use such abilities can lead to disadvantageous outcomes (Barkley 2006; Goldstein & Naglieri, 2008).

Despite several separate etiological means, there is agreement that ADHD is the result of an interaction of multiple factors (Barkley, 2003; Cantwell, 1996). There are numerous biological and environmental factors that influence the development of ADHD in children. This means that the developmental psychopathology of the disorder can be affected by a combination of biological, genetic, familial, environmental, and community factors. These factors can interact in many different ways, leading to differences in age of onset, types and amount of symptoms and their severity, comorbid disorders, course of development, and response to treatment (Campbell, 2000). However, it is difficult to determine the direct effects of specific factors at particular points in time, especially due to overlap with other disorders such as Oppositional Defiant Disorder and Conduct Disorder. Despite these innate difficulties, it remains necessary to recognize and

understand the influence of these biological and environmental factors in a child's life and how they play a role in the development of ADHD. In the present study, three significant factors (attachment, temperament and parental sensitivity) are examined in relation to the development of ADHD.

Attachment

Attachment represents the idea of a lasting psychological connectedness to other human beings characterized by a tendency to seek and maintain proximity to specific people (Ainsworth, 1973; Bowlby, 1969). John Bowlby (1988) believed that attachment has an evolutionary component in that the inclination to make strong emotional bonds to particular individuals is a basic component of human nature. The concept of attachment theory asserts that early experiences in childhood have an important influence on development and behavior later in life and that our early attachment styles are established in childhood through the infant/caregiver relationship. However, this is not simply a unidirectional relationship provoked by the parents. Instead, it is created by both parent and child in an ongoing reciprocal relationship over time (Levy & Orlans, 2000).

In conjunction with the ideas set forth by John Bowlby (1969), Mary Ainsworth developed a system for identifying and classifying attachment patterns in early childhood. This system was developed in laboratory experiments involving the Strange Situation procedure, which stemmed from the idea of the secure base (Ainsworth, Blehar, Waters, & Wall, 1978). In essence, the secure base is one who provides physical and emotional comfort and nourishment by being available, ready to respond when called upon to encourage and assist but intervene only when necessary. The way in which an attachment figure adheres to such standards, in other words the positive or negative way in which an

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attachment figure responds to their child, becomes encoded in the child's mind and is referred to as their internal working model of attachment. The more confident a child is that their base is secure, the more confident they will be to venture from that base and explore on their own (Bowlby, 2003). The four different types of attachment identified and used in current research consist of secure attachment, anxious-ambivalent attachment, anxious-avoidant attachment, and disorganized attachment with the latter three categorized as insecure or disordered attachment. However, disorganized attachment was not added by researchers until later (Main & Solomon, 1990).

Secure attachment is the ideal adaptive bond between a child and their caregiver. This form of attachment is characterized by sufficient reciprocal and affectionate interactions with a caregiver who is both available and responsive to the child's needs on a frequent basis. A child who develops secure attachment is therefore confident about exploring the environment with feelings of safety and security, assured that they will be successful and loved. This disposition then serves as a foundation that helps promote healthy cognitive and social development (Morris, 1994; van der Kolk, 1996; Werner & Smith, 1992).

The first type of insecure attachment is anxious-ambivalent attachment. In this attachment style, a child will be anxious to explore either in the presence or absence of the caregiver. When the caregiver returns, the child seeks to remain close to them but is hesitant to reciprocate when they initiate attention. Essentially, this type of bond is characterized by inconsistent caregiver responsiveness, in which the child is unsure of whether or not their needs will be met.

The second type of insecure attachment is anxious-avoidant attachment. A child with this type of attachment may generally appear to be independent and self-sufficient, showing little concern when a caregiver or even a stranger departs or returns. However, this self-sufficiency spawns from the fact that the child's relationship with the caregiver is virtually non-existent. In other words, the child's needs are frequently not met; therefore, they come to believe that communicating their needs to the caregiver is futile.

The final type of insecure attachment is considered disorganized attachment. This label was created to describe children who "lack a consistent strategy for organizing their comfort-seeking behaviors" (Ladnier & Massanari, 2000, p. 34). The child's reaction may even include desperate measures such as stereotyped behavior or prolonged motor freezing in which they may freeze or fall to the floor when approached by the caregiver due to fear (Main & Solomon, 1990). This type of bond is of most concern due its threatening and variable nature on a child's development.

These types of attachment become important in evaluating a child's development. Knowledge of attachment theory grants one an improved capability in understanding factors leading to adaptive or maladaptive behaviors. It has been proposed that attachment theory may even offer an important perspective on ADHD (Clarke, Ungerer, Chahoud, Johnson, & Stiefel, 2002; Erdman, 1998; Stiefel, 1997). In particular, it has been suggested that symptoms of ADHD may be fostered in the context of an insecure attachment relationship.

ADHD and Attachment

Clarke, Ungerer, Chahoud, Johnson, and Steifel (2002) examined this concept through a controlled study in a group of young boys with ADHD. In their study, the

authors compared the quality of attachment representations in young boys (ages 5-10) diagnosed with ADHD to a control group of same-age peers. They used the Strange Situation procedure (Ainsworth et al., 1978) and broad-based attachment assessment in order to determine each child's quality of attachment. After comparing the ADHD and control groups on each of the broad-based attachment ratings, significant between-group differences were found. These differences revealed that the ADHD group obtained poorer scores than the controls on all three attachment measures used. Some examples of responses in the ADHD group that represented an insecure attachment were an inappropriate concern, fear, or sadness during a difficult separation, hostile coping strategies, and negative descriptions of the parent-child relationship portraying parents as unresponsive and unreliable. Even when comorbid diagnoses such as oppositional defiant disorder and learning disorders were analyzed, the subgroup analyses indicated that the findings for the ADHD group as a whole still applied. Despite the limitation of a small and all-male clinical sample size, the results of the study are consistent with the hypothesis that ADHD is associated with insecure attachment.

Furthermore, Niederhofer (2009) also investigated the possible associations between attachment and ADHD symptoms. In his study, 101 children with ADHD-like symptoms aged 3 to 17 were assessed, using a parent-child questionnaire for evaluating a child's behavior with scores highly associated with responses to the Strange Situation (Ainsworth et al., 1978). Results indicated that 79 children could be categorized as insecurely attached and 22 children could be categorized as securely attached. Out of the 79 insecurely attached children, 72 presented with ADHD-like symptoms. This is noteworthy given that only 5 of 22 securely attached children showed such symptoms.

Despite the small sample size and the exploratory nature of the data, this study indicated additional support for the importance of considering attachment in the categorization of ADHD.

A longitudinal study conducted by Carlson, Jacobvitz, and Sroufe (1995) provided evidence for the role of early parent-child relations in the development of hyperactivity in early childhood. In line with attachment theory and the studies discussed, the early parent-child relationship serves as the foundation for the development of self-regulation skills. Since ADHD is characterized by deficits in self-regulation, which include problems with impulse control, self-soothing, initiative, perseverance, patience, and inhibition, it is necessary to further examine the role of the parent-child attachment relationship in the development of ADHD. This necessity is also corroborated by fact that research indicates that secure attachment has a positive effect on the development of specific areas of competence in which children with ADHD have difficulty such as attention span, persistence, flexibility, resourcefulness, and impulse control (Arend, Gove, & Sroufe, 1979; De Wolff & van IJzendoorn, 1997; Jacobsen, Huss, Fendrich, Kruesi, & Ziegenhain, 1997; Maslin-Cole & Spieker, 1990; Olson, Bates, & Bayles, 1990).

While this attachment theory perspective can contribute to the identification of specific factors in the development of ADHD, no single viewpoint or system in and of itself simplifies such an endeavor. In order to further clarify the developmental psychopathology of ADHD from the difficulty inherent in its diagnosis, one must examine the role of child characteristics such as temperament; an important construct definitively linked to attachment (Vaughn et al., 1992).

Temperament

Temperament can be defined as "constitutionally based individual differences in emotional, motor, and attentional reactivity and self-regulation" (Rothbart & Bates, 1998). In an effort to understand temperament, Thomas and Chess' (1977) conducted a ground-breaking longitudinal study that examined infant behaviors. The researchers began this study by thoroughly and repeatedly interviewing a sample of parents about their infants' specific behaviors. In order to reduce the possibility of bias from the parents, the researchers asked them to provide detailed descriptions of their infant's behavior rather than interpretive characterizations.

Based on these interviews, Thomas and Chess (1977) identified nine different behaviors in children. These behaviors consisted of activity level, rhythmicity (regularity), approach or withdrawal, adaptability, threshold of responsiveness, intensity of reaction, quality of mood, distractibility, and attention span and persistence. Activity level indicates the amount of physical motion exhibited during the day. Rhythmicity, or regularity, is the extent to which patterns of eating sleeping, elimination, etc. are consistent or inconsistent from day to day. Approach or withdrawal is the initial reaction to novel situations, whether approaching or withdrawing. Adaptability describes the ease of changing behavior in a socially desirable direction. Threshold of responsiveness is the sensitivity, or degree, to which one reacts to light, sound, and other factors. Intensity of reaction indicates the amount of energy exhibited in emotional expression. Quality of mood describes the quality of emotional expression, either positive or negative. Distractibility is the ease of being interrupted by sound, light, and other factors unrelated

to behavior. Lastly, attention span and persistence indicates the extent of continuation of behavior with or without interruption.

In examining these behaviors, Thomas and Chess (1977) determined that even though all children show the same behaviors at some point or another, some children were more likely than others to show certain behaviors. They found that sixty-five percent of children were likely to fall into one of three groups: The Easy Child, The Difficult Child, or the Slow-To-Warm-Up Child. In their initial study, forty percent were classified as easy, ten percent as difficult, and fifteen percent as slow-to-warm-up.

The Easy Child can be considered the ideal child temperament. These children present with regular biological cycles, a positive approach and response to novel situations, and accept frustration with minimal fuss. They adjust readily to new situations, smile often, and are generally in a good mood and easy to calm. Contrary to The Easy Child, The Difficult Child often presents with irregular biological cycles and exhibits a negative approach and response to novel situations. When frustrated, these children will often display frequent or loud crying and throw temper tantrums. They are slow to adapt to change and can have difficulty in areas that revolve around socialization patterns, and expectations of family, school, and peer groups. Similarly, Turecki (1989) specifies a difficult temperament style as being characterized by high activity level, distractibility, high intensity, withdrawal from or poor reaction to new or unfamiliar things, poor adaptability, negative persistence, low sensory threshold, and negative mood.

The Slow-To-Warm-Up Child falls somewhere in between The Easy Child and The Difficult Child. This child shows negative responses of mild intensity when exposed to novel situations, but then slowly comes to accept them with repeated exposure. They

usually exhibit fairly regular biological routines, and while problems with these children do exist they often vary based on other characteristics.

In more recent years, Rothbart and Bates (1998) suggested that temperament can be captured in six dimensions, consisting of fearful distress, irritable distress, attention span and persistence, activity level, positive affect, and rhythmicity. Fearful distress can be characterized as the amount of time it takes a child to adjust in new situations in conjunction with amount of distress and withdrawal the child exhibits in those scenarios. Irritable distress is considered to be signs of anger, fussiness, and frustration. The duration of orienting toward objects or events of interest describes attention span and persistence. Activity level is simply how much an infant or child moves. Lastly, rhythmicity is the regularity and predictability of a child's bodily functions, such as sleeping and eating. The first five of these characteristics of temperament are particularly significant in classifying and predicting children's behavior (Rothbart & Bates, 1998).

