ASSESSING THE RELATIONSHIP BETWEEN PARENTING AND EXECUTIVE FUNCTIONING IN PEDIATRIC ANXIETY

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by

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CHAPTER I

INTRODUCTION

Anxiety Overview: Prevalence, Course, & Impairment

Collectively, the anxiety disorders (e.g. generalized anxiety disorder, separation anxiety disorder, social phobia, and specific phobia) are among the most common cluster of pediatric pathologies, ultimately representing a critical area of concern amongst youth populations (Merikangas et al., 2010a; Merikangas, et al., 2010b). Though individual anxiety disorders demonstrate differing statistics, past epidemiological research estimates an overall anxiety lifetime prevalence of 28.8%.

Some degree of anxiety symptomatology is normative throughout life (Muris, 2007). Research on the developmental course of normative anxiety suggests moderate levels of stability, with children in infancy demonstrating anxiety towards imaginary creatures and concrete stimuli within their immediate environment (e.g. monsters, ghosts, strange people, etc.; Gullone, 2000; Muris, 2006). As children age their anxiety begins to encompass worry over anticipatory events and abstract concepts (e.g. worries about social evaluation, behavioral competence, bodily injury, etc.). Developmental hypotheses of anxiety suggest that this normative pattern is mediated by children's cogntive maturation (Muris, 2006). That is, with greater cognitive capacities (e.g. memory, thinking and processing abilities, etc.) children are able to develop and increase focus on more complex worries and thus may also become increasingly vulnerable to pathological anxiety. Beginning research supporting such hypotheses – though sparse- demonstrates a

mediating effect of age and cognitive development on worry elaboration (i.e. increased ability to generate things to worry about and explain why they should be worried about them, increased focus on more complex worries, etc.) - with worry increasingly manifested in middle childhood through late adolescence (Muris, Merckelbach, Meesters, & van den Brand, 2002; Vasey, Crnic, & Carter, 1994).

Within the anxiety disorder literature, approximately 75% of pathological anxiety cases begin during middle childhood, with an overall median age of 11 years old (Kessler, Berglund, Demler, Jin, Merikangas, & Walter, 2005). Middle childhood is a developmental period of transition marking the beginning and end of the primary school years in which children experience critical cognitive, social, and physical development and further attainment of essential life competencies (e.g. independence, understanding of the self, skill mastery, etc.). Thus, increased changes in cognitive capacities during this time – in the context of additional social and physical development – may implicate middle childhood as a particularly salient period in understanding the development of anxiety during this period.

Pediatric anxiety also demonstrates several associated impairments in psychosocial functioning. For example, Verduin and Kendall (2008) assessed peer perceptions amongst youths with and without an anxiety disorder (i.e. generalized anxiety disorder, social phobia or separation anxiety disorder), with results indicating a negative association between peer liking and youth anxiety levels. Additional associated impairments within the literature include lower scores in relation to academic achievement and self-esteem and higher levels of depression and aggression (Grover, Ginsburg, & Ialongo, 2007; Mazzone, Ducci, Scoto, Passaniti, D'Arrigo, & Vitiello, 2007; Mychailyszyn, Mendez, & Kendall, 2010; Swan & Kendall, 2016). Despite this significant impact, several aspects of pediatric anxiety remain elusive - particularly in relation to

the pathogenesis of anxiety (e.g. etiological and maintaining factors). Thus, developing a broader understanding of this aspect to pediatric anxiety may aide in alleviating the degree of impairment and foster development of improved interventions.

Etiological Models of Anxiety

As alluded to thus far, etiological models highlight a number of cognitive and environmental risk factors for the development of anxiety - with such models differing in relational complexity (Brumariu & Kerns, 2010; Esbjorn et al., 2012; Suveg et al., 2010). For example, several models emphasize the role of individual characteristics, such as perceived control (i.e. a cognitive individual characteristic), in anxiety etiology. Models such as these suggest that individuals differ in levels of perceived and actual control, with disparities in these dimensions contributing to the development of anxiety (Weems & Silverman, 2006). Though such models identify important factors in relation to anxiety development, they do not address relational complexities highlighted in developmental theories.

Work in the area of developmental psychopathology hypothesizes multiple causal influences on pathology (i.e. biological, psychological and social contextual) with such processes occurring within a developing person (Cicchetti & Toth, 2009). This suggests that a comprehensive understanding of, for example, anxiety pathology must include consideration of the relationships between multiple domains - including those within (i.e., cognitive functioning) and outside the developing individual (i.e., parenting behaviors). An abundance of theory-driven research supports such conceptualizations, with literature indicating a dynamic interplay between multiple domains during child development (Ayoub & Fischer, 2006; Danforth, Connor, & Doerfler, 2016; Kim-Cohen, et al., 2006; McLaughlin & Lambert, 2017). For example, social cognitive theory examines relationships between cognitive factors, the external environment and

individual behaviors (Bandura, 1978). Within this framework, it is purported that the environment influences individual behavior through cognitive processes. These relationships are also viewed as reciprocal or bidirectional in that the environment impacts the person and the person in turn impacts the environment. Similarly, individual cognitions impact behaviors, with results of these behaviors in turn impacting cognitions.

Though limited (i.e. often theoretically assumed rather than statistically tested; Pardini, 2008), research in the broader developmental field supports bidirectional relationships across several domains (e.g. between parent and child behaviors, environment and child psychosocial problems, cognitive and mental health, etc.; Brooker et al., 2015; Newton, Laible Carlo, Steele, McGinley, 2014; van den Eijnden, Vermulst, van Rooij, Scholte, & Mheen, 2014). Collectively, this suggests that research testing developmental models of child anxiety may benefit from incorporation of varied domains and assessment of the potential bidirectional nature of these processes. Furthermore, developmental psychopathology emphasizes the importance of understanding these relationships within the context of developmental changes (Cicchetti & Toth, 2009). Specifically, abnormalities in these changes are considered to play a direct role in the development of pathology. As such, models of anxiety pathology must also consider those critical developmental changes occurring within the child at specific periods. Considering the increased manifestation of anxiety in middle childhood (in part due to improved cognitive abilities) this may again highlight the importance of research considering the role of cognitive and social changes likely to occur during this time.

One example of a developmental model that has greatly informed my dissertation is Ginsburg and Schlossberg's 2002 model of pediatric anxiety. This model depicts bidirectional relationships between both child (e.g. cognitive distortions, temperament, attachment, etc.) and

parent characteristics (e.g. parenting behaviors, parental anxiety and temperament, etc.) in the context of additional environmental factors (e.g. environmental stressors, demographic and cultural factors, etc.). In comparison to unidimensional and unidirectional models, Ginsburg and Schlossberg's model is advantageous as it considers those numerous components involved in development and their interactive functions. Given the complexity which exists in seeking to understand relationships, employing such an approach to models of pediatric anxiety (i.e. considering various domains, bidirectional relationships, etc.) warrants further investigation and refinement (Muris & Broeren, 2009). For instance, though demonstrating multiple critical relationships, Ginsburg and Schlossberg's (2002) model is limited in the depth of factors considered, specifically with relation to cognitive risk factors (e.g. focusing only on cognitive distortions). Given theories emphasizing multiple causal pathways in development, identification of alternative or complementary factors may be particularly advantageous. Specifically, the interplay between environmental and additional cognitive risk factors (i.e., executive functioning) may enhance the field's understanding of alternative pathways leading to the development of pediatric anxiety. Identification of these pathways may broaden science's conceptualization of pediatric anxiety and inform novel interventions (e.g. modifications to target newly identified pathways). As such, this dissertation aims to expand on previous relational models (specifically bidirectional relationships between environmental and cognitive risk factors) and examine one potential alternative pathway of anxiety development.

Parenting Behaviors

Identification of alternative pathways towards the development of anxiety in youths may be facilitated through (1) further consideration of previously identified risk factors and (2) integration of research from the broader developmental literature. For example, childhood

parenting behaviors (i.e. specific parenting behaviors used to rear youths; Darling & Steinberg, 1993) are one critical environmental risk factor highlighted in previous relational models of child anxiety (Ginsburg & Schlossberg, 2002). Considering a youth's proximity to and dependence on parental figures, it is important to understand how parenting behaviors may contribute to and/or be impacted by disorders with a childhood onset (e.g. pediatric anxiety).

From a normative perspective, positive parenting behaviors are integral to healthy child development (e.g. related to secure attachment, healthy mental and social adjustment, academic achievement, etc.; De Wolff & Ijzendoorn, 2006; Jeynes, 2003; Morris Silk, Steinberg, Myers, & Robinson, 2007; Repetti, Taylor, & Seeman, 2002). Research suggests that parenting behaviors at each child development stage are distinct and critical given various child transitions and necessary parenting adaptations (Bornstein, 2002).There are a variety of different parenting behaviors studied within the broader anxiety literature (e.g. parental modeling, accommodation, monitoring, etc.). This dissertation focuses specifically on parental sensitivity given the extensiveness of anxiety research focused on specific parenting behaviors related to sensitivity (e.g. control/autonomy, warmth, supportive presence).