ADHD and Temperament

According to Rothbart & Posner (2006), it is possible to contemplate an individual's developmental course of ADHD and what pathways might reveal certain subtypes. One potential pathway can be discerned by examining a child's temperament as an infant. In the area of developmental psychopathology, certain temperamental predispositions are thought to increase the likelihood of developing behavior and emotional problems such as those that characterize ADHD. Despite the theoretical overlap between the constructs of ADHD and temperament, few studies have actually examined their empirical relationship, indicating a need for continued research in this area. A review and discussion of both types of studies follows.

As part of their study, Bacchini, Affuso, and Trotta (2008) investigated the link between temperament and ADHD in school-age children. In order to accomplish this, mothers were interviewed about their child's temperament and teachers were questioned about ADHD symptoms. Structural Equation Model multigroup analyses revealed that certain temperamental traits have an almost direct relation to ADHD symptoms. Interestingly, they found that among the temperamental traits they considered in their study, the one with the strongest association with ADHD was not attention, but inhibition to novelty. This construct is associated with difficulty handling change in the environment, which is a characteristic of The Difficult Child. However, the researchers did state that their measure for attention had low internal consistency in comparison to their measure for inhibition to novelty.

Auerbach et al. (2008) also examined the relationship between risk for ADHD and temperament, but in contrast to Bacchini et al. (2008), their study focused on the child's first two years of life. In their longitudinal investigation of infants at risk for ADHD, both mothers and fathers independently completed temperament ratings on their infants. "At risk" for ADHD in the child was determined by the degree of symptomatology for ADHD in the father. The researchers expected that infants at risk for ADHD would be rated by the parents as lower in effortful control, or the ability to inhibit a dominant response in order to perform a subdominant response (Rothbart, 1989), as expressed by difficulties with attentional and inhibitory control. They also expected that the infants at risk for ADHD would have higher levels of activity and present as angrier than infants not at risk for ADHD. Results did in fact indicate that the ADHD risk group was higher in activity level and anger and had more difficulty with attention, inhibitory

control, and effortful control than the control group, which is similar to previous findings (Bussing et al., 2003). Therefore, this study gives further support for a link between temperament and ADHD. In addition, differences in levels of temperament were evident at 7, 12, and 25 months of age, suggesting a potential developmental sequence of the disorder. However, this study was limited to boys, therefore an examination of both males and females is warranted.

It stands to reason that temperament might affect the development of ADHD because, in general, there is evidence that highly irritable infants that are difficult to console are more likely to be seen as problematic as a toddler than infants who are less so. Sanson, Oberklaid, Pedlow, and Prior (1991), found temperament to be a good predictor of problem behavior. Specifically, the authors analyzed longitudinal data for over two thousand children to examine infancy risk factors and their effect on later behavioral and emotional adjustment around the preschool age. Results indicated that difficult temperament resulted in an increase in prevalence for problem behavior and later maladjustment. However, when temperament was combined with certain risk factors, there was a significant increase in prevalence rates for problem behaviors and maladjustment. This is also in concordance with other research on temperament which indicates that certain "difficult" traits, such as low harm avoidance, high novelty-seeking, and behavioral disinhibition, may serve as predispositions for externalizing and psychopathological disorders, especially if combined with unfavorable home environments including poor parenting practices (Caspi, Henry, McGee, Moffitt, & Silva, 1995; De Pauw & Mervielde, 2010; Hirshfeld-Becker et al., 2002; Prior, Smart, Sanson,

& Oberklaid, 2001; Rettew, Copeland, Stanger, & Hudziak, 2004; Rettew & McKee, 2005).

Foley, McClowry, and Castellanos (2008) studied the relationship between ADHD and temperament by examining differences and similarities between ADHD and temperament in thirty-two children with ADHD aged six to eleven as compared to a control group. The researchers assessed all children for ADHD symptoms including hyperactivity, impulsivity, and inattention along with six dimensions of child temperament: negative reactivity, task persistence, activity, attentional focusing, impulsivity, and inhibitory control. Analyses indicated that dimensions of temperament and symptoms of ADHD were highly correlated, even for all three subtypes. Specifically, children in the ADHD group presented with significantly higher scores on negative reactivity, activity and impulsivity, and lower scores on task persistence, attentional focusing, and inhibitory control as compared to the comparison group of children. This study is supported by two previous empirical studies that obtained similar strength of results (Bussing, Gary, & Mason, 2003; McIntosh & Cole-Love, 1996). Together, these studies provide further evidence that temperament should be considered when evaluating the development of ADHD.

Nigg, Goldsmith, and Sachek (2004) suggest that more than one developmental pathway is likely involved in ADHD. Therefore, they theorized a multiple process developmental model that outlines alternate pathways to ADHD. Their model requires clinicians to take into account the sequence and timing in development of the vulnerability to behavioral problems. This is due to the fact that research on infants and toddlers indicates that reactive and regulatory processes follow a sequence of

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developmental timing as they begin to influence attention and behavior early in life. Reactive processes involve differences in approach and withdrawal (or nonapproach). This includes either fearful or hostile affect or positive affect. Regulatory processes involve those that attenuate, amplify, or sustain an elicited emotion. Observational studies indicate that reactive processes can be observed to begin changing the direction of attention in late infancy, with the regulatory domain observed to begin influencing the distribution of attention, and thus begin regulating the reactive responses, in the toddler years (Rothbart & Ahadi, 1994). Therefore, the authors posit that the development of temperament traits may provide insight into the developmental sequence of traits that may be responsible for ADHD and associated comorbid psychopathology, with infancy serving as a critical time for starting along the pathways driven by dysfunction or vulnerability in reactive processes.

Nigg et al. (2004) further stated that the term "temperament" can be used in two ways, with the most common usage referring to "a set of behavioral dimensions that develop early in life and form a basis for later personality" (p. 43). The second typically refers to a pattern of biological-behavioral features that characterize a person as possessing a certain set of temperaments. As such, one must keep in mind that while studies have identified links between temperament and behavior problems and attention, it is difficult to determine the direction of the influence. In other words, while temperament might create a certain predisposition for the child, others might react in certain ways to the child's temperament which in turn may further influence the child's behavior towards that predisposition. This is why it is crucial to take parental sensitivity into consideration.

Parental Sensitivity

According to the definition of Ainsworth, Bell, and Stayton (1974), a parent is said to display sensitive behavior if they perceive the child's behaviors and everyday signals in an appropriate way, interpret them correctly, and act adequately and promptly. This includes alertness to infant signals, appropriate interpretation of response, promptness of response, flexibility of attention and behavior, appropriate level of control, and negotiation of conflicting goals (Ainsworth et al., 1978). While carrying out these behaviors will be beneficial for a child, what might be equally important is the fit between the child and the parent. In other words, the parent's reaction to the child's behavior, rather than the nature of the child's behavior itself, may be more important in examining the development of maladaptive behavior.

When the environmental demand does not match the child's characteristics, or similarly, when the child's characteristics do not match the environmental demand, this creates a mismatch between parent and child. When this mismatch is present, it can create conflict according to the goodness-of-fit model, which suggests that the psychopathology is the result of the mismatch between trait and environment (Lerner, 1984; Thomas & Chess, 1977). In addition, similar to the idea of traits such as low harm avoidance, high novelty-seeking, and behavioral disinhibition serving as predispositions for externalizing and psychopathological disorders, the caregiving environment can be equally as important in the development of externalizing disorders, including those such as ADHD (Shaw, Owens, Giovannelli, & Winslow, 2001). Following is a review and discussion of parental sensitivity's role in temperament and attachment.

Parental Sensitivity and Temperament

One of the important features that Thomas and Chess (1977) identified in the goodness-of-fit model is that the degree of fit between the child's temperament and the parent's expectations is a fundamental characteristic in determining the health of parent-child interactions. This means that goodness of fit needs to be evaluated at the family level with the idea that parenting experience, beliefs, and values are important determinants of the level of fit. The parent-child system interacts according to set goals for a variety of infant temperaments; when this system operates close to these goals it is likely there is a high degree of fit, whereas when interactions consistently violate these goals there is likely a poor fit (Seifer, 2000).

Basically, just as their child brings their own characteristics to their environment, there are demands placed on the child from the environment by virtue of the parents. These demands may take the form of previously established attitudes, values, or expectations held by the parents in the context of the child's physical and behavioral attributes. Therefore, the child must also coordinate, or fit, their attributes for adaptive interactions to take place. For example, if a child has a difficult temperament but the parents believe that it is simply a cry for attention and should therefore be ignored, the child's needs may not be met appropriately. This may then cause a bad fit or mismatch to occur in the parent-child system. From this perspective, it is not necessarily the presence or absence of difficult behavior, but more so the match between the child's inherited characteristics and the demands of the environment which determines how positive the outcome will be for the child. Children with difficult temperaments can weaken parental functioning and contribute to conflict in the parent-child relationship. However, research

also shows that temperamentally driven behaviors can be modulated by environmental conditions (Kagan, 1994).

Crockenberg (1987) asserted the possibility that different temperaments elicit distinct patterns of caregiving that may then account for differences in a child's development. The author observed that several prior studies tested the effects of difficult emotionality in infants predicting maternal behavior, but that the problem with these studies was that there were conflicting results in terms of the direction of the effects. Out of sixteen studies that tested aspects of temperament predicting maternal behavior, nine studies revealed associations indicating that babies with difficult temperaments experience less responsive caregiving. On the contrary, the other seven studies provided support for mothers of difficult babies being more engaged with their babies than mothers of less irritable babies. Given that up to this point there has been a dearth of empirical research to resolve the debate of the directional influence of temperament and parental sensitivity, it is necessary to examine if one exists in order to inform developmental sequence for potential psychopathology.

Parental Sensitivity and Attachment

Previous research has suggested that one of the conditions contributing to the development of a secure attachment may be the attachment figure's sensitivity in responding to the child's signals. Ainsworth et al. (1978) were the first to examine this relationship through use of the Strange Situation procedure, concluding that sensitive responsiveness to infant signals and communications was in fact a large determinant of attachment style. Despite the significant contribution of this study, there is still some

controversy over the parental antecedents of the Strange Situation attachment classifications.

In the first meta-analysis conducted on attachment and sensitivity, Goldsmith and Alansky (1987) found that in terms of statistical significance, many replication studies found similar predictive power of maternal sensitivity. However, they also noted that the actual size of that effect is much smaller than once believed, which suggests only a weak relation between attachment security and parental sensitivity. Ten years later, De Wolff and van IJzendoorn (1997) conducted a second meta-analysis to re-examine the controversy in the literature on parental sensitivity and infant attachment. The purpose of their meta-analysis was to address whether maternal sensitivity is associated with infant attachment security, and if so its strength, by quantitatively integrating the available studies on parenting and attachment. Maternal sensitivity, as defined by Ainsworth et al. (1978), was statistically found to have a medium effect size in relation to attachment in the replication studies. In other words, the meta-analysis determined that maternal sensitivity indeed appears to be an important condition for the development of attachment security. However, while maternal sensitivity attests to playing a causal role in attachment, it is not an exclusive component, therefore it is necessary to take other components into consideration.