Parental sensitivity, though relatively stable throughout childhood, requires adaptions throughout development (Behrens, Hart, & Parker, 2012; Belsky, Fearon, & Bell, 2007). Specific parenting behaviors encompassing sensitivity can be varied; however, collectively these behaviors are characterized by socially appropriate, consistent responses to child cues and the ability to engage with a child to provide structured and appropriate environments for proper development (Ainsworth, Bell, & Stayton, 1974). Research and measures of parental sensitivity have often conceptualized sensitivity to include specific, related behaviors of autonomy granting (i.e. encouragement of child's own opinions, choices, perspectives, etc.), warmth (i.e. a parent's

positive affect towards their child), and supportive presence (i.e. a parent's effort to provide their child with emotional support and positive reinforcement; Dallaire & Weinraub, 2005; Kerns, Siener, & Brumariu, 2011; van der Voort et al., 2014). Notably, however, though conceptually appropriate, little research has sought to assess the longitudinal construct validity of these sensitivity measures. This may be a point of particular interest for developmental research given the importance of parental sensitvity across various age ranges and thus the importance of assessing sensitivity longitudinally to be able to more accurately assess its influence on child anxiety.

Within infancy and toddlerhood (when children are perhaps most dependent on their parents), parental sensitivity may be depicted through appropriate responses to nonverbal cues, tactile comfort through hugs, providing and focusing child's attention on stimulating objects, etc. (Bornstein, 2002; Edwards, Liu, 2002). Sensitivity remains important within middle childhood, however particular adaptations are necessary given child increases in cognitive abilities, physical maturation, increased vulnerabilities to stress and the environment, etc. (Collins, Madsen, Susman-Stillman, 2002; DelGiudice, 2018). For example, increased thinking abilities and self-sufficiency during middle childhood (in comparison to younger years), requires adaptive provision of stimulating environments in which parents provide more explanations to their children and increase levels of autonomy to foster beginning independence. Such parenting behaviors also require additional adjustment into adolescence as children face new transitions of puberty, self-exploration, and increased exposure to peers (e.g. new expressions of warmth between parent and adolescent, increased levels of autonomy, etc.; Steinberg & Silk, 2002).

Deviations from these adaptive parenting behaviors may result in difficulties within child development, such as pathological anxiety. Though research limitations preclude full

understanding of the role and direction of this relationship, it is hypothesized that maladaptive parenting behaviors maintain a bidirectional role in anxiety pathology. As noted previously, the most commonly studied parenting behaviors within the anxiety literature are several of the behaviors subsumed under maternal sensitivity (e.g. autonomy and warmth). For example, autonomy granting is one parenting behavior hypothesized to be related to pediatric anxiety. Notably, within the anxiety literature, when autonomy is assessed apart from maternal sensitvity it is often included under the broader construct of parental overcontrol (McLeod, Wood, & Weisz, 2007). Parental overcontrol is defined as behaviors aimed at directing children to behave, act or think in a particular manner, ultimately lowering child autonomy(van der Bruggen, Stams, & Bögels, 2008). From an etiological perspective, parental overcontrol may communicate to a child that he or she is unable to effectively manage distressing or novel situations and simultaneously decrease opportunities for a child to refute such beliefs. Such cognitions and lack of opportunity may ultimately contribute to and maintain child anxiety symptoms (Hudson & Rapee, 2004). Bidirectionally, resulting child anxiety symptoms may also further impact parenting behaviors . For example, parental overcontrol may also increase a child's perception of environmental threats, circularly limiting exposure to situations for adapting necessary coping skills, thus continuing the child's need for higher levels of parental control (Barlow, 2002).

Similarly, low levels of parental warmth and supportive presence are also implicated in pediatric anxiety development. One proposed hypothesis is that low parental warmth or supportive presence may communicate to a child that he or she lacks a support system and that the world is unsafe (Drake & Ginsburg, 2012). Such cognitions may then decrease the likelihood of a child engaging in particular activities that may refute such beliefs - which may ultimately

contribute to and/or increase a child's anxiety levels. For example, a child who receives little encouragement or positive reinforcement for engaging in anxiety provoking tasks (e.g. difficult or novel activities) may begin to think that he or she should avoid these tasks because they are unachievable without support. As a result of this avoidance, the child does not get the opportunity to see that such tasks are actually achievable and he or she continues to have anxiety with difficult or novel activities. Bidirectionally, children with anxiety may at times be perceived by their parents as more difficult . For example, when introduced to novel or anxious situations these children may have a harder time being soothed or comforted by their parents. These difficulties may then increase parent's irritability or agitation, contributing to future lower levels of warmth and support (Rapee, 2001).

Available research (i.e. individual studies, narrative reviews, meta-analyses) indeed supports a relationship between maladaptive parenting behaviors and pediatric anxiety (Bögels & Brechman-Toussaint, 2006; Degnan, Almas, & Fox, 2010; Drake & Ginsburg, 2012; Ginsburg, Siwueland, Masia-Warner, & Hedtke, 2004). Several longitudinal studies have demonstrated a predictive relationship between the composite of parental sensitvity and later anxiety symptoms (Degnan, Henderson, Fox, & Rubin, 2008; Kok, et al., 2013; Warren & Simmens, 2005). For example, in a 2005 study Dallaire and Weinraub examined several family correlates (i.e. maternal sensitvity, mother child attachment, maternal anxiety) of separation anxiety symptoms in an ethnically diverse sample of 99 parent-child dyads. Maternal sensitvity in this study was assessed using a mother-child interaction task at 6, 15, 24 and 72 months. Findings indicated that higher levels of maternal sensitvity at each time point were correlated with lower levels of anxiety symptoms at first grade. Similarly, a more recent 2014 study assessed maternal sensitivity, using an interaction task, and internalizing symptoms (i.e. anxious-depressed

symptoms) amongst 160 adopted children from infancy to adolescence (van der Voort et al., 2014). Results indicated that more sensitive parenting in early and middle childhood predicted less behavioral inhibition in middle childhood and fewer internalizing symptoms in adolescence. Together, this literature supports the importance of parental sensitvity in anxiety development – perhaps above and beyond the impact of genetics.

Further meta-analytic reviews of specific sub behaviors of parental sensitivity (e.g. autonomy, warmth, support) have also demonstrated strong evidence supporting this claim. In a 2007 meta-analysis McLeod, Wood and Weisz assessed the relationship between anxiety and several parenting behaviors including parental control and rejection amongst children 2 -18 years old. Within this analysis, parental overcontrol was divided into two sub behaviors including overinvolvement (i.e. parental interference with children's normative expressions of autonomy, excessive restriction, etc.) and autonomy granting (i.e. encouragement of child's own opinions, choices, perspectives, etc.). Parental rejection was also divided into three sub behaviors, such that parental warmth was considered a dimension of rejection. Additional sub behaviors of rejection included parental withdrawal (i.e. lack of involvement and interaction between parent and child – perhaps reflective of low supportive presence), and aversiveness (i.e. parental hostility towards the child). Results indicated that parenting explained 4% of the variance in pediatric anxiety, with more negative parenting associated with increased child anxiety ($g = .21$). This effect was moderated by age, with older samples demonstrating larger effects (e.g. school age children versus preschool samples). Further analysis assessing the moderating impact of specific parenting behaviors demonstrated a significant relationship between anxiety and dimensions of control (i.e. overinvolvement [$g = .23$] and autonomy granting [$g = .42$]) and rejection (i.e. parental warmth [$g = .06$], withdrawal [$g = .22$] and

responsiveness [g = .23]). Such findings are corroborated in additional research as well. For example, Yap's 2014 meta-analysis (focused on individuals 12-18 years of age) demonstrated a significant negative relationship between parental warmth and anxiety (r = .306). Further within this review a significant positive relationship was also indicated between anxiety and parental withdrawal (r =.308) - a subdimension of rejection identified in McLeod's 2007 review. Again, such research supports the role of parental sensitivity in pediatric anxiety.

Interestingly, consistent with normative development, this research also suggests that some components of parental sensitivity may be more or less important for anxiety development, depending upon youth age. For example, research demonstrates larger effects of parental overcontrol in older samples (e.g. school age children) compared to samples of early childhood (e.g. preschool samples) in which some studies have found no effect (Möller, Nikolić, Majdandžić, & Bögels, 2016; van der Bruggen, Stams, & Bögels, 2008). Similarly, effect sizes of parental warmth have varied amongst various meta -analyses. Within their review, Yap and colleagues (2014) identified several plausible reasons for this discrepancy including differences in sample age (e.g. parental warmth may have a larger impact in older children compared to early childhood) and study methodology (e.g. differences in coding of parenting measures between the meta-analyses; use of retrospective and longitudinal studies in Yap's review compared to focus on cross sectional studies in McLeod's review). Such conjecture is corroborated by further moderating analyses indicating stronger effect sizes for parenting behaviors in older children compared to preschool children (McLeod, et al., 2007). Collectively, this highlights the potential importance of continued longitudinal review of parenting behaviors in child anxiety (to determine differences in effect sizes between age groups) and may also highlight the increased importance of certain parenting behaviors in later years (e.g. middle childhood, adolescence) as

conduits by which anxiety may develop. As such, further exploration of this relationship between parenting behaviors and anxiety development is warranted – with one avenue of research being further exploration of mechanisms by which this relationship unfolds.