Also noteworthy in this domain is a meta-analysis of sensitivity and attachment interventions in early childhood conducted by Bakermans-Kranenburg, van IJzendoorn, and Juffer (2003). The purpose of this meta-analysis was to determine if early preventive intervention is effective in enhancing parental sensitivity and infant attachment security. While a discussion of intervention strategies is beyond the scope of this discussion at this

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time, it is necessary to review this study due to its production of further evidence for parental sensitivity's crucial role in the development of attachment. Specifically, with a moderate effect size, the researchers found that randomized interventions appeared to be fairly effective in changing insensitive parenting and, although to a lesser extent, infant attachment security. While it is clear that parental sensitivity has an effect on attachment, the fact that it does not exclusively account for attachment leads way for further examination of other variables involved, such as temperament. Accepting the perspective that insecure attachment is related to ADHD and that there is an established connection between attachment and temperament, the logical extension would be to next examine how these elements are linked to parental sensitivity.

ADHD: Temperament, Attachment, and Parental Sensitivity

Campbell (1991) demonstrated the additive effects of temperament and parenting. In the study, the researcher reported results from two longitudinal samples. The first included 3-year-olds referred by parents while the second sample included a 3-year-old group rated by their teachers as inattentive, overactive, and impulsive, and a matched control group from the same class. Data was collected longitudinally by home visits, laboratory, and preschool classrooms. Ratings of externalizing behavior problems were consistent across parents and teachers of preschool, first-grade, and fourth-grade children. Relationships were found between early inattention, hyperactivity, and the development of poor impulse control, as well as aggression and noncompliance. In addition, higher levels of externalizing problems in preschool children were found to be related to both higher levels of stress in the family and the mother's use of more negative control strategies.

Ellis and Nigg (2009) corroborated an association between parenting practices and ADHD symptoms and diagnoses. They assessed 181 children for ADHD and non-ADHD status via clinical interview with the parents and teacher standardized ratings and separated groups into controls, ADHD Inattentive type, ADHD Combined type, and not otherwise specified. Parents also completed interviews and parenting questionnaires about themselves and any of their own symptoms of ADHD. Similar to Campbell (1991), Ellis and Nigg found that inconsistent maternal discipline was associated with ADHD diagnosis. However, the researchers actually found that this construct was related specifically to ADHD Combined type, even after child Oppositional Defiant Disorder (ODD) diagnosis, Conduct Disorder (CD) diagnosis, and parental ADHD symptoms were statistically controlled for. They also revealed that low paternal involvement was associated with ADHD regardless of subtype, even when ODD and CD were covaried. While low and inconsistent paternal involvement and discipline was exclusively related to child inattention, inconsistent maternal discipline was related to all behavior domains. Along the lines of maternal parenting, research has also suggested mothers' attributions of child oppositional behavior to internal, stable, and global causes may contribute to the maintenance of child problems over time (Johnston, Hommersen, & Seipp, 2009).

In terms of temperament and attachment, there is still debate on the directional influence. Some attachment theorists postulate that temperament may affect the way in which an infant indicates distress, but traditionally the caregiver's response, or parental sensitivity, has been thought to be the driving force in determining the quality of attachment (Belsky & Rovine, 1987; Sroufe, 1985). Other theorists, however, believe that temperament, either directly or indirectly, plays the bigger role in determining attachment

style (Vaughn & Bost, 1999; Zeanah & Fox, 2004). Regardless, it has been demonstrated that there are associations between the two constructs at all ages (Vaughn et al., 1992). In fact, Seifer and Schiller (1995) assert that there are two important ways in which temperament and attachment might be related. One is that temperamental variability among infants might influence interpretation of attachment assessments. The other is that infant temperament during the first year of life might influence the parent-child interactions central to shaping the development of attachment patterns. That latter was of particular interest for the purposes of the present study.

For example, Mangelsdorf, Gunnar, Kestenbaum, Lang, and Andreas (1990) examined the relations between infant proneness-to-distress temperament, maternal sensitivity, and mother-infant attachment. One might expect that if infant temperament influences attachment quality it does so through affecting how the mother responds to the infant. If so, this relates back to the goodness-of-fit model (Thomas & Chess, 1977) in that it might be because of the fit between the mother's personality and the infant's temperament. Regardless, the results from the researchers' study indicated that there was not support for arguments that proneness-to-distress temperament plays a significant, direct role in determining the security division of attachment classifications. However, they did find evidence for a link between maternal behavior and infant temperament. Despite that the analyses were essentially post hoc, the results support the need to consider goodness of fit in relating temperament traits to attachment security as well as considering parental sensitivity in examinations of temperament.

Seifer, Schiller, Sameroff, Resnick, and Riordan (1996) took parental sensitivity into consideration in their study of attachment and temperament during the first year of

life. Specifically, in a longitudinal study the researchers examined families at 6, 9, and 12 months on infant attachment, infant temperament, and maternal parenting sensitivity measures. Their research questions of interest consisted of determining whether maternal sensitivity is related to attachment status, if infant temperament is related to attachment status, and what the relation is between the infant temperament and maternal sensitivity. Analyses revealed that maternal sensitivity was only weakly related to attachment status, infant temperament was more strongly related to attachment status, and observed infant temperament and maternal sensitivity were related to each other. This further supports the need to consider temperament, attachment, and parental sensitivity together. While this study should be interpreted with caution due to the statistical power and sample size, results concerning a primary relationship between maternal sensitivity and attachment are also reflected in the De Wolff and van IJzendoorn (1997) meta-analysis discussed previously.

In taking goodness of fit into consideration for temperament and attachment, there are several things to keep in mind. Theoretically, parent-child dyads that either fit well together by efficiently maintaining set goals or that adapt well to distress during interactions will likely attain a system of sensitive parenting, a suitable balance of proximity and exploration, and therefore a secure attachment. In this regard, parent-child dyads that accomplish a high degree of fit for difficult temperaments may be the most sensitively mutually regulated pairs. In contrast, parent-child dyads that do not regularly acquire adequate fit may instead be defined by insensitive parenting, creating a greater tendency towards a disturbance in the quality of attachment (Seifer & Schiller, 1995).

Olson, Bates, and Bayles (1990) conducted a longitudinal investigation of early mother-child interaction as a predictor of children's later self-control capabilities. These self-control capabilities consisted of impulse control, which is an important component to consider in the development of ADHD. The researchers used several assessments of mother-child relationships during the first two years, which focused mostly on observed relationship qualities in the home. These relationships, along with cognitive competence and temperament, were assessed during the second year and related to later impulsivity as determined by follow-up assessments at age six. The researchers' main purpose was to identify the relative contributions of different parent-child interaction antecedents to children's later self-regulatory abilities. Of particular interest were research questions about qualities of early parent-child interaction predicting individual differences in children's impulsivity over a long time span. Also of interest was the extent to which observed relationships between early social interaction and later impulsivity are a function of variations in children's cognitive competence or temperament.

Results of the Olson, Bates, and Bayles (1990) study indicated that the qualities of caregiver-child interaction assessed at 13 and 24 months were modestly predictive of later self-regulatory competence. The researchers also found that the ability to delay gratification and remain task-focused was predicted by maternal responsiveness to the child's verbal communications at age two. In addition, analyses revealed that cognitive competence at age two was consistently correlated with children's later self-regulatory skills, with both child cognitive competence and caregiver-child interaction making significant contributions to the variance in later child impulsivity. In terms of temperament as a precursor of children's later impulse control capabilities, the study

found that measures of difficult temperament failed to predict indexes of impulsivity at age six, either alone or in combination with caregiver-child interaction measures. Essentially, this study provides support for the hypothesis that responsive, sensitive, and cognitively enriching mother-child interactions are important precursors of child impulse control. Calkins and Fox (1992) also demonstrated similar results with attachment and behavioral inhibition.

While compliance and self-control play a large part in the development of ADHD, there is a broader range of traits and factors that encompass the disorder. Since the Olson, Bates, and Bayles (1990) study did not specifically investigate the role of parental sensitivity, attachment, and temperament in the development of ADHD, such examination remains necessary. In addition, the small sample size was a limitation to their study. Also noteworthy is the fact that temperament measurements were not collected until age two. In order for temperament to be fully considered, it would be worthwhile to examine temperament from earlier points in the child's life.

If an infant is considered to have a difficult temperament, it may elicit a lesser quality of care from caregivers than if they are considered to have an easy temperament. The differences in temperament may then act indirectly on the level of attachment security, resulting in problematic interactions with the caregiver environment (Vaughn & Bost, 1999). It might then be difficult for a parent to be sensitive to the temperamentally difficult child, who may be at risk for developing ADHD. If the parent does not adapt to these attributes and fit the child's needs, it may become difficult to instill in the child the ability to self-soothe and inhibit inappropriate responses (Fonagy & Target, 2002). This may then interfere with the development of attachment security (Belsky, 1999). As

discussed previously, insecure attachment is a strong precursor for the development of ADHD.

Taking this into consideration, Finzi-Dottan, Manor, and Tyano (2006) conducted a study that investigated the impact of temperament and parenting styles on attachment patterns in children with ADHD. The researchers wanted to investigate how the attachment patterns of children diagnosed with ADHD related to the emotional capability of parents to regulate the child's temperament. Specifically, the researchers focused on the parents' promotion or restriction of autonomy in the child. Results indicated that in terms of temperament, the activity dimension contributed to the prediction of attachment in that the higher the child's activity level, the less likely he or she was to have an anxious attachment pattern. In addition, the higher the emotionality level, the more likely the child displayed an avoidant pattern of attachment. Interestingly, the interaction of parental autonomy with each of these temperament dimensions contributed significantly to the variance of type of attachment.

The interactions discovered in the Finzi-Dottan, Manor, and Tyano (2006) study suggest that inadequate parenting might exacerbate the child's difficulties in self-regulation and lead to an insecure attachment pattern. However, if children with ADHD who have a difficult temperament have supportive and organized parenting to fit their needs, the potential for developing less-than-optimal skills may diminish. This particular study focused on children who already had a diagnosis of ADHD, therefore it would be difficult to determine whether the parents' style was brought on by the child's difficult temperament or if the parents' style increased the child's development of those characteristics. In addition, the children who participated in this study were aged seven

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through fifteen. Therefore, it is believed that it is necessary to examine these factors among an early childhood population who have not yet been diagnosed with ADHD. In this manner it may then be possible to see if a goodness of fit between parent and child can decrease the likelihood of developing a diagnosis of ADHD.

In summary, if parent-child interactions, including parental sensitivity and goodness of fit, during the months prior to the full behavioral expression of the attachment system do influence its development, then understanding how temperament might play a role in shaping these interactions is necessary. In addition, it would be valuable to determine if there is a directional influence of parental sensitivity, temperament, and attachment based on goodness of fit and see how these components affect the potential development of ADHD in children. By advancing knowledge of the potential developmental and sequential pathways to ADHD, we can better understand how to develop early individualized interventions for both parent and child to foster optimal cognitive, social, and emotional experiences in formal and informal settings.

CHAPTER III

Method

Participants and Sample Design

Data source. The study utilized data from the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B), which includes a nationally representative sample of approximately 14,000 children born in the year 2001. Information in the ECLS-B was collected from children, their families, their childcare providers, and their teachers. Children participating in the study came from diverse socioeconomic as well as racial and ethnic backgrounds. The same children were followed from birth through kindergarten entry with information collected at four different time points. The waves of data collection occurred at 9 months of age, 2 years of age, 4 years of age (preschool age), and during the fall of kindergarten entry (U.S. Department of Education, National Center for Education Statistics, n.d.a.).