Executive Functioning

While parenting behaviors may indeed impact anxiety development through a number of factors identified in previous models (e.g. child and environmental characteristics), one potential cognitive mechanism overlooked in existing models of youth anxiety is executive functioning. Executive functioning is defined as higher order neurocognitive processes underlying goal directed behaviors (Suchy, 2009). Though debate exists regarding exact domains of executive functioning, evidence highlights four main components including planning (i.e. ability to organize and follow a sequence of steps for a particular goal; Owen, 1997), cognitive flexibility (i.e. ability to switch between tasks as necessary for a particular goal- also known as set shifting; Ionescu, 2012), inhibitory control (i.e. ability to stop a prepotent response; Williams, Ponesse, Schachar, Lohan, & Tannock, 1999), and information updating and monitoring (i.e. ability to manipulate information, including monitoring, coding and revising – also known as working memory; Miyake et al., 2000). Identified components of executive functioning demonstrate an intricate relationship as components are believed to work both independently and interdependently (e.g. components have independent functions as well as often work together to complete higher order tasks; Miyake et al., 2000).

Within the context of normative development, executive functioning appears to emerge in childhood and develops with age and brain maturation (e.g. frontal lobe development, brain myelination; De Luca et al., 2003; Hughes, 2011; Welsh; 1991). For example, research suggests that planning emerges around 4 years old (e.g. able to plan with simple and familiar tasks),

develops rapidly between 7 and 10 years old (e.g. improvements in multistep planning and efficiency), and gradually increases in complexity into adolescence (e.g. increased planning flexibility in response to varying demands of a task; Anderson, 2002; Berk & Meyers, 2016). Similarly, children begin to exhibit rudimentary cognitive flexibility between 3 and 4 years old (e.g. able to switch between tasks, but have difficulty when rules become more complex), with this function rapidly improving between 7 and 9 (e.g. increased control and efficiency in selective and flexible attention, flexibility in the presence of distraction) and continuing development into adolescence as well. Following this trajectory, with relation to inhibition, though infants younger than 9 months demonstrate difficulty controlling their attention, by approximately 12 months children increasingly begin to improve inhibition of prepotent responses, demonstrating longer attention span and ability to shift attention, with this skill improving with age. Lastly, working memory also emerges during the preschool years with studies suggesting that children may begin to reach adult levels of working memory performance between 10 and late adolescence- depending on task complexity (e.g. increases in amount of information successfully held in the mind, able to combine information into more complex and efficient representations; Luciana, Conklin, Hooper, Yarger, 2005). Collectively, the trajectories described support childhood as a critical period of executive functioning development. And perhaps more importantly, highlights the continued importance of later developmental periods, given significant gains demonstrated in the middle childhood and adolescent years (though a large portion of developmental research focuses on early childhood; Best, Miller & Jones, 2009).

Within the context of non-normative development, it is plausible that pediatric anxiety may be related to a deviation from normal executive functioning processes. Current hypotheses suggest that pathological anxiety may stem from the inability of executive functioning to inhibit

limbic responses (e.g. executive functioning related brain domains such as the prefrontal cortex may be impaired and unable to control fear responses from the amygdala; Martin, Ressler, Binder, Nemeroff, 2009; Taylor &Whalen, 2015). For example, research suggests, that all young children exhibit interpretational bias towards threat (e.g. interpreting ambiguous stimuli as threatening); however, with increasing experience and executive functioning development, children learn to inhibit automatic threat interpretations (Field & Lester, 2010). Within the context of anxiety symptomatology, hypotheses posit that though such biases diminish with normative development, anxious youths continue to demonstrate interpretation biases due to poor executive functioning control (e.g. inability to inhibit automatic threat response and deflect attention away from threatening stimuli, etc.; Eysenck, Derakshan, Santos, & Calvo 2007; Rebega & Benga, 2013; Susa, Pitică, Benga, & Miclea, 2012; Taghavi, Moradi, Neshat-Doost, Yule, & Dalgleish, 2000).

Though relatively limited and at times conflicting - several studies indeed demonstrate a significant relationship between pediatric anxiety and differential executive functioning performance (Ng & Lee, 2015; Richards, French, Nash, Hadwin, & Donnelly, 2007; Toren et al., 2000; Visu-Petra, Stanciu, Benga, Miclea, Cheie, 2014). For example, Ursache and Raver (2014) examined executive functioning in at risk youths age 9-12, with findings indicating that higher trait anxiety predicted lower performance on measures of working memory and inhibitory control (i.e. Heart and Flowers Task and the Colour-Word Stroop Task). Somewhat similarly, Murphy and colleagues (2017) assessed executive functioning, via an automated neurocognitive battery, in a transdiagnostic sample of youths exhibiting varying degrees of anxiety symptoms. Results indicated poorer working memory performance, yet increased inhibition and planning (despite no difference in overall planning accuracy) amongst youths with marked anxiety

symptoms compared to youths with minimal and no anxiety symptoms. Notably, though planning outcomes at first glance may appear counterintuitive, it is plausible that increased planning (with no added benefit) may still add to difficulties by contributing to lowered efficiency in relation to usage of one's time (either from spending longer time than necessary planning or needing longer time to come to the same conclusions) and may also contribute to additional impairment outside of the planning and organization domain (e.g. limited time to devote to different activities due to increased time planning/thinking about one area). In another 2017 study, Rodrigues and colleagues corroborated such findings by demonstrating poorer planning efficiency amongst children diagnosed with an anxiety disorder. Collectively, such research highlights executive functioning as an understudied but potentially critical factor for understanding the etiology of child anxiety and appears to support the inclusion of this domain within modern conceptualization of anxiety development.

Integration of Parenting Behaviors and Executive Functioning: Broader Developmental Literature

Interestingly, research within the broader developmental literature has begun to demonstrate a strong relationship between executive functioning and parenting behaviors. Social cognitive theorists hypothesize that environments created through parenting behaviors may affect youths' neurobiology and/or brain structure (e.g. executive functioning) in that appropriate parenting may create a social environment conducive to practicing regulatory skills, thus aiding development of the associated brain structure. Burgeoning research supports such hypotheses, with several parenting behaviors and characteristics (e.g. parental sensitivity, maternal mental health, family socioeconomic status) predicting early childhood executive functioning performance (e.g. planning, inhibitory control, cognitive flexibility; Bernier et al., 2010; Bernier,

Carlson, Deschenes, & Matte-Gagne, 2012; Fay-Stammbach, Hawes, & Meredith, 2014; Hughes, Roman, Hart, & Ensor, 2013; Lucassen et al., 2015; Merz, 2017; Sarsour et al., 2011).

In a 2017 meta-analysis, Valcan and colleagues investigated the relationship between parenting behaviors and several domains of executive functioning in early childhood. Parenting behaviors in this study were organized into three groups: positive (e.g. maternal sensitivity), negative (e.g. intrusive, detachment) and cognitive behaviors (e.g. scaffolding, cognitive stimulation). Forty-two longitudinal studies were assessed, with overall analyses indicating a significant relationship between executive functioning and positive, negative, and cognitive parenting behaviors ($r = .25, -.22, .20$ respectively). Interestingly, though cognitive behaviors demonstrated a stronger effect in younger children, positive and negative behaviors indicated a stable association across ages, suggesting that these are critical stable relationships across early childhood. Similar relationships are also indicated in studies of broader age ranges in which children from deprived institutions are compared to normative samples. For example, Merz and colleagues (2011) assessed executive functioning development in children (2-18 years old) adopted from Russian orphanages characterized by low levels of sensitvity (i.e. low levels of warmth, few opportunities for child directed activities with responsive caregivers, etc.). Though significant findings were not demonstrated for children 2-5 years old, assessment of children 6-18 years old indicated that children adopted after 18 months of age demonstrated poorer executive functioning (e.g. deficits in planning, working memory, inhibition) compared to children adopted before 18 months of age and normative samples who had never been institutionalized. Collectively, this suggests that parenting behaviors such as sensitivity may play a critical role in children's development of self-regulatory capacities (i.e. executive functioning).

Integration of Parenting Behaviors and Executive Functioning: Anxiety

Interestingly, implications highlighted in the broader literature, may significantly contribute to further understanding relationships between parenting behaviors, executive functioning and anxiety development. Specifically, this may suggest that executive functioning mediates the relationship between parenting behaviors and anxiety symptoms. That is, while positive parenting behaviors may facilitate normative development of executive functioning, maladaptive parenting behaviors (e.g. low autonomy granting, supportive presence and warmth) may limit executive functioning development, thus contributing to increased risk for anxiety pathology. Similar to reciprocal relationships depicted in previous models, it is equally plausible that this association is bidirectional, in that youth executive functioning may further elicit particular parenting behaviors (i.e. whether adaptive or maladaptive), thus creating a cyclical contribution to anxiety vulnerability.

It is worth noting that previous research assessing relationships between parent behaviors and executive functioning has done so largely during early childhood (i.e. 1-6 years old). Though early childhood indeed represents a critical parenting period and the beginning of executive functioning development, discussed research suggests that executive functioning skills continue to develop throughout childhood (into adolescence or adulthood), and parenting demonstrates critical and distinct periods throughout later years as well (e.g. Best & Miller, 2010; Brocki & Bohlin, 2004; Collins et al., 2002; Karbach & Unger, 2014). As such, parenting behaviors likely demonstrate continued effects on executive functioning development beyond early childhood, warranting further investigation in the later years. To that end, middle childhood may be a particularly salient period for assessing this relationship in anxiety development given several critical markers of this time period including (1) increased vulnerabilities to anxiety, (2)

distinct and increased effects of parental sensitivity on anxiety compared to early childhood and (3) continued development of critical executive functioning components related to anxiety.

Current Study

Though prior studies have assessed the joint impact of several cognitive factors (e.g. locus of control, threat appraisal, outcome expectancy) and parenting behaviors (e.g. socialization, family discussion) on pediatric anxiety development, such studies fail to incorporate executive functioning domains specifically and include no assessment of bidirectionality in examining these relationships (Brooker et al., 2014; Chorpita, Brown, & Barlow, 1998; Hadwin, Garner, Perez-Olivas, 2006). What is more, such research is lacking in relation to the specificity of parenting behaviors examined, excluding several critical domains shown to be specifically related to anxiety symptoms and shown to predict general executive functioning development (i.e. autonomy, warmth, supportive presence, etc.). As such, in addressing these gaps and informed by the model posited herein, the current study seeks to examine the longitudinal reciprocal relationships between executive functioning (i.e. planning), parenting behaviors (i.e. maternal sensitivity as measured through autonomy, supportive presence and hostility) and anxiety symptoms across middle childhood (i.e. 6-12 years old). Specific aims and hypotheses are as follows:

Aim 1. Examine the longitudinal relationships between maternal sensitivity, planning and anxiety development across middle childhood.

Aim 1a. Examine the cross lagged relationships between maternal sensitivity and planning and planning and anxiety across middle childhood.

Hypothesis 1: Based on research demonstrating stability in maternal sensitivity, executive functioning, and anxiety symptoms across middle childhood (Belsky et al., 2007; Best

& Miller, 2010; Kerns, 2011), I hypothesized that there would be significant autoregressive effects for these constructs. Specifically, I expected earlier levels of maternal sensitivity, planning, and anxiety to predict later levels of maternal sensitivity, planning and anxiety respectively.

Hypothesis 2: Given cross sectional research demonstrating relationships between maternal sensitivity, planning and anxiety, I hypothesized that there would be significant within time correlations between these constructs (Bögels & Brechman-Toussaint, 2006; Murphy et al., 2017).

Hypothesis 3. Based on previous research supporting a longitudinal relationship between parenting behaviors and executive functioning (Merz, 2010; Valacan, 2017), I hypothesized that there would be a positive relationship between maternal sensitivity and planning. That is, I expected higher levels of maternal sensitivity to predict higher levels of planning efficiency and lower levels of maternal sensitivity to predict lower levels of planning efficiency.

Hypothesis 4: Given previous –albeit limited- research demonstrating a relationship between planning and anxiety symptoms (Murphy et al., 2017, Rodrigues et al., 2017), I hypothesized a negative relationship between planning and anxiety. I expected higher levels of planning efficiency to predict lower levels of anxiety and lower levels of planning efficiency to predict higher levels of anxiety.

Hypothesis 5: Based on social cognitive theory positing bidirectional relationships between behavioral, cognitive and environmental influences (Bandura, 1986), I also hypothesized that there would be reciprocal effects between maternal sensitivity and planning and planning and anxiety. Specifically, higher levels of planning would also predict higher levels

of maternal sensitivity and lower levels of planning would predict lower levels of maternal sensitivity. Differentially, higher levels of anxiety would predict lower levels of planning efficiency and lower levels of anxiety would predict higher levels of planning efficiency.

Aim 1b. Examine the potential mediating effect of planning in the relationship between maternal sensitivity and anxiety development.

Hypothesis 6: Based on research demonstrating predictive relationships between maternal sensitivity and planning and planning and anxiety (Lucassen et al., 2015; Murphy et al., 2017), I hypothesized that planning would be a significant mediator in the relationship between maternal sensitivity and anxiety.

Aim 1c: Assess overall fit of my theoretical model.

Hypothesis 7: I hypothesized that my final model depicting reciprocal cross lagged relationships between maternal sensitivity and planning and planning and anxiety would demonstrate the strongest model fit, with a significant mediation.

CHAPTER II

Methods

Participants

The current study utilized secondary data analysis of the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care. Families (i.e. children and their parents) were recruited across 10 American states as part of a larger study assessing the impact of child care history on youth psychological development. In total, 1,364 families were assessed across four phases of data collection beginning in 1991 - from the time the target child was 1 month to 15 years old (see NICHD Early Child Care Research Network, 2001 for a full description of data collection and procedures). Given available time points in which measures of interest overlap, this study used data collected within phases 2 and 3 (i.e. data collected in the 1st, 3rd, and 5th grade (see Measures section for considerations of measure selection). Families were excluded from the overall study if (a) mothers were younger than 18 at the time of the target child's birth, (b) families planned to move from the recruitment area (c) target child was born with disabilities (d) mother did not speak English, or (e) mother engaged in substance abuse. Inclusion within the present sample required each participant to have at least one data point (from the specified time points above) for each main measure of interest (i.e. anxiety, parenting and executive function). Participants (N = 257) failing to meet this inclusion criteria were excluded from present analyses. The final sample consisted of 1,107 child-parent dyads. Children were primarily White (91.8%) with approximately half male (50.6%) and half female participants (49.4%). Parents (i.e. mothers) were primarily White (84.1%) with an educational

background of some college or above (71.9%) and an average income to needs ratio of 3.95. See Tables 1 and 2 for a more detailed description of final sample characteristics.

Measures

Anxiety Symptoms

Child Behavior Checklist (CBCL; Achenbach, 1991*):* The CBCL is a 112-item parent report (i.e. mother, father, and/or other guardian), rated on a 0-2 scale, designed to assess social competence and problem behavior of children 4-18 years old. The larger NICHD dataset contains CBCL data collected from multiple sources, however given several analytic considerations (i.e. limited sample of CBCL data collected from fathers or other parental guardians; larger sample preferred in data analyses to partially compensate for overall measurement error; desirability for consistency in parental figure used across measures), the current study only used CBCL mother report. Research using the CBCL demonstrates strong reliability and validity (Achenbach & Edelbrock, 1983; Dutra, Campbell, & Westen, 2004; Ivanova et al., 2007). Within the current study, the CBCL was administered at Grades 1, 3, and 5. Based upon previous research (Wadsworth, Hudziak, Heath, & Achenbach, 2001), anxiety in this study was assessed using a 12-item scale, including 8 items from the CBCL Depression/Anxiety scale (Items 31, 32, 34, 45, 50, 71, 89, and 112) and 4 additional CBCL items (Items 9, 29, 30, and 66). An anxiety score for each participant was calculated from the mean of these items, with higher scores indicating higher levels of anxiety. Previous research using this anxiety scale demonstrates adequate internal consistency (Bosquet & Egeland,2006; Feng, Shaw, & Silk, , 2008; Kerns, Siener, & Brumariu, 2011). Chronbach's alpha within the current sample was adequate at all time points (α = .691 at 1st grade; α = .744 at 3rd grade; α = .734 at 5th grade).