During data collection, parent respondents were asked about themselves, their families and their children. Fathers were also specifically targeted to gain information about their role in the children's lives. Children were observed and participated in assessment activities. Once the children were two years of age, information from childcare and early education providers was also obtained. Data obtained provided information on children's cognitive, social, emotional, and physical development across multiple settings (U.S. Department of Education, National Center for Education Statistics, n.d.a.).

Participants. Data was collected from children and their parents in four waves of data collection; 9-month, 2-year, Preschool, and Kindergarten. The 9-month wave of data

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collection included 5,450 males and 5,250 females creating a total sample of 10,700 participants. The racial and ethnic breakdown of the sample population was as follows: 54% White non-Hispanic, 14% Black non-Hispanic, 26% Hispanic, 3% Asian/Pacific Islander, and 4% Other. In terms of language, 81% of the population spoke English as their primary language in the home while 19% spoke a non-English language. Within the sample, mother's education at the 9-month interview was largely high school diploma, GED, some college, and/or VOTECH (56%), while 20% had less than a high school education and 24% had a bachelor's degree or higher. Poverty status within the sample consisted of 24% of participants below the poverty threshold and 76% at or above the poverty threshold (U.S. Department of Education, National Center for Education Statistics, n.d.c.).

The 2-year wave of data collection included a total sample of 9,850 participants. The racial and ethnic breakdown of the sample population was as follows: 54% White non-Hispanic, 14% Black non-Hispanic, 25% Hispanic, 3% Asian/Pacific Islander non-Hispanic, and 4% Other. In terms of language, 81% of the population spoke English as their primary language in the home while 19% spoke a non-English language. Within the sample, mother's education at the 2-year interview was largely high school diploma, GED, some college, and/or VOTECH (57%), while 18% had less than a high school education and 25% had a bachelor's degree or higher. Poverty status within the sample consisted of 24% of participants below the poverty threshold and 76% at or above the poverty threshold (U.S. Department of Education, National Center for Education Statistics, n.d.d.).

The preschool wave of data collection included a total sample of 8,900 participants. The racial and ethnic breakdown of the sample population was as follows: 54% White non-Hispanic, 14% Black non-Hispanic, 25% Hispanic, 3% Asian non-Hispanic, and 4% Other. In terms of language, 82% of the population spoke English as their primary language in the home while 19% spoke a non-English language. Within the sample, mother's education at the preschool interview was largely high school diploma, GED, some college, and/or VOTECH (59%), while 16% had less than a high school education and 26% had a bachelor's degree or higher. Poverty status within the sample consisted of 25% of participants below the poverty threshold and 75% at or above the poverty threshold (U.S. Department of Education, National Center for Education Statistics, n.d.e.).

Weights. Response rates can be either weighted or unweighted. In general, the purpose of weights is to "adjust for disproportionate sampling, survey nonresponse, and undercoverage of the target population when analyzing complex survey data" (Snow et al., 2009, p. 147). This design also serves to eliminate or reduce biases that may occur in unweighted analyses and allows for an estimation of population totals, making it possible to inferentially describe the population from which a sample was taken. While the unweighted rate can provide a description of the successful operational aspects of the survey, the weighted rate gives a better description of the success of the survey within the sample population (U.S. Department of Education, National Center for Education Statistics, n.d.c.). Unless the probabilities of selection and the unit response rates in the categories with different selection probabilities vary to a considerable extent, both of these rates are typically similar (U.S. Department of Education, National Center for

Education Statistics, n.d.c.). In the ECLS-B, the base weight for the sampled cases was first calculated using the overall sampling selection probabilities. The next step in the weighting process involved adjusting weights for survey nonresponse. The final step consisted of using calibration to improve precision of survey estimates and adjust for undercoverage (Snow et al., 2009).

Weighting for the ECLS-B was applied to three data collection waves: 9-month, 2-year, and preschool. In the 9-month data wave, the weighted unit response rate for the 9-month parent interview was 74.1%. This was calculated by dividing the weighted number of children with completed 9-month parent interviews by the weighted number of children eligible to participate in the 9-month data collection, as the presence of a complete 9-month parent interview, as well as additional eligibility criteria in some instances, served as the criterion for being considered a participant in the 9-month data collection. The 9-month child assessments had a weighted unit response rate of 95.6%. Unweighted unit response rate for the 9-month parent interview was 76.8%, while the unweighted unit response rate for the 9-month child assessment was 95.6% (U.S. Department of Education, National Center for Education Statistics, n.d.c.).

In the 2-year data wave, the weighted unit response rate for the 2-year parent interview was 93.1%. This was calculated by dividing the weighted number of children with completed 2-year parent interviews by the weighted number of children eligible to participate in the 2-year data collection, as the presence of a complete 2-year parent interview, as well as additional eligibility criteria in some instances, served as the criterion for being considered a participant in the 2-year data collection. The 2-year child assessments had a weighted unit response rate of 94.2%. Unweighted unit response rate

for the 2-year parent interview was 92.8%, while the unweighted unit response rate for the 2-year child assessment was 93.7%. The longitudinal response rate, or overall weighted unit response rate, was 69.0% for the parent interview and 65.0% for the child assessments. While the unit response rate is a round-specific rate that indicates the proportion of eligible sample responding to a survey at a particular time point, the longitudinal response rate takes into account response for all rounds of collection (U.S. Department of Education, National Center for Education Statistics, n.d.d.).

In the preschool data wave, the weighted unit response rate for the preschool parent interview was 91.3%. This was calculated by dividing the weighted number of children with completed preschool parent interviews by the weighted number of children eligible to participate in the preschool data collection, as the presence of a complete preschool parent interview, as well as additional eligibility criteria in some instances, served as the criterion for being considered a participant in the preschool data collection. The preschool child assessments had a weighted unit response rate of 98.3%. Unweighted unit response rate for the preschool parent interview was 91.2%, while the unweighted unit response rate for the preschool child assessment was 97.9%. The longitudinal response rate, or overall weighted unit response rate, indicating the proportion of all eligible cases originally sampled for the 9-month collection that participated at preschool, was 63.1% with preschool parent data collection included. When the preschool child assessment unit response was taken into consideration this rate dropped to 62.0% (U.S. Department of Education, National Center for Education Statistics, n.d.e.).

Sampling design. To obtain the original sample of children born in the year 2001, a clustered, list frame sampling design was utilized (Jacobson Chernoff, Flanagan,

McPhee, & Park, 2007). The National Center for Health Statistics vital statistics system provided the list of registered births from which the list frame was created. There were 96 core primary sampling units (PSUs) from which the births were sampled. These PSUs were counties and county groups that were considered to be representative of all infants born in the year 2001 within the United States. There were also 18 additional PSUs selected from a supplemental frame to support the oversample of American Indian/Alaska Native participants. These additional PSUs consisted of areas where a higher proportion of American Indian/Alaska Native births were present in the population. Sampled children in which the state registrars recognized as deceased or adopted after the birth certificate was issued were excluded from the sample preceding the 9-month data collection. In addition, state confidentiality and sensitivity concerns regarding birth mothers under the age of 15 at the time of the child's birth led to the exclusion of these children in the sample as well (Jacobson Chernoff et al., 2007).

For the purposes of this study, a sampling frame was chosen from the sample of participants selected for the database. First, the ECLS-B codebook was examined in conjunction with the assessment measures utilized in the database, and a taglist was created that contained variables chosen for their theoretical and empirical representation of temperament, attachment, parental sensitivity, and ADHD. It was found that not all assessment measures and test items were used across each data wave, so the number of variables chosen to represent temperament, attachment, parental sensitivity, and ADHD were not equal as originally anticipated.

Measures

The proposed model for this study will include several variables of which were measured by use of direct assessment and indirect assessment, such as questionnaire and interview methods. These assessments will be described below and will be drawn from four waves of data collection periods, including the 9-month, 2-year, preschool, and first wave of kindergarten.

Data collection. Data collection consisted of both direct and indirect assessment measures. With parent permission, children were visited in their homes and observed by trained assessors for the direct child assessment portion via activities that measured specific developmental skills within the cognitive, language, social, emotional, and physical domains. Developmental and physical measures also included children's height, weight, and middle upper arm circumference. Indirect child assessment involved computer, face-to-face, and written questionnaire methods. A child's primary caregiver, usually the mother, was interviewed using a computer-assisted method. Fathers completed self-administered written questionnaires. Telephone interviews were used to obtain information from early child education providers. Kindergarten teachers of participants also completed questionnaires (U.S. Department of Education, National Center for Education Statistics, n.d.b.).

Parental sensitivity. The parents' degree of sensitivity to child cues and their response to child distress and growth fostering was measured using scores from the Nursing Child Assessment Teaching Scale (NCATS), which is one element of a larger clinical battery knows as the Nursing Child Assessment Satellite Training (NCAST). The NCAST uses multiple assessments to examine quality of parent-child interaction.

At 9 months, the parent was given a list of activities and asked to select and subsequently teach an activity to their child that they could not yet do. This period of teaching the child an activity was videotaped, but it is important to note that whether or not the child learned the activity was not taken into consideration. The videotaped interactions were then viewed by trained coders and parent-child dyads were examined for whether or not they demonstrated any of 73 different behaviors and rated with a yes or no response that converted to the number one for yes and the number zero for no. Child responsiveness was also coded along with parent teaching behaviors and the parent's ability to read and respond appropriately to the baby's cues. A Total Parent Score was then configured by adding up scores on the 50 parent behaviors, with higher scores indicating greater teaching and responsiveness towards the baby (variable X1NCATTP; this was used to represent parental sensitivity in the present study). A Total Child Score consisted of the sum of scores on the 23 child behaviors, with higher scores indicating greater clarity of cues and responsiveness toward the parent (variable X1NCATTC; this was also extracted for examination in the present study). A Total Score was also computed, which equated to the sum of all 73 parent and child behaviors that were coded (variable X1NCATTS; this was utilized to look at possible goodness-of-fit). Dyads that received a higher Total Score were indicative of smoother interactions than dyads with lower scores (U.S. Department of Education, National Center for Education Statistics, n.d.f.).

Reliability ratings of the NCATS have largely been sufficient according to previous research. Magill-Evans, Harrison, & Ogden Burke (1999) reported Chronbach's alpha between .74 and .80 for the Total Parent score and between .69 and .73 for the

Total Child score, indicating adequate internal consistency. In addition, Hodges, Houck, & Kindermann (2009) reported high interrater reliability scores with percentage agreement between 90.86 and 94.57 and correlations between .61 and .75.

At the 2-year and Preschool data collections, the focus of the tasks switched from teaching to play since the child is a more active participant in the interactions that take place at this point. Therefore, the Two Bags Task (TBT) was utilized for assessment purposes instead of the NCATS. The TBT is a modification of the Three Bags Task, which was a viable measure of parent-child interaction with good psychometric properties used in the study of early child care conducted by the National Institute of Child Health & Human Development (NICHD). During the administration of the TBT, the parent received two different bags from the interviewer. The first bag contained a developmentally appropriate book, while the second bag contained materials for play; pots and pans at 2-years, Play-Doh® and cookie cutters at Preschool age. The parent was instructed to begin playing with the first bag and then move to the second bag whenever he or she and the child were ready, staying within the 10-minute time frame allotted for the task. This interaction was then videotaped and coded by trained coders to obtain both parent and child scores (Snow et al., 2007).