Parenting Behaviors (i.e. Maternal Sensitivity)

Mother-Child Interaction Task: The Mother Child Interaction Task is a 15-minute semi structured interaction between mother and child, designed by study developers to assess quality of the parent-child relationship. Based on discussed research implicating specific parenting behaviors in anxiety development, parenting behaviors targeted in the current study included maternal hostility, respect for child's autonomy (a sub-domain of parental control) and supportive presence. High levels of hostility in this task may reflect a mother's rejection of the child, expressions of anger, low support, etc. High respect for autonomy may be indicated by a parent acknowledging and encouraging the child's perspectives, input, etc. High levels of supportive presence may reflect a mother's continuous effort to provide her child with emotional support and positive reinforcement. Based on previous literature, these three parenting behaviors were aggregated into a latent factor to create the overall latent construct of maternal sensitivity (i.e. providing emotional support during tasks, acknowledging accomplishments, etc.). Use of latent constructs are advantageous given their ability to control for random measurement error (Kline, 2016). Higher levels of maternal sensitivity were indicated by higher respect for autonomy and supportive presence, and lower hostility. The mother-child interaction task was administered in Grades 1, 3 and 5 and interactions during these tasks were videotaped and scored on a 7-point scale by trained coders for each parenting domain. Tasks at each time point were developmentally tailored to assess desired constructs, however variables and coding systems were identical at each time period. Additional research demonstrates success in using these tasks across time points (Belsky, Fearon, & Bell, 2007; Kerns, Siener, & Brumariu, 2011). What follows is a brief description of mother-child tasks in the 1st, 3rd and 5th grade.

First Grade: Interaction activities in the 1st grade consisted of two tasks the child was unable to solve independently -thus requiring parental guidance - and one task encouraging play between the mother and child. In the first task mother and child were given one Etch-A-Sketch and were asked to draw a picture together of a house and tree on the screen. The mother was instructed to only control the vertical knob of the Etch-A-sketch and the child was instructed to only control the horizontal knob. This task required good coordination between mother and child for successful completion of the drawing. In the second task mother and child were given patterned blocks to fill in a geometric figure. This task had a high level of difficulty and required mother assistance for successful completion as well. In the final task, mother and child completed the "one up/one down" card game. In this game mother and child successively laid their cards face up on a growing pile of cards and raced to slap and claim all the cards if someone laid a card that was one number higher or one number lower than the previous card. Given the potential emotional nature of this activity (e.g. excitement or frustration) this task provided an opportunity for observation of maternal and child affect.

Third Grade: Interaction activities in the third grade consisted of two tasks, including one discussion task and one problem-solving task. In the first task mother and child were jointly presented with three piles of colored cards, with each pile containing either rules for kids (e.g. "kids should be able to eat what they like"), rules for parents (e.g. "parents should decide who their children can be friends with"), or difficult decisions (e.g. "sometimes it's ok to tattle"). Mother and child chose one card from each pile to discuss together. In the second task mother and child were given a list of errands to complete in a fictional town. Pairs were presented with a map of the town and were asked to plan the best route to complete all the errands.

Fifth Grade: Interaction activities in the fifth grade also consisted of two tasks, including a discussion and problem-solving task. In the discussion task mother and child were presented with a stack of 22 cards containing family issue topics (e.g. bed time, television, swearing, etc.). Pairs were asked to choose their top three family issues and discuss potential solutions. In the problem-solving task, mother and child were presented with various raw material and were asked to use this material to build a bungee jump for a raw egg.

Executive Functioning (i.e. Planning/Problem Solving)

Tower of Hanoi (TOH, Welsh, 1991*):* The TOH is a 6-problem task used to assess planning and problem-solving skills. Previous research using the TOH demonstrates construct validity in youth samples. Within the larger study, the TOH was administered in Grades 1, 3 and 5. In this task children were presented with three rings of different diameters and colors on three vertical pegs. The rings were presented in an initial configuration and participants were asked to move the rings to create one tower in which all the rings were ordered by size (i.e. largest ring on the bottom and smallest ring on the top). Children were asked to construct this tower in the fewest number of moves while simultaneously following three rules (i.e. (1) only one ring can be moved at a time, (2) larger rings cannot be placed on smaller rings, and (3) a ring must be on a peg or in the participant's hand). Children were given a maximum of six trials for each problem and received a score from 0 to 6 for each tower built. The primary outcome measure for this task is planning efficiency (i.e. calculated by summing scores on individual problems), with higher scores indicating greater efficiency. With relation to previously discussed conceptualization of executive functioning, this outcome represents the executive function domain of planning.

Of note, several additional cognitive tasks in the larger NICHD dataset were also considered as measures of executive functioning in the current study (i.e. Continued Performance

Task [CPT] and Woodcock Johnson Psycho-educational Battery- Revised [WJ-R]). I decided against including the CPT given its primary focus on sustained attention rather than higher order executive functioning abilities (e.g. principal component analyses in prior research indicating majority factor loading in sustained attention rather than flexibility, shifting; Mirsky et al., 1991). Similarly, of the WJ-R subtests administered in the larger study (i.e. Memory for Names, Memory for Sentences, Picture Vocabulary, Verbal Analogies, Letter-Word Identification, Word Attack, Applied Problems, Passage Comprehension, Calculation), no tasks measured executive functioning skills directly (Schrank, 2005). As such – of the data available- only the TOH was deemed to be an appropriate measure of executive functioning and administered at multiple time points (i.e. 1st grade, 3rd grade, 5th grade) during the course of the larger study.

Covariates (i.e. Child IQ, Maternal Anxiety)

Child IQ

Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). The WASI is a brief clinician administered assessment of overall cognitive ability and is used as a measure of IQ in individuals 6 years old and above. In this study, the WASI was administered to children in the 4th grade. This measure consists of four individual subscales assessing nonverbal and verbal reasoning, processing of visual information, and verbal understanding. Scores for these subscales were combined to create a full-scale IQ, with higher scores indicating higher IQ. Past research using the WASI demonstrates construct validity in child samples (Canivez, Konold, Collins, & Wilson, 2009).

Maternal Anxiety

State-Trait Anxiety Inventory (STAI; Spielberger, Gorusch, Lushene, Vagg, & Jacobs, 1983). The STAI is a self-report designed to assess anxiety. For the larger study, items were

modified to ask mothers to rate how anxious they felt "during the past week" rather than "right now". Mothers completed this measure at the 5th grade time point. Items were rated on a 4-point scale and summed for a total score, with higher scores indicating higher anxiety. Research utilizing the STAI demonstrates good validity and reliability (Barnes, Harp, & Jung, 2002; Novy, Nelson, Goodwin, & Rowzee, 1993). Chronbach's alpha within the current sample was adequate ($\alpha = .86$).

Socioeconomic Status

Income Needs Ratio. Mothers provided family income information during home interviews at each time point of data collection. Total family income was divided by the U.S. Census poverty threshold for the appropriate family size to create an income needs ratio for each child-parent dyad. This final ratio was an indicator of family's socioeconomic status with higher numbers indicating higher status.

Maternal Education

Mothers provided their number of years of education received during a home demographic interview when their child was 1 month old.

Health Status

Child Health Condition Follow-up. The Child Health Condition Follow-up Questionnaire was a set of questions designed by the larger study to assess child's health status (e.g. pink eye, tonsillitis, ear infections, intestinal problems, allergies, chronic diarrhea, asthma . pneumonia, , etc.). Mothers completed this questionnaire during a home interview at the 1st grade time point. Within this measure, mothers responded "no", "yes", or "don't know" to several questions inquiring whether their child had experienced specific health conditions in the past 12 months or at least 3 months in the child's life time (e.g. "In the past 12 months did CHILD have any kind of

food or digestive allergy? Has CHILD had any kind of food or digestive allergy for at least 3 months in CHILD's lifetime?) . Only those conditions indicated to be related to anxiety (via the broader literature and correlation analyses) were examined as potential covariates in the present study (i.e. intestinal problems, allergies, chronic diarrhea, asthma, respiratory problems; see Results section for further explanation and analysis).

Procedure

Approval for the current study was granted by the Kent State Institutional Review Board. Data were collected by the NICHD research team at several time points in several settings (i.e. lab, home, phone, elementary school, and child care settings). Main measures of interest in the present study were completed in Phases 2 and 3 (i.e. 1st, 3rd and 5th grade). The TOH was completed in the laboratory at all grades and the CBCL and Mother Child Interaction Tasks were completed by child's mother in either the laboratory (CBCL: 1st grade; Interaction Task: 3rd Grade) or home setting (CBCL: 3rd & 5th grade; Interaction Task: 1st & 5th grade). Covariate measures were also completed in the home (STAI at all time points, socioeconomic status, maternal education, Child Health Condition Follow-up) or laboratory (WASI).

Data Analytic Plan

Preliminary analyses: Preliminary analyses were conducted in SPSS to assess for statistical assumptions (i.e. normality, multicollinearity), missing data patterns and potential covariates. With relation to sample size, previous rule of thumb and current research addressing these rules, suggest that samples of 200 or more are considered the requisite, with this number deemed as conservative (Iacobucci, 2010). The current sample (N = 1,107) exceeds this number.