Behaviors were assessed using a 7-point Likert scale with higher numbers indicating a greater display of behaviors. At the 2-year point there are six scores for parent behavior consisting of Sensitivity, Positive Regard, Cognitive Stimulation, Negative Regard, Intrusiveness, and Detachment with three child behavior scores for Engagement, Sustained Attention, and Negativity. At this phase of data collection, Parent Sensitivity, Positive Regard, and Cognitive Stimulation were aggregated into one

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composite score labeled as Supportiveness due to their tendency of scores on these scales to hang together (variable X2TBSPPT; used to represent parental sensitivity from the second data wave for the present study). Due to high correlation of Sensitivity and Positive Regard at the 2-year phase, the two constructs were combined and replaced with one Emotional Supportiveness scale at the Preschool phase (variable C3EMOSPT; used to represent parental sensitivity from the third data wave for the present study). Cognitive Stimulation, Negative Regard, Intrusiveness, and Detachment still remained as parent behavior scores. The three child behaviors utilized in the 2-year phase were present in the Preschool phase, with the exception of Quality of Play replacing Sustained Attention (U.S. Department of Education, National Center for Education Statistics, n.d.f.).

While the TBT was a modification from the Three-Bags Task, trainers established reliability on all the TBT rating scales quickly, achieving 90 percent reliability for all rating scales after only an average of 12 reliability tapes (Andreassen & Fletcher, 2007). Reliability was continually maintained with coding workshops, and inter-lab reliability was also utilized to resolve any discrepancies. Coders needed to maintain a minimum of 85 percent agreement with the consensus reliability coding. The average reliability percent agreement for all subscales of the TBT was at or about 93 percent for the ECLS-B 2-year data collection (Andreassen & Fletcher, 2007).

Attachment. Child security of attachment was measured at the 2-year data phase utilizing the Toddler Attachment Sort (TAS-45), which is a shortened and modified version of the Attachment Q-sort (AQS; Vaughn & Waters, 1990; Waters & Deane, 1985). Q-sort methodology is comprised of three different components: the first consists of procedures for developing sets of descriptive items which are then assigned scores, the

second involves assigning scores to items by sorting them into a rank order, and the third

component consists of a wide range of procedures for data reduction and data analysis

(Waters & Deane, 1985). The Attachment Q-set essentially serves as an overview of the

entire domain of attachment relevant behavior as understood through an ethological and

control systems lens, with individual constructs of security, dependency, sociability, and

social desirability. The Q-sorting procedure involves observers sorting 100 behaviorally

descriptive items on cards into nine piles according to a predefined distribution that

provides a summary of an infant's attachment behavior based on a forced choice scale.

Items most characteristic of the participant are placed at one end of the scale while items

least characteristic of the participant are placed at the opposite end. Items placed in the

center piles reflect neutral items that are neither characteristic nor uncharacteristic of the

child or cannot be scored based on the observation. The placement of an item in the sort

determines that item's score, therefore highly characteristic items receive higher scores

than uncharacteristic items. A score for attachment security can then be derived from the

comparison of the resulting descriptions with the behavioral profile of a secure child as

determined by experts of attachment theory. This AQS security score is therefore the

correlation between the expert sort describing the prototypical secure child and the actual

Q sort of the participating child

 (Vaughn & Waters, 1990).

Meta-analyses conducted by van IJzendoorn, Vereijken, Bakermans-Kranenburg,

and Riksen-Walraven (2004) on 139 studies with 13,835 children revealed modest

support for both the reliability and validity of the AQS. While the self-report AQS did not

appear to show sufficient validity throughout the meta-analyses, the observer AQS did

prove to be an adequate assessment of attachment, thus giving it strong merit within the field. Strong convergent validity was also discovered in a comparison of the observer AQS and the Strange Situation Procedure (SSP) as measures of secure attachment. The observer AQS correlated substantially to attachment security as derived by the SSP with r = .31. Discriminant validity was demonstrated by a comparison of AQS attachment security and measures of temperamental reactivity, which resulted in a weak correlation (r = .16). In terms of predictive validity, the observer AQS had a strong correlation with parental sensitivity and responsiveness (r = .39), although it was noted that the association between observer AQS and maternal sensitivity may have been somewhat inflated. While reported reliability for the AQS was scarce, a measure of stability of attachment over time revealed a modest size of r = .28.

Due to the lengthy three-hour period required for completion of the AQS, the ECLS-B formed the TAS-45, which modified and shortened the AQS to make it more feasible for administration during the home visit. Unlike the AQS, the TAS-45 only contained 45 items instead of 100 and required the use of four piles instead of nine. After a home visit consisting of interviewers observing the child's behavior with the parent, a card sort was completed on a laptop computer to indicate what child attachment behaviors were observed. This procedure first involved forty-five cards indicative of attachment behaviors being placed into an "apply" or a "not apply" category based on whether or not the child displayed the behavior, and then those behaviors that applied were sorted into four piles whose categories mimicked a 4-point Likert scale from "strongly not apply" to "strongly apply" and subsequently analyzed using multi-dimensional scoring. Resulting scores were then used to classify the child's attachment

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type as Insecure Avoidant (A), Secure (B), Insecure Ambivalent (C), or Disorganized (D) (U.S. Department of Education, n.d.f). When this variable (X2TASCLS) was used in the present study, the 4-point likert scale was recoded into a dichotomous variable, with the participant coded to either have secure or insecure (insecure avoidant, insecure ambivalent, disorganize) attachment.

As mentioned previously, the TAS-45 was developed specifically for the purposes of the ECLS-B study in an effort to make administration more streamline and feasible during field study. Due to its new development, there is limited psychometric data regarding its use. However, Andreassen & Fletcher (2007) conducted both field tests and reliability tests before implementing its use within the actual data collection. Initially, a 4-pile, 39-item version (TAS-39) of the modified attachment measure was tested during an 18-month field test. One sort was completed by an interviewer immediately after a home visit while the other was completed by a parent. After deriving variables for each child separately for the parent-completed and interviewer-completed sorts, it was determined that the distribution of children across attachment categories was comparable to those reported in the attachment literature (Ainsworth et al., 1978). This led interviewers to conclude that they would be able to observe and sort child attachment behaviors successfully. However, while this field test was being conducted, an expert attachment colleague was acquiring additional data to include items that reflected the disorganized style of attachment behavior. The analyses determined that an additional six items would be added to the TAS measure, resulting in the TAS-45, in order to appropriately classify children who could not be easily categorized into the original avoidant, secure, and ambivalent attachment types (Andreassen & Fletcher, 2007).

In order to ensure reliable coding and interpretation of child behavior, all trainees received consistent and objective computer training regarding the use of the TAS-45, with more time spent learning to recognize behaviors than trying to have an incomplete understanding of the underlying theory (Andreassen & Fletcher, 2007). Computer training agreement rates between trainees were calculated by comparing their results to standardized results from undergraduate and graduate students known to be reliable on the administration of the TAS-45. The ECLS-B field staff had an average interobserver agreement rate of 82 percent, exceeding the required minimum of 80 percent. Simulation videotapes were then used as part of the training process where individuals conducted preliminary TAS-45 sorts to identify children from each major attachment classification. The expert attachment colleague and several of his students then completed sorts and developed prototypical profiles for each of the children, which were then used for purposes of interviewer reliability. Overall, while some attachment categories were more reliable than others, interviewers averaged an acceptable 82 percent agreement with the prototypical profiles on the reliability videotapes (Andreassen & Fletcher, 2007).

In addition to reliability, Andreassen and Fletcher (2007) provided a report of construct validity for the TAS-45. This was presented by means of the weighted distributions of attachment classifications resultant of the 2-year data collection. The weighted percentage distribution was 16.27% for Attachment Type A, Avoidant, 61.12% for Attachment Type B, Secure, 8.91% for Attachment Type C, Ambivalent, and 13.46% for Attachment Type D, Disorganized. These percentages reflect the general distribution of attachment styles as reported in the previous literature base (Ainsworth et al., 1978).

Temperament. Questionnaire data from the Parent Computer-Assisted Personal Interview (Parent CAPI) was utilized for individual child temperament. The Parent CAPI

was a component of each wave of data collection, and involved a 90-minute in-person interview in which the interviewer asked questions aloud and entered responses in the computer, or the Parent CAPI Instrument (Snow et al., 2007). Due to the design of the study, the child's mother served as respondent whenever possible, although additional relatives or guardians were permitted so long as they were knowledgeable about the child's care and education and currently living in the household with the child. Order of preference for the parent interview respondent consisted of the child's biological mother, then the child's biological father, then another parent or guardian or household member. Interviews were conducted primarily in English but arrangements were made for those who spoke a language other than English. The Parent CAPI Instrument included several environmental, physical, cognitive, and socio-emotional aspects of both the parents and child. Due to the sensitive nature of some of these items, a short Parent Audio Computer-Assisted Self-Interview (ACASI) was included in the CAPI in order to maintain personal confidentiality of responses during home visits. (Snow et al., 2007). For the purposes of the present study, only socio-emotional items from the Parent CAPI were utilized.

Within the Parent CAPI were several questions regarding child temperament. The content of these questions encompass several different dimensions of temperament including distress to novel stimuli, self-regulation, attention, and difficulty raising the child. Distress to novel stimuli was assessed during the 9-month data collection. Self-regulation was assessed at the 9-month, 2-year, and Preschool data waves. Attention was assessed at the 2-year and Preschool waves. Lastly, difficulty raising the child was assessed at both the 9-month and 2-year data collection phases (Snow et al., 2007). For the purposes of the present study, Likert-scale responses for the temperament variables

mentioned above were going be classified into three major temperament categories as defined by Thomas and Chess (1977), consisting of Easy, Difficult, or Slow-To-Warm-Up, for each individual child. However, due to the inability to access certain temperament questions in the Parent CAPI for copyright reasons, only certain temperament items could be utilized which only existed in the first and second data waves. These variables (P1FUSSY, P1WHMPR, P2FUSSY, P2WHMPR) reflect the fussiness or irritability the child exhibited and how quickly the child went from a whimper to crying. A 4-point Likert scale was used to indicate the degree of these characteristics, with high scores indicating a more difficult temperament.

ADHD characteristics and subtypes. Information regarding ADHD diagnosis was also obtained from the Parent CAPI Instrument. Specifically, the CAPI contained a question regarding whether or not a doctor had ever diagnosed the child with a specific condition, with ADHD serving as one of the options. The questions that specifically addressed ADHD were present in three data waves and those variables were selected for the present study (P3ADHD, P4ADHD, P5ADHD). If the first research question of the present study provided results of significance, a second research question was going to further examine variables in relation to the three subtypes of ADHD; Inattentive Type, Hyperactive/Impulsive Type, and Combined Type. In order to differentiate between the subtypes, Parent CAPI questions regarding specific symptoms would be utilized. Specifically, the Parent CAPI questioned whether or not the child has been evaluated by a professional in response to overall activity level, as well as whether or not the child has been evaluated by a professional for their ability to pay attention or learn. The former would be used in conjunction with ADHD, Inattentive Type, while the latter would be

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used for ADHD, Hyperactive/Impulsive Type. If responses on the Parent CAPI indicated

significance for both of those questions, they would be used to signify ADHD, Combined

Type.

Research Questions

The present study initially examined the following research questions and

hypotheses:

Research Question 1:

What is the directional influence of child temperament and parental sensitivity in the

development of ADHD?

Hypothesis:

When examining factors of parental sensitivity and child temperament in the

development of ADHD, a directional influence will exist which then affects the

attachment style related to the presence or absence of ADHD diagnosis.

Research Question 2:

Can developmental sequence of psychopathology via child temperament, parental

sensitivity, and child attachment determine subtype of ADHD?

Hypothesis:

The developmental sequence of psychopathology via child temperament, parental

sensitivity, and child attachment can determine subtype of ADHD, such that specific

sequences of child temperament, parental sensitivity, and child attachment lead to ADHD

Inattentive Type, ADHD Hyperactive/Impulsive Type, or ADHD Combined Type.

Statistical Model

The research questions and hypotheses listed above were addressed utilizing the statistical techniques of Structural Equation Modeling (SEM). SEM does not specify a distinct statistical technique but instead encompasses a family of related procedures. These techniques are commonly used for testing and estimating causal relations. SEM is suited for both theory testing and theory development due to the fact that is allows for both exploratory and confirmatory modeling. In addition, SEM provides the ability to construct latent variables, which are variables that are not measured directly and instead estimated in the model from other measured variables. The examination of latent variables in combination with observed variables therefore allows for a better understanding of the impact of interactions between variables (Kline, 2005).

One of the special cases of SEM is path analysis, which is the original SEM technique for analyzing structural models that contain observed variables. This technique is useful when the causal relations among variables have already been hypothesized or when there is only a single measure of each theoretical variable. Essentially, the estimation of supposed causal relations among observed variables is the main technique of path analysis, therefore the overall goal is to estimate causal versus noncausal aspects of observed correlations (Kline, 2005).

The original specification of the path model can be viewed in Figure 1. This model indicated that according to the extant literature base, the development of ADHD is affected by variables of parental sensitivity, temperament, and attachment, with parental sensitivity and temperament collectively affecting the development of attachment style that can lead to ADHD. However, the literature does not convey the directional influence

between parental sensitivity and temperament in the development of ADHD, therefore it was considered necessary to determine for purposes of early intervention. It was hypothesized that there would be a specific developmental sequence of ADHD when considering variables of parental sensitivity, temperament, and attachment.
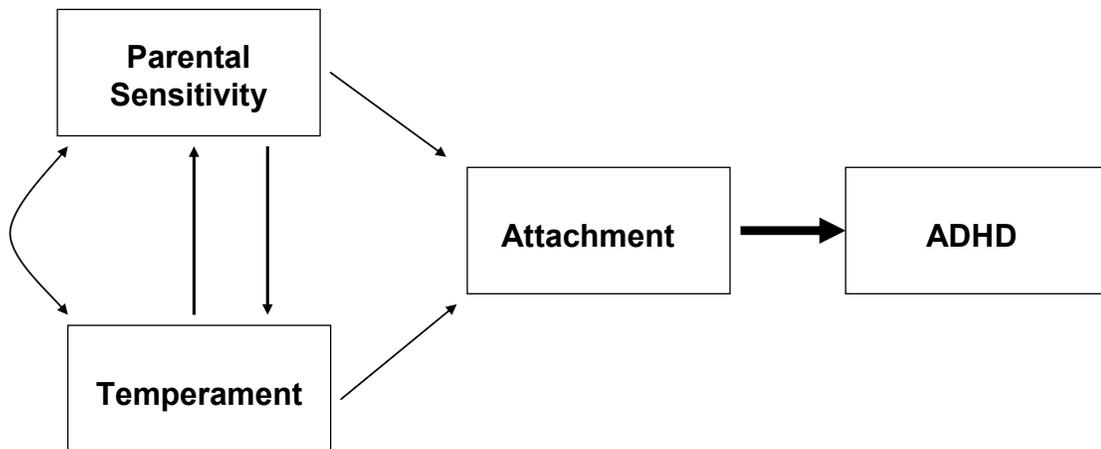
Figure 1. Path analytic model.

Power. According to Kline (2005) power is "the probability of rejecting the null hypothesis when there is a real effect in the population" (p. 41). Power, therefore, varies directly with the sample size and the degree of the real population effect. It is imperative to determine the minimum sample size necessary in order to achieve a desired level of statistical power within a given model because statistical power directly affects the confidence with which models can be interpreted (McQuitty, 2004). If power is too low, it can imply that a false model will not be rejected. Conversely, if power is extremely high it may cause overrejection of acceptable models.   MacCallum, Browne, and Sugawara (1996) provide a method for estimating the power associated with the test of an entire structural model with known sample size and degrees of freedom, which employs

the root-mean-square error of approximation (RMSEA) in a series of hypothesis tests concerning model fit. For studies with moderate to large degrees of freedom, reasonable power is achieved with moderate sample sizes, with any sample size number of 200 or more understood to provide sufficient statistical power for data analysis (Hoe, 2008; MacCallum, Browne, & Sugawara, 1996). In addition, the general consensus is that there should be 10 participants per estimated parameter (Schreiber, Nora, Stage, Barlow, & King, 2006).

Data Analysis

The data analyzed consisted of continuous, ordered categorical, and nominal data. Variables were selected from the ECLS-B based on their theoretical and empirical representation of temperament, attachment, parental sensitivity, and ADHD. A taglist was formed that contained these variables and a separate sample was created. Each variable was examined for missing data. Several variables contained codes that indicated unworkable responses such as Not Ascertained, Don't Know, Refused, and Not Applicable. Each of these responses was recoded to represent missing data, and then all participants that contained missing data were removed from the sample. The final sample consisted of 1,134 participants that contained no missing data. The attachment variable was also recoded to reflect a dichotomous secure versus insecure attachment instead of four categories of attachment. In order to utilize the data, this author created a covariance and correlation matrix from which to perform the analyses.

Maximum likelihood (ML) estimation served as the estimation method used for the data analyses. The method of ML estimation is used to approximate the parameters of a statistical model. According to Kline (2005), ML estimators maximize the continuous

generalization of a sample that is actually observed. In other words, ML selects values of

the model parameters that create a distribution that offers the observed data the greatest

probability. Overall fit of the model to the data was examined.

CHAPTER IV

Results

For the purposes of this study, path analysis was initially going to be utilized to determine directional influence of temperament, attachment, and parental sensitivity in the development of ADHD. However, the preliminary SEM Confirmatory Factor Analysis (CFA) revealed significant difficulties, therefore path analysis was no longer a viable option. Regression analyses were then performed instead utilizing the PASW Statistics 18 Package, version 18.0.0 (SPSS, Inc., 2009) and research questions were modified to accommodate the change. The information that follows will provide specific details about this process and the subsequent findings that provided a means to reject or accept hypotheses.

Descriptive Statistics

The present study utilized the ECLS-B database, which was comprised of 10,688 participants. These participants included a national sample of children born in the United States in 2001. Specific variables were chosen from each data wave that reflected aspects of temperament, attachment, parental sensitivity, and ADHD. Once a separate sample using the selected variables was created, each individual variable was examined for uncategorized responses (i.e., Not Ascertained, Don't Know, Refused, Not Applicable) and participants with these codes were removed. The final analysis consisted of 1,134 participants and contained no missing data, with 616 males and 518 females. Table 4.1 contains the demographic variables of the participants.

Table 4.1

Frequency Rates for Male vs. Female Participants

	Frequency	Percentage
Male	616	54.3
Female	518	45.6

Table 4.2 contains the means and standard deviations for each of the variables utilized in this study.

Table 4.2

Means and Standard Deviations of Variables

	M	SD
Parental Sensitivity		
X1NCATTS – Parent/Child Interaction (NCATS Total Score – 1st wave)	45.85	5.68
X1NCATTC – Child Responsiveness (NCATS Total Child Score – 1st wave)	15.21	2.69
X1NCATTP – Parental Sensitivity (NCATS Total Parent Score – 1st wave)	34.64	4.40
X2TBSPPT – Parent Supportiveness (Two Bags Support – 2nd wave)	4.33	.89
C3EMOSPT – Emotional Supportiveness (Parent Behavior: Emotional Support – 3rd wave)	4.47	.97
Attachment		
X2TASCLS – Attachment Security (TAS Classification – 2nd wave)	2.27	.90
Temperament		
P1FUSSY – 9 mo. Fussiness (Fussy or Irritable – 1st wave)	1.21	.99
P1WHMPR – 9 mo. Whimpering (Goes from Whimper to Crying – 1st wave)	1.12	1.07
P2FUSSY – 2 yr. Fussiness (Fussy or Irritable – 2nd wave)	1.56	.92

P2WHMPR – 2 yr. Whimpering (Goes from Whimper to Crying – 2nd wave)	1.26	1.08
ADHD		
P3ADHD – 4 yr. ADHD Diagnosis (Child has/does not have ADHD – 3rd wave)	1.98	.11
P4ADHD – Kindergarten ADHD Diagnosis (Child has/does not have ADHD – 4th wave)	1.97	.16
P5ADHD – 2nd Kindergarten ADHD Diagnosis (Child has/does not have ADHD – 5th wave)	1.95	.21

Preliminary Statistical Analyses

Bivariate correlations of all variables utilized in the present study were conducted. These correlations are listed in Table 4.3. Correlations were noted to be significant at $p<.001$ between parental sensitivity variables from the three data waves. However, these did not correlate the same with the temperament and attachment variables. For example, only the parental sensitivity measure from the second data wave (Parent Supportiveness) had a significant correlation with the attachment variable (Attachment Security) even though the others were purported to measure similar constructs. Correlations were also significant at the $p<.001$ level between the four temperament variables from the two data waves. However, these also correlated differently with the parental sensitivity variables, being significant at the $p<.001$ level for the second and third data wave variables but not the first. Although the three data wave ADHD variables were significantly correlated at the $p<.001$ level, they also showed different relationships with the other variables. Overall, while small relationships were noted, some differences caused problems for additional analyses. Some of these issues may be due to the fact that the ECLS-B

database did not use some of the same measures consistently over data waves; therefore,

different variables had to be chosen to represent the construct being studied.

Table 4.3

Bivariate Correlations of Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
P/C Interact	1.00	.658**	.887**	.280**	.195**	-.056	-.058	-.020	-.080**	-.061	.035	-.006	.028
Child Resp.		1.00	.236**	.092**	.055	-.008	.002	-.005	-.018	-.043	-.005	.007	.028
Parent Sens.			1.00	.305**	.218**	-.067	-.075	-.023	-.093**	-.052	.049	-.012	.019
Parent Supp.				1.00	.374**	-.078**	-.090**	-.008	-.114**	-.157**	.064	.001	.033
Emo. Supp.					1.00	-.048	-.098**	-.035	-.083**	-.067	-.087**	.053	.067
Att. Security						1.00	.066	.059	.112**	.106**	-.093**	-.069	-.010
2yr Fuss							1.00	.302**	.218**	.161**	-.084**	-.040	-.055
2yr Whimp								1.00	.140**	.249**	.021	-.031	-.008
4yr Fuss									1.00	.357**	-.088**	-.090**	-.079**
4yr Whimp										1.00	-.014	-.009	-.001
4yr ADHD											1.00	.596**	.441**
K. ADHD												1.00	.617**
2ndK.ADHD													1.00

**p<.001

A confirmatory factor analysis utilizing maximum likelihood was conducted on the temperament, parental sensitivity, and ADHD items due to the use of multiple data waves and varying items in ECLS-B database that purported to measure aspects of temperament, parental sensitivity, and ADHD. This was to help determine if the measured variables could be reduced to their latent factors and confirm the factor structure of the set measured variables. If the analysis revealed adequate fit of the data onto the factor model, composite scores would have been created accordingly and the causal model would be tested using path analysis. EQS version 6.1 was the program utilized for these purposes (Bentler, 1995).