Factorial Invariance of the Latent Maternal Sensitivity Construct. An important assumption of assessing relationships with longitudinal analysis is factorial invariance of the

constructs. Factorial invariance assumes that the construct measured is equivalent across time (i.e. construct validity; Little, 2013; Widaman, Ferrer, & Conger, 2010). Constructs with multiple indicators (i.e. latent variables) can be tested for factorial invariance using confirmatory factor analysis and comparison of increasingly restrictive models. As such, confirmatory factor analyses were used in Mplus version 7.11 to assess factorial invariance of the latent maternal sensitivity construct (Muthen & Muthen, 2012). See Figure 1 for a visual depiction of the construct model. First, an initial configural invariance model included only autoregressive pathways between maternal sensitivity at each time point to assess patterns in construct indicator loadings over time (i.e. supportive presence, autonomy, and reverse coded hostility). Second, a weak invariance model equated loadings of the construct indicators across time. Third, a strong invariance model equated both construct indicator loadings and intercepts. Model chi squares (χ^2) were compared to assess whether increasing restrictions indicated a poorer or improved model fit. Given specific aims of the current study (i.e. assessing relationships across time rather than comparing means), a model meeting weak invariance is sufficient to run primary analyses (Little, 2013).

Aim 1 (a-c). Examine the longitudinal relationships between maternal sensitivity, planning and anxiety development across middle childhood. In examining the relationships hypothesized herein, I assessed improvements in model fit over a series of competing path analysis models using Mplus. Path analysis models are particularly advantageous compared to other longitudinal methods (e.g. latent growth curve modeling) given their ability to assess for relationships across time, mediations and bidirectional relationships (Selig & Little, 2012). First, an initial base model included only within time correlations and auto-lagged pathways to assess within time relationships and stability in the constructs over time (Aim 1a Hypotheses 1 and 2;

See Figure 2, Model 1). This model included the latent construct of maternal sensitivity, and manifest constructs of planning and anxiety at all three time points as well as appropriate covariates. A second model included auto-lagged as well as cross-lagged pathways to assess direct relationships between constructs over time (Aim1a Hypotheses 3 and 4; See Figure 3, Model 2). Mediation in this model was tested specifically using the MODEL INDIRECT in MPlus, with significance of indirect pathways between parenting and anxiety supporting a mediating relationship (Aim 1b Hypothesis 6). A third model included stability coefficients, direct and indirect effects and reciprocal paths to assess bidirectionality in relationships (Aim 1a Hypothesis 5; See Figure 4, Model 3). All models were evaluated using the model chi square (χ^2), confirmatory fit index (CFI), and root mean square error (RMSEA). Previous research (vanDulmen et al., 2012; Sweeting, Young, West, & Der, 2006) suggests the following criteria for assessing model fit: (1) a non-significant χ^2 test – though given sensitivity of this value to sample size a significant χ^2 may also indicate reasonable model fit, (2) a CFI value of .90 or higher and (3) a RMSEA value of less than .08, with values between .05 and .08 suggesting a reasonable fit and values less than .05 suggesting a good fit. Improvements in model fit were tested by comparing chi-square differences of the different models, with a change p value of less than .05 indicating significant model improvement (Aim 1c Hypothesis 7).

CHAPTER III

Results

Preliminary Analyses

Normality. Normality of the sample was assessed through exploration of skewness and kurtosis in SPSS. Based upon cutoff criteria of Curran, West, and Finch (1996; normality indicated by skewness ≤ 2 and kurtosis ≤ 7), the current sample demonstrated minor deviations from normality. Specifically, hostility in the 1st grade indicated a skewness of 2.135 and hostility in the 3rd grade indicated a skewness of 2.351 and a kurtosis of 7.930. Best practices of longitudinal analyses do not recommend transformation of non-normal variables given (1) the limited impact of transformations on model results and (2) the potential difficulties of interpreting transformed latent variable scores and associations (Little, 2013). Rather it is recommended to use more robust estimation procedures. As such, maximum likelihood estimation with robust standard errors (MLR) were utilized for all models in Mplus. MLR provides standard errors and a chi-square test statistic robust to non-normality. More specifically, this estimator is asymptotically equal to the Yuan-Bentler T^2 test statistic (Yuan & Bentler, 2000) and provides an extension of the Satorra-Bentler mean-adjusted chi-square that can include missing data (Finney & Distefano, 2013). When using these estimates, model chi square differences must be calculated using a scaled chi-square value (Satorra & Bentler, 2001). These scaled values were used in the present analyses.

Multivariate and univariate outliers. Outliers were assessed through inspection of Mahalanobis distances in SPSS (i.e., the squared distance in standard units of an observation

from the study variable mean). Previous research suggests outliers may be indicated by data points 3 or more standard deviations in Mahalanobis distance. Assessment of univariate distances demonstrated several outlying data points. However, further review of these points suggested that they were probable scores and did not significantly impact the variable mean (assessed via 5% trimmed means). Multivariate outlier analysis also indicated 15 cases with outlying scores. Notably however, robust estimations (such as MLR) are able to tolerate moderate violations of normality. Taken together, I decided to include all data points within the present analyses.

Multicollinearity. Preliminary analyses indicated that there were no correlations between variables above a .9. Thus, there were no issues of multicollinearity in this sample.

Missing Data. Due to the longitudinal nature of this study, there were cases in which participants had some missing data at one or more time points. As noted previously, participants without at least one data point for each main measure of interest (N= 257) were excluded from this study. However, participants with at least one data point and some missing information were still included in analyses. Overall, 699 participants had complete data at all time points and 408 participants had some missing data at various time points (168 with some missing at time one; 177 with some missing at time two; 214 with some missing at time three). Excluding participants with missing data can reduce statistical power and bias parameter estimates (Allison, 2003), therefore to minimize such issues a full information maximum likelihood estimation was utilized (FIML) in Mplus. This estimation avoids discardment of potentially useful information in the dataset by using all available data (i.e. variances and covariances) to estimate parameters of the model and reduce bias (Acock, 2012; Hoyle, 2011).

Potential effects of attrition were assessed using correlation analyses. Specifically, I examined correlations between outcome measures and demographics at each time point, comparing participants with complete data and those with missing data. Analyses indicated several significant correlations, however magnitudes of these relationships were rather small. Overall, participants with missing data had younger mothers (r= -.085) and lower levels of maternal education (r =-.071). At time 1, participants with missing data had lower levels of child planning (r = -.099), maternal respect for autonomy (r = -.099), supportive presence (r = -.130) and higher hostility (r = -.085). At time 2, participants with missing data had lower respect for autonomy (r = -.066). At time 3, participants with missing data had lower levels of planning (r = -.149) and respect for autonomy (r = -.093).

Covariates. Based upon previous literature, several variables were considered as covariates in the present analyses (i.e. socioeconomic status [SES], child IQ, maternal education, maternal anxiety, and child health status). Consideration of covariates are particularly important to help isolate the effects of main constructs of interest- above and beyond additional independent variables – thus providing a more explicit answer to posed research questions. Maternal education and SES were used as proxies for maternal IQ. Maternal and child IQ were considered as covariates linked to child executive functioning given identified relationships between IQ and child executive functioning in previous literature (Arffa, 2007; Engelhardt et al., 2017). Maternal anxiety and child health status (i.e. intestinal problems, allergy problems, diarrhea, asthma) were considered as covariates linked to child anxiety given identified relationships between maternal and child anxiety (Beidel & Turner, 1997; Murray, Creswell, & Cooper, 2009) and child anxiety and specific health outcomes (i.e. intestinal problems, allergy problems, diarrhea, asthma; respiratory problems; Cummings, Knibb, King, & Lucas, 2010;

Greenley et al., 2010; Katon, Richardson, Lozano, & McCauley, 2004). To maintain model parsimony, correlation analyses were used to assess statistical relationships between theoretically identified covariates and relevant study outcome measures at the appropriate time point. Only those variables indicating a significant correlation ($p < .05$) with its relative outcome measure were included as covariates within the initial models. As a result, the following covariates were used in initial path analysis models: SES, child IQ, maternal education, maternal anxiety and specific health conditions (i.e. intestinal problems, allergies, chronic diarrhea). See Tables 3-5 for study bivariate correlations.

Factorial Invariance of Maternal Sensitivity. Confirmatory factor analyses were used to assess factorial invariance of maternal sensitivity. See Table 6 for summary fit statistics of all confirmatory factor analysis models. Results indicated that the initial configural model fit the data reasonably well, χ^2 (df = 15) = 21.990, p = .1081, RMSEA = .021, 90% CI [.000, .038], CFI = .998. As such, this model was used for subsequent model comparisons.