A violation of multivariate normality was revealed in a leptokurtic plot of the distribution residuals, indicating that the data was highly concentrated around the mean due to lower variations within observations. It should also be noted that one of the parental sensitivity items, X1NCATTS (Parent/Child Interaction), had to be removed due to significant scaling issues. The chi-square statistic for the model was significant (χ^2 (46) = 137.048, p < .001), suggesting an inadequate model. However, the χ^2 statistic is not independent of sample size, and becomes increasingly liberal with increasing sample size. Therefore, additional fit indices were examined. The comparative fit index (CFI) value of .941, Bentler-Bonnet Normed Fit Index value of .915 and Bentler-Bonnet Non-Normed Fit Index value of .915 all suggest adequate fit. However, some of the factor loadings and associated values of R^2 were so low that convergent validity seemed doubtful. Loadings on many of the items with their respective factors were less than .50, and R^2<.50 for a total of ten out of twelve indicators (all except the first two out of the three ADHD variables), indicating observed associations poorly explained by the model.

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The major limitation regarding these analyses is that the analyses were run from covariance matrices that were ill-scaled. Kline (2005) describes an ill-scaled covariance matrix as one where the ratio of the largest to the smallest variance is greater than ten. Specifically, the variances of the observed variables were very different in magnitude. This becomes a problem during iterative estimations, because the size of changes made from one step to the next may be huge or trivial depending on the size of variable variance. This then leads to problems with the entire set of estimates, making appropriate fit of the model more difficult to achieve (Kline, 2005). Due to raw data being inaccessible, adjustments to scaling issues could not be conducted in order to continue the use of SEM data analyses procedures. As a result, an alternative plan was devised.

Primary Statistical Analyses

Due to difficulties with preliminary SEM data analyses procedures, regression analyses were performed instead using PASW Statistics 18 package, version 18.0.0 (SPSS, Inc., 2009) and research questions were modified accordingly. The regression analyses explored the relationship between the temperament, attachment, and parental sensitivity variables and the development of ADHD. Table 4.4 illustrates the modifications made to the original research questions and hypotheses.

Table 4.4

Modifications to Original Research Questions and Hypotheses

Original	Modified
Research Question 1: What is the directional influence of child temperament and parental sensitivity in the development of ADHD?	Research Question 1: To what extent do variables of temperament, parental sensitivity, and attachment contribute to a diagnosis of ADHD?
Hypothesis:	Hypothesis:

When examining factors of parental sensitivity and child temperament in the development of ADHD, a directional influence will exist which then affects the attachment style related to the presence or absence of ADHD diagnosis.	All variables of temperament, parental sensitivity, and attachment contribute to a diagnosis of ADHD with attachment as the most significant contributor.
Research Question 2: Can developmental sequence of psychopathology via child temperament, parental sensitivity, and child attachment determine subtype of ADHD?	Research Question 2: When looking at temperament and parental sensitivity, which serves as a better predictor of attachment style?
Hypothesis: The developmental sequence of psychopathology via child temperament, parental sensitivity, and child attachment can determine subtype of ADHD, such that specific sequences of child temperament, parental sensitivity, and child attachment lead to ADHD Inattentive Type, ADHD Hyperactive/Impulsive Type, or ADHD Combined Type.	Hypothesis: Parental sensitivity will serve as a better predictor of attachment style regardless of temperament, such that higher parental sensitivity will be associated with a more secure attachment even with a more difficult temperament.

(Modified) Research Question 1:

To what extent do variables of temperament, parental sensitivity, and attachment contribute to a diagnosis of ADHD?

Hypothesis:

All variables of temperament, parental sensitivity, and attachment contribute to a diagnosis of ADHD with attachment as the most significant contributor.

A regression model equation was conducted to evaluate the relationship between the variables of temperament, parental sensitivity, and attachment (IVs) and ADHD (DV). The overall regression relationship was statistically significant, $F(9,1124) = 3.65$, $p<.001$, indicating that we can reject the null hypothesis that there is no relationship between the set of independent variables and the dependent variable. However, the

multiple R for the relationship between the set of independent variables and the dependent variable was 0.168, which indicates a very weak correlation. The calculated effect size ($R^2 = .028$) shows that only 2.8% of variance in the dependent variable (ADHD) can be explained by temperament, attachment, and parental sensitivity.

The C3EMOSPT parental sensitivity variable (Emotional Supportiveness), X2TASCLAS attachment variable (Attachment Security), and P1FUSSY (2yr. Fussiness) and P2FUSSY (4yr. Fussiness) temperament variables were significant at the p<.05 level, indicating a relationship with ADHD. The remaining parental sensitivity and temperament variables (X1NCATTC-Child Responsiveness, X1NCATTP-Parental Sensitivity, X2TBSPPT-Parent Supportiveness, P1WHMPR-2yr. Whimpering, P2WHMPR-4yr. Whimpering) were insignificant (p>.05), and it should also be noted that the X1NCATTS (Parent/Child Interaction) was excluded from the model. Due to the use of different metrics in the ECLS-B database, unstandardized regression coefficients could not be compared. The standardized beta coefficient associated with the C3EMOSPT parental sensitivity variable (Emotional Supportiveness) was positive (.064). Based on the ADHD variable where the low number was coded as having an ADHD diagnosis and the higher number was coded as not having an ADHD diagnosis, this implies a positive relationship in which higher numeric values for parental sensitivity are associated with not having an ADHD diagnosis. The standardized beta coefficient associated with the X2TASCLS attachment variable (Attachment Security) was negative (-.081), implying an inverse relationship in which higher numeric values for attachment (insecure attachment style) are associated with having an ADHD diagnosis. The standardized beta coefficients associated with the P1FUSSY (2yr. Fussiness) and

P2FUSSY (4yr. Fussiness) temperament variables were also negative (-.075; -.070), implying an inverse relationship in which higher numeric values for fussiness (difficult temperament) are associated with having an ADHD diagnosis. Based on these values, there is support for the hypothesis that attachment is the largest contributor to an ADHD diagnosis when considering variables of temperament, attachment, and parental sensitivity. See Table 4.5 for a summary of regression coefficients and significance levels.

Table 4.5

Regression Coefficients for Parental Sensitivity, Attachment, and Temperament Variables on ADHD

| | Unstandardized Coefficients | | Standardized Coefficients | | |
	B	Std. Error	Beta	t	Sig.
(Constant)	1.974	.035		56.488	.000
Child Resp.	-.001	.001	-.015	-.500	.617
Parent Sens.	.000	.001	.017	.546	.585
Parent Supp.	.002	.004	.019	.588	.557
Emo. Supp.	.007	.004	.064	1.991	.047
Att. Security	-.010	.004	-.081	-2.706	.007
2yr. Fuss	-.009	.004	-.075	-2.363	.018
2yr. Whimp	.006	.003	.054	1.707	.088
4yr. Fuss	-.009	.004	-.070	-2.178	.030
4yr. Whimp	.003	.003	.025	.779	.436

a. Dependent Variable: ADHD

(Modified) Research Question 2:

When looking at temperament and parental sensitivity, which serves as a better predictor of attachment style?

Hypothesis:

Parental sensitivity will serve as a better predictor of attachment style regardless of temperament, such that higher parental sensitivity will be associated with a more secure attachment even with a more difficult temperament.

A regression model equation was conducted to evaluate the relationship between the variables of temperament and parental sensitivity (IVs) and attachment (DV). Based on the results of significance from the analysis for the first research question, the C3EMOSPT variable (Emotional Supportiveness) was used to represent parental sensitivity, the X2TASCLS variable (Attachment Security) was used to represent attachment, and P1FUSSY variable (2yr. Fussiness) was used to represent temperament. The overall regression relationship was statistically significant, $F(2,1131) = 3.471$, $p<.05$, indicating that we can reject the null hypothesis that there is no relationship between the set of independent variables and the dependent variable. However, the multiple R for the relationship between the set of independent variables and the dependent variable was 0.078, which indicates a very weak correlation. The calculated effect size ($R^2 = .006$) shows that only 0.6% of the variance in attachment can be explained by temperament and parental sensitivity. However, when examining the contribution of the temperament and parental sensitivity variables, the results indicated that the temperament variable was significant at the $p<.05$ level, while the parental sensitivity variable was not. This does

not support the hypothesis that parental sensitivity would be a stronger predictor than temperament in attachment style.

Two regression model equations were also conducted to look at the effect of parental sensitivity in ADHD when also considered with temperament and attachment. The first regression included the parental sensitivity variable, such that attachment, parental sensitivity, and temperament served as IVs and presence of ADHD the DV. The overall regression relationship was statistically significant, $F(3,1130) = 7.890$, $p<.001$, and the multiple R for the relationship between the set of independent variables and the dependent variable was 0.143 with an effect size of $R^2 = .021$. When the parental sensitivity variable was removed, such that temperament and attachment served as IVs with presence of ADHD as the DV, the overall regression relationship was statistically significant, $F(2,1131) = 8.474$, $p<.001$. The multiple R for the relationship between the set of independent variables and the dependent variable was .122 with an effect size of $R^2 = .015$. While both equations were significant, the results indicated that more variance of the IVs was shared with ADHD when the parental sensitivity variable was included than when it was not included. This suggests that although parental sensitivity may not hold as much significance as temperament in the development of attachment style, it still plays a role in the development of ADHD which as affected by attachment style.

CHAPTER V

Discussion

The present study attempted to identify a potential directional pathway between temperament, attachment, and parental sensitivity in the development of ADHD. This was examined from an early childhood perspective, utilizing data from a nationally representative sample of children followed from birth through kindergarten. The following chapter will provide interpretation of the results, conclusions drawn, and limitations of the present study. Implications and future recommendations for practice and research are provided.

Conclusions

Regression analyses indicated that when taken together, temperament, attachment, and parental sensitivity explained a statistically significant amount of the variance in the presence of ADHD. However, the effect size was small, such that the combined influence of temperament, attachment, and parental sensitivity did not play as much of a role in the ADHD diagnosis as expected. One possible explanation is that the variables chosen from the database to portray temperament, attachment, and parental sensitivity may not have been the most effective representation of these constructs and how they relate to ADHD. Specifically, some of the assessments used were not specific measures of the constructs. Individual items had to be extracted from the assessments, and in some cases these items were only based on a single and brief observation period. If other assessments and methods of data collection were utilized in the database for those constructs, the variables extracted may have potentially produced different results.

Another explanation of the small effect size may be that there are extraneous variables not included in this study that could have created a more significant combined effect towards the development of ADHD. For example, other possible variables to be included and examined could be maternal substance abuse during pregnancy, complications during delivery (e.g. prematurity or low birth weight), paternal involvement, number of siblings, socioeconomic status, diet and nutrition, or genetic influence. Another factor to be taken into consideration is the influence of parent ADHD and other parent background information related to mental health diagnoses. The present study did not examine information related to parent ADHD diagnosis, but this may potentially have a significant effect on the influence and outcome of the factors studied. Specifically, the heritability of ADHD is very high in comparison to other mental health diagnoses, therefore the effect of temperament, attachment, and parental sensitivity may look different for children of parents with the disorder versus children whose parents do not have a history of ADHD.