Comparison of scaled chi square values suggested that the subsequent full weak invariance model (in which all indicator loadings were constrained) demonstrated significantly worse model fit, χ^2 (df = 19) = 55.408, p = .000, RMSEA = .042, 90% CI [.029, .055], CFI = .991. Notably, when full invariance of a model is not met, partial invariance may be considered (i.e. a model in which one or more loadings/intercepts are not constrained to be equal across time; Little, 2013). Thus, modification indices can be assessed to identify problems within the model - particularly potential indicators where the loading constraints can be relaxed (Kline, 2015; Little, 2013). Modification indices of the full weak invariance model suggested that releasing the loading constraints of the hostility indicator would result in the largest reduction of chi square. Given hostility's lower loadings and greater fluctuation in loadings over time in the

initial configural model (compared to supportive presence and autonomy), it is possible that hostility as measured herein did not contribute to the maternal sensitivity construct in the same manner across time. As such, I decided to release the loading constraint for the hostility indicator at Time 1, 2 and 3. Reassessment of fit indices indicated that this new model fit the data well and did not indicate poorer model fit compared to the configural model, χ^2 (df = 17) = 22.810, p = .155, RMSEA = .018, 90% CI [.000, .035], CFI = .999. As such, the maternal sensitivity measure met requirements for partial weak invariance and was deemed sufficient to assess relationships across time (Millsap & Cham, 2012).

For further exploration, strong invariance was also assessed (in which supportive presence and autonomy indicator means were also constrained). However, this model indicated significantly worse model fit, χ^2 (df = 19) = 73.084, p = .000, RMSEA = .051, 90% CI [.039, .063], CFI = .986. Review of modification indices suggested that releasing mean constraints of the autonomy indicator would result in the greatest chi square reduction. Theoretically, considering the increasing importance of autonomy as children age, it is possible that autonomy's contribution to the construct of maternal sensitivity changes over time. Taken together, the mean of the autonomy indicator was relaxed at Time 1, 2 and 3. Reassessment of modification indices indicated that this new model fit the data well, χ^2 (df = 17) = 22.810, p = .1556, RMSEA = .018, 90% CI [.000, .035], CFI = .999. However, given majority of the maternal sensitivity indicators could not be constrained, this measure does not meet requirements for strong invariance and construct validity for this measure is limited (Little, 2013). See Table 7 and Figure 5 for a summary of parameter estimates.

Aim 1 (a-c). Examine the longitudinal relationships between maternal sensitivity, planning and anxiety development across middle childhood.

Cross lagged models were used to assess the relationships between sensitivity, planning and anxiety over time. See Tables 6 and 8-11 for a detailed summary of fit statistics and directional path estimates for all models. Path estimates (i.e. standardized directional and correlational paths) are also visually depicted in Figures 6-8. The first stability model fit the data well, χ^2 (df = 170) = 480.690, p = .000, RMSEA = .041, 90% CI [.036, .045], CFI = .949. However, further inspection of parameters indicated that several covariate paths were not significant (i.e. SES, maternal education, and all child health variables). In an effort to maintain model parsimony, these covariates were removed from subsequent models. Re-estimate of model fit with only significant covariates again indicated a good model fit, χ^2 (df = 93) = 364.886, p = .000, RMSEA = .051, 90% CI [.046, .057], CFI = .953. Analysis of auto lagged pathways demonstrated significant stability in all constructs. Furthermore, though maternal sensitivity and planning demonstrated significant within time correlations (i.e. constructs within the same time period significantly correlated with one another at 1st grade and 3rd grade), maternal sensitivity and anxiety and anxiety and planning demonstrated no significant within time correlations at any time point.

The second model included auto-lagged as well as cross-lagged and mediation pathways (i.e. direct and indirect effects). Model fit analyses indicated an increase in overall model fit, χ^2 (df = 89) = 315.87, p = .000, RMSEA = .048, 90% CI [.042, .054], CFI = .961. As hypothesized, the model indicated several significant direct paths. Specifically, maternal sensitivity in 1st and 3rd grade predicted child planning in 3rd (β = .095, SE = .036, p = .008) and 5th grade respectively(β = .176, SE = .030, p = .000; controlling for child IQ). Similarly, child planning in 1st grade predicted child anxiety in the 3rd grade (β = -.070, SE = .029, p = .015). However, child planning in the 3rd grade predicting child anxiety in the 5th grade only demonstrated

marginal significance (β = -.045, SE = .025, p = .066; controlling for maternal anxiety). As such, contrary to hypotheses, the mediational path was not significant (β = -.004, SE = .003, p = .136).

The final cross lagged model included stability coefficients, direct and indirect effects and reciprocal paths. Model fit analyses again indicated a decrease in chi square, however this improvement was not significant, χ^2 (df = 85) = 310.526, p = .000, RMSEA = .049, 90% CI [.043, .055], CFI = .961. Contrary to hypotheses, reciprocal paths were not significant and this final model did not best fit the data.

CHAPTER IV

Discussion

Primary aims of this study sought to explore the relationships between maternal sensitivity, planning and anxiety across middle childhood. As a preliminary step of these analyses, factorial invariance of the latent maternal sensitivity construct was also assessed, with results indicating partial strong invariance of the construct. Subsequent analyses of primary aims indicated significant direct relationships between maternal sensitivity, planning and anxiety. However, contrary to hypotheses, results did not support mediating or reciprocal effects. What follows is a discussion of these findings and implications for theory and future research.

Exploration of factorial invariance indicated partial strong invariance for the maternal sensitivity construct. Taken together with results of subsequent auto lagged models (i.e. significant stability of the maternal sensitivity measure across time), this outcome supported use of this measure in assessing relationships across time. Notably however, it is important to consider implications of the partial invariance structure. For one, partial invariance suggests that although this measure has construct validity, it is limited. In some instance, this may suggest the need for slight modifications of the measure. Specifically, though hostility was a significant indicator of sensitivity, it demonstrated varied lower loadings and lack of invariance. Thus, tasks within this measure may need to be modified to more accurately assess hostility/warmth between mother and child as it relates to maternal sensitivity. As is, the established tasks required emotionally arousing games, discussion and problem-solving tasks with scales of hostility remaining the same across time periods (focusing on quantifying mother's rejection of the child,

expressions of anger, low support, etc.). It may be that hostility was difficult to assess consistently across these tasks – particularly within the 3rd grade tasks (given this was the time period in which hostility loading was the lowest). Therefore, future research wishing to employ this maternal sensitivity measure may consider potential ways of modifying this task to further improve strength and consistency of indicator loading. For example, it may be helpful to increase levels of difficulty in one or more tasks. Increasing difficulty may heighten emotion, stress and required cooperation during tasks and thus also increase the likelihood of evoking clear and consistently identifiable behaviors of rejection, anger, support, etc. Notably however, invariance of maternal sensitivity measures is not common place in previous research, therefore it is impossible to compare invariance of the current measure with invariance of other sensitvity measures to identify exact modifications required. Thus, suggestions and hypotheses presented are merely based on conjecture and require further formal analysis (e.g. replication in different samples, assessment and comparison of invariance in other maternal sensitivty constructs, etc.).

Interestingly, though an unnecessary criterion for analyses in the current study, further exploration of invariance suggested that both hostility (given lack of weak invariance) and autonomy means could not be constrained across time. In line with theory and previous research, this may support the idea that autonomy contributes differently to the construct of maternal sensitivity across middle childhood. As children are just beginning to become more independent during this time, this may be a period when parents are first gauging and reassessing what autonomy looks like for their growing child and parent and child may be continuously negotiating appropriate levels of autonomy. Thus, mean changes in autonomy may be due to additional factors beyond those common factors of the maternal sensitivity indicators (e.g. normative adjustments for new buddings of independence). Given that the majority of indicators

for this measure (two out of three) did not meet strong invariance, this may suggest that this measure is unsuitable to assess mean trends over time as it would be uncertain whether changes assessed by the measure are due to actual mean changes or influences apart from the common factor (Millsap & Cham, 2012). As such, future research assessing longitudinal data with this measure should remain cautious in interpretation of analyses (e.g. limited construct validity, assessing mean changes over time with this measure may not produce valid results). This also highlights the continued importance of assessing for factorial invariance in future longitudinal studies and measure development.

Consistent with proposed hypotheses and previous stability research, auto lagged models demonstrated significant stability across constructs (Belsky et al., 2007;Best & Miller, 2010; Kerns, 2011). This supports the notion that earlier levels of maternal sensitivity, planning and anxiety predict later levels of maternal sensitivity, planning, and anxiety respectively across middle childhood. Similarly, additional cross lagged panel analysis indicated significant direct relationships between maternal sensitivity and planning across time after controlling for child IQ. Though lack of experimental manipulation prohibits definitive causal claims, such findings indeed corroborate previous longitudinal research and provide further support for components of social-cognitive causal theory positing that sensitive parenting promotes healthy self-regulatory development (Bernier et al., 2010). For example, it is likely that mothers with higher levels of sensitivity attempt to provide their children with appropriate autonomy and greater opportunities to independently engage in tasks that may build executive functioning skills. Further, warmth and support from these mothers during these tasks may then increase the child's confidence and likelihood that they continue to engage in these tasks when presented with the opportunity.

Findings herein also support the notion that predictive relationships between parenting behaviors and executive functioning are important beyond just the early childhood years. It is worth noting, however, that the demonstrated effect sizes for this relationship in the current study are smaller compared to effect sizes indicated in early childhood (Valcan et al., 2017). Furthermore, maternal sensitivity only explained a partial percentage of the variance in planning. This may be due to a number of factors (e.g. additional impact of other characteristics such as peer relationships), yet indication of these relationships in middle childhood is still important. These results suggest that parenting behaviors remain a part of the environmental contribution to executive functioning development in middle childhood. As such, this provides continued support for the notion that middle childhood remains a relevant time for interventions focused on executive functioning improvement. Such interventions may include executive functioning skill building activities and parent behavior modifications designed to foster improvement of skills outside of the therapy setting (e.g. parent training aimed at improving maternal sensitivity).

Notably, findings also indicated a significant predictive relationship between planning at 1st grade and anxiety at 3rd grade, however – contrary to hypotheses and previous research - this relationship was not significant from 3rd to 5th grade after controlling for maternal anxiety and child IQ. Consequently, the mediational effect was also not significant. Further analyses also indicated no statistically significant relationship between maternal sensitivity and anxiety. Thus this may suggest that, contrary to hypotheses, planning in middle childhood does not mediate a relationship between maternal sensitivity and anxiety. However, given limitations of statistical models (i.e. models are incapable of testing null hypotheses), despite non-significance of these parameters it is not a definitive conclusion that the hypothesized relationships do not exist. Methodological issues must be considered.

The majority of previous studies demonstrating a relationship between sensitivity and executive functioning and executive functioning and anxiety, have done so using multiple indicators of executive functioning (i.e. additional executive functioning domains; Bernier et al., 2010; Valcan et al., 2017). Though planning has been implicated in previous studies, future research may benefit from including more comprehensive assessments of executive functioning. A comprehensive assessment with multiple indicators reduces bias related to single indicator measurements (e.g. biased parameter estimates due to lack of control for measurement error, poorer test-retest reliability compared to comprehensive measures, etc.). For example, the Cambridge Automated Neuropsychological Test Assessment Battery (CANTAB; Cambridge Cognition Limited, 2011) has demonstrated reliability and validity in child samples (Henry & Bettenay, 2010). The CANTAB is able to assess multiple domains of executive functioning within a relatively short time span and provides a standardized administration reducing possibility for human error in administration and scoring. Previous research demonstrating a relationship between planning and anxiety has also done so in samples with a higher prevalence of severe anxiety symptoms (Murphy et al., 2017; Rodrigues et al., 2017). Specifically, findings of previous research indicated impaired planning efficiency in children with marked anxiety symptoms (i.e. clinical level symptoms) compared to those with minimal (i.e. sub-clinical) or no anxiety symptoms (i.e. normative anxiety levels). Considering the current sample did not recruit specifically for children with high levels of anxiety, it is possible that rates of clinical level anxiety are lower in this sample. Thus, relationships between planning and anxiety may be of greater importance for children demonstrating more severe symptoms. Future research may consider replication of this work within more disordered populations to further explore this conjecture. Relatedly, such research may also consider varying the type or number of measures

used to assess anxiety. Though the CBCL demonstrates strong reliability and validity in child samples, it is not impervious to the potential limitations of parent-report of their child's behavior (e.g. social desirability responding, disagreement with child report, smaller effect sizes compared to observational report, etc.). Furthermore, similar to the TOH limitations discussed above, use of one indicator for anxiety may result in biased parameter estimates. Thus, to support a stronger assessment of anxiety, future research may wish to include additional psychometrically strong measures of anxiety (e.g. perhaps from multiple informants) and/or alternative methods of anxiety assessment (e.g. observational or clinical assessments - particularly if illumination of symptom severity is desired).

An additional point of consideration related to the current sample's makeup may be the overall planning ability of the sample. Just as this sample likely contains children with lower anxiety severity, it is also possible that this sample contains children with higher planning abilities as well. Supporting this conjecture, participants demonstrated high mean levels of planning and IQ (positively related to executive functioning performance) and analysis of attrition indicated that those with missing data had lower levels of planning. Thus, it is possible that the current sample contains a limited range of planning abilities, making it more difficult to assess the full extent of the relationships to be tested herein. Future research should consider efforts to recruit children demonstrating a broader range of executive functioning abilities.

Lastly - and also contrary to hypotheses - results did not support bidirectional relationships between maternal sensitivity and planning or planning and anxiety. Therefore, my theorized model did not provide best model fit compared to the simpler cross lagged model. This is contrary to components of social cognitive theory highlighting bidirectional effects between behavioral, cognitive and environmental influences and is also contrary to specific theory

highlighting bidirectional relationships between parent and child influences (Bell, 1968). Findings herein contrarily suggest a unidirectional relationship between studied domains – at least in middle childhood. It is worth noting that although these findings are contrary to theory, they do somewhat fit with the mixed picture regarding bidirectional effects. Though some research has indicated bidirectional relationships between various domains (between parent and child behaviors, environment and child psychosocial problems, cognitive and mental health, etc.; Brooker et al., 2015; Newton, Laible Carlo, Steele, McGinley, 2014; van den Eijnden, Vermulst, van Rooij, Scholte, & Mheen, 2014), other research has indicated weak or no such relationships (Bates, Schermerhorn, & Petersen, 2012; Belsky, Fearon, & Nell, 2007; Eisenberg et al., 2005). This perhaps suggests that bidirectional effects only occur under certain circumstances and calls for the need to identify exactly what these circumstances are. For example, behavioral, cognitive, and environmental domains subsume a vast array of entities (e.g. different individual behaviors, cognitions, executive functioning, cognitive biases, home environments, neighborhoods, schools, etc.). It may be that bidirectional effects only occur for certain entities during certain developmental periods. For instance, bidirectional relationships between parent behaviors and child executive functioning may be strongest in early childhood or these relationships might only be seen for certain behaviors (e.g. parent gauges their child early in life and this pattern determines future parent behavior when executive functioning remains relatively stable, parent behaviors may be more impacted by outward physical behavior rather than child executive function, etc.).

As discussed above, the presence of non-significant parameters does not definitively conclude absence of relationships. Thus, it is also possible that bidirectional relationships are present, yet they occur over a longer or shorter time period than assessed in the current study.

For example, Belsky, Fearon and Bell (2007) assessed bidirectional relationships between maternal sensitvity and child executive functioning at 54 months, 1st, 3rd , 4th and 5th grades. Findings supported these relationships during specific lags (i.e. 54 months to 1st grade and 4th grade to 5th grade, but not 1st grade to 3rd grade). Unfortunately, the larger dataset used by the current study did not contain datapoints for planning at 54 months or 4th grade, therefore these specific lags could not be tested for comparison. Future research assessing bidirectional relationships may consider further lag manipulation. Additionally, methodological considerations discussed previously may also be considered as plausible explanations for lack of bidirectional relationships (e.g. lack of multiple indicators for the executive functioning and anxiety constructs, limited construct validity of maternal sensitivity, etc.). As such, additional research is clearly needed to help refine posited theories and hypotheses on this matter. This includes more assessment of bidirectional relationships - rather than just theoretical assumption - and meta analyses to quantitively identify potential mediators and moderators of bidirectional relationships.

Notably, results of the current study must be considered in light of several limitations. First, as highlighted previously, though maternal sensitivity was assessed as a latent construct, additional constructs (i.e. planning and anxiety) within this study were not. Given statistical advantages of latent constructs (e.g. ability to assess for factorial invariance, controls for random measurement error), future research may wish to utilize measures with multiple indicators or employ multiple measures of a construct. Second, the maternal sensitivity measure demonstrated limited construct validity (i.e. partial weak invariance). Though appropriate to assess relationships longitudinally, this may suggest that over time the maternal sensitivity measure is not equally efficient or the underlying latent construct may change meaning - potentially limiting

results (e.g. reducing strength of parameter estimates, confounding parameter interpretations, etc.). Additional research and discussed modifications to this measure may help address these limitations. Fourth, though observational tasks tend to be more reliable than self-reports (Aspland & Gardner, 2003), observations of maternal sensitivity did occur in a laboratory setting with a semi-structured task. Therefore, it is unknown whether observed behaviors between mother and child are akin to their behaviors during every day activities outside of the laboratory. Fifth, though the full longitudinal design used in this study provided a strong analysis of mediation and causal theory (Little, 2013), time points utilized in this study were restricted given limited overlapping points between the constructs of interest (e.g. the TOH was not administered at any other time points than those used in this study). Though middle childhood demonstrates a period of critical development, future research may wish to compare associations across various developmental periods (e.g. early childhood to adolescence). Such a broadened design may provide opportunities to observe additional developmental differences in the relationships examined herein (e.g. whether bidirectional effects are present in one age period, versus another). Finally, as a note of caution and suggestion for future research, the current study perhaps highlights a difficulty of using pre-collected data from large scale studies. Though undoubtedly a wealth of data for many research questions and preliminary endeavors, there are clearly limitations with relation