Given that the attachment variable was the most significant contributor in the present study, this relationship was examined further. Specifically, this study attempted to determine the significance of parental sensitivity in temperament and the development of attachment styles that contribute to ADHD. Based on the goodness-of-fit model (Lerner, 1984; Thomas & Chess, 1977), it was posited that the insecure attachment styles associated with ADHD may be less likely to develop if parental sensitivity is appropriately matched to child temperament, even if temperament characteristics reflect those associated with ADHD symptoms. When examining the contribution of temperament and parental sensitivity variables, regression analyses revealed that the

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temperament variable was statistically significant while the parental sensitivity variable was not. In other words, results suggested that when looking at the development of attachment, temperament is a more significant predictor of attachment style than parental sensitivity. However, while parental sensitivity did not play as large a role in the development of attachment style, results showed that it did make a difference when included in the model for ADHD, as indicated by regression statistics. In other words, when parental sensitivity was included with temperament and attachment as predictors of ADHD, there was more explanation of an ADHD diagnosis then when parental sensitivity was not included.

Relationships between parental sensitivity, temperament, and attachment have been examined in the extant literature base, but to this date there has been no research conducted to examine these relationships together in the context of ADHD. However, the present study supported several links found in previous research. A diagnosis of ADHD was found to be more likely if parental sensitivity was included in the model with attachment and temperament. This supports the research of Campbell (1991), which indicated that there are additive effects of temperament and parenting. Specifically, when early negative temperamental characteristics are paired with negative parental control strategies, more externalizing problems in children were likely. Furthermore, Ellis and Nigg (2009) found an association between parenting practices and ADHD symptoms and diagnoses. However, these studies focused on preschool through school-age children, and the present study supports these links from an even earlier developmental stage.

Interestingly, when attachment in the context of ADHD was examined by way of temperament and parental sensitivity, results indicated that parental sensitivity played

less of a role than temperament. Although Seifer, Schiller, Sameroff, Resnick, and Riordan (1996) did not specifically study these variables with respect to ADHD, their analyses revealed that parental sensitivity was only weakly related to attachment status. The researchers also found that temperament was more strongly related to attachment status, but that temperament and parental sensitivity were still related to each other. Seifer et al. (1996) focused on the first year of life from birth, therefore the present study extends these findings and implies that temperament remains a strong indicator of attachment even after infancy. In addition, while that study was interpreted with caution due to small sample size, the larger sample size of the present study provides more support for those results and does so in a developmental psychopathology framework.

Overall, the present study in combination with previous research suggests that temperament plays a greater role in attachment style and the later development of ADHD than parental sensitivity. It is possible that parental sensitivity is dependent on more contextual factors than temperament, therefore it may be more difficult to remain stable and more difficult to measure for this same reason. For example, the external conditions placed on a parent, such as the level of income and subsequent work pressures, amount of support from other adults, and health conditions may affect their resources and ability to develop consistent and appropriate sensitivity to their child's needs, especially if these things change frequently over time. In contrast, temperament may present as a more stable individual characteristic. As a result, this may lead one to speculate that individual characteristics (e.g. biological and hereditary factors) play a greater role in the developmental psychopathology of ADHD than environmental factors.

Implications for Practice

Information from the present study suggests that although parental sensitivity may not be as significant as predicted in the development of ADHD, it can still play a role and can therefore be targeted as an area of intervention in early childhood. Specifically, given that temperament was a more significant predictor of attachment style related to ADHD than parental sensitivity, parent trainings can focus on psychoeducation about temperament styles and how to effectively handle children that present with specific temperaments. When a child is perceived as difficult, reactive, and prone to distress it may become harder for a parent to provide the type of quality care they might provide to a child with easier temperamental attributes. This less-than-optimal interaction may then damage the bond between parent and child, which is why it is important for this psychoeducation to occur.

Although general parent training programs can be beneficial, findings from the present study suggest that tailoring them to specific temperament styles may be more effective in the prevention of ADHD. Although a difficult temperament is associated with ADHD, one may speculate that an easy temperament could also result in ADHD if a mismatch between parent and child exists. Specifically, if an easy temperament leads to a parent granting too much autonomy, the child may fail to learn the appropriate structure and organization necessary for later success in school and beyond. However, a difficult temperament should not automatically imply that a parent should utilize more restrictive sensitivity. Despite current findings that temperament plays a larger role than parental sensitivity, research has shown that it is possible for temperamentally driven behaviors to be modulated by environmental conditions (Kagan, 1994). The appropriate match between parent and child is still vital for optimal development, therefore both

temperament and match should be incorporated in parent trainings. An example of an intervention that could assist with this is Parent-Child Interaction Therapy, which facilitates and teaches better interactions between parent and child and has been shown to foster more flexible temperament in young children (Nixon, 2001).

In addition to parent trainings, it would likely be beneficial for those involved in early childhood education to receive trainings that provide management techniques for specific temperaments in an effort to provide continuity of care between child, parent, and educational setting. Given their knowledge of behavior modification techniques and the social/emotional development of children, school psychologists are in a good position to develop and facilitate training programs that address these needs, both from a prevention and intervention position. It would be especially beneficial for school psychologists to also collaborate with social workers or other mental health professionals that work with family systems.

Limitations

The current study had several noteworthy limitations. While SEM and path analysis were originally planned to help determine a potential directional pathway of ADHD, there were significant scaling issues with some of the variables. Due to the raw data being inaccessible for making adjustments, it was decided that regression analyses would be used as an alternative and research questions were adapted to reflect this change. Modified research questions looked at how each of the temperament, attachment, and parental sensitivity variables contributed to a diagnosis of ADHD, and then examined how parental sensitivity affected the development of attachment security when compared

with temperament to determine which variables were the most significant contributors to the ADHD diagnosis.

Another major limitation of the study was varying assessment and observation measures in the ECLS-B database, which also created some of the scaling issues. Specifically, the researchers that collected data did not consistently use the same measures or assessment items in each data wave. For example, when choosing parental sensitivity variables, the first data wave used an NCATS item that specifically addressed level of parental sensitivity. However, the NCATS was not used in the data waves that followed, so different parental sensitivity variables had to be chosen, which had different data collection and scaling methods and sometimes contained more parent information than sensitivity. This created problems when trying to run a CFA to create constructs that could be tested in a path analysis. In addition, some of the measures used in the ECLS-B database were based off a single observation by the researcher collecting the data, which may not have fully represented the interactions between parent and child.

Due to difficulties with data analyses, there is a significant threat to external validity as these results cannot be easily generalized to the population. Different results may have been obtained if scaling issues were resolved and the initial path analysis was conducted. In addition, not all available participants with an ADHD diagnosis were included in the final sample due to missing data on the temperament, attachment, and parental sensitivity variables. Therefore, results may not be easily generalized to the entire ADHD population. The actual number of children that did have a reported ADHD diagnosis was also small in comparison to those in the sample that were reported not to have a diagnosis, so this may have affected the validity of the results.

Another limitation was that the ADHD diagnoses were based on parent report, and this author found no documentation that proof of ADHD diagnosis from a medical or mental health professional was required or obtained during the ECLS-B data collection process. This creates a threat to the validity of the reported diagnoses used for the purposes of the present study. Similarly, response bias is a potential threat for the ADHD item and any other items included that were based solely on parent report. In other words, it is possible that some parents may have answered questions regarding their child in what they perceived to be a more favorable manner, interfering with accurate reporting.

Recommendations for Future Research

There are several recommendations for future research based on the current study. The first is that the original analyses utilizing SEM could be attempted after adjusting scaling issues so that unstandardized coefficients could be interpreted more appropriately and directionality of constructs could be tested. By having a more effective model for testing directionality, a more detailed conclusion regarding a directional pathway in the development of ADHD may be reached.

Another direction for research could be to examine the difference between males and females. The distribution of males and females in the final sample was fairly equal, but this distribution could be examined more closely in those that were reported as having an ADHD diagnosis and separated to determine if there are gender effects when examining pathways of temperament, attachment, and parental sensitivity. This may be especially interesting to look at since research indicates that males are more likely to receive the diagnosis than females (Barkley, 2003). In addition to males versus females, it may be interesting to examine effects of race/ethnicity. The ECLS-B did include this data

as part of the demographics for each child, but this variable was not included in the sample used for the present study. Examining differences between these groups may further provide information to create more targeted interventions.

Future research would also benefit from obtaining a larger sample of children diagnosed with ADHD. Instead of relying on parent report for diagnosis, it may be helpful to collaborate with medical professionals to obtain such data so that diagnostic information is more reliable and capable of being generalized to the ADHD population. However, this may be difficult to find in early childhood (ages 0-5) populations, as seen in the present study, as children are not often diagnosed until the primary school years or later.

Lastly, another future research direction would be that described in the original second research question of this study. ADHD is separated into three different subtypes (Hyperactive-Impulsive, Attentive, Combined), and parsing out the pathways to the different subtypes of ADHD would be very interesting to study as part of a preventative treatment model. If aspects of temperament, attachment, and parental sensitivity present themselves differently in each of the subtypes and can be recognized early on, preventative interventions could be geared towards specific traits of children and parents.

Summary

The present study attempted to identify a potential directional pathway between variables of temperament, attachment, and parental sensitivity in the development of ADHD from an early childhood perspective, utilizing data from a nationally representative sample of children followed from birth through Kindergarten. Results indicated that there was a significant relationship between temperament, attachment, and

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parental sensitivity variables with ADHD. However, the relationship was not very strong, which could be contributed to a number of factors such as the type of assessments used in the database or the effect of extraneous variables not included in the study. Given that the attachment variable was the most significant contributor in the present study, the relationship was examined further. Specifically, this study attempted to determine the significance of parental sensitivity in temperament and the development of attachment styles that contribute to ADHD. Results suggested that when looking at the development of attachment, temperament is a more significant predictor of attachment style than parental sensitivity. However, while parental sensitivity did not play as large a role in the development of attachment style, results showed that it did make a difference when included in the model for ADHD.

Overall, information suggests that temperament plays a greater role in attachment style and the later development of ADHD than parental sensitivity. It is possible that parental sensitivity is dependent on more contextual factors than temperament; therefore it may be more difficult to remain stable and more difficult to measure for this same reason. Given that the present study suggests that although parental sensitivity may not be as significant as predicted, it can still play a role in the development of ADHD, implications for practice are that it can be targeted as an area of intervention in early childhood. Specifically, given that temperament was a more significant predictor than parental sensitivity, parent trainings can focus on psychoeducation about temperament styles and how to effectively handle children that present with specific temperaments. The appropriate match between parent and child is still vital for optimal development, therefore incorporating both temperament and match in parent trainings would likely be

very beneficial. Another implication for practice is that early childhood education trainings could include behavior management techniques for specific temperaments in an effort to provide continuity of care between caregivers and settings. School psychologists are in an excellent position to develop and facilitate these training programs. Additionally, optimal prevention and intervention would result from collaboration with other mental health professional that work in family systems. Future research could then focus on the development and implementation of these training programs, along with continued examination of factors associated with ADHD and potential pathways towards ADHD subtypes.

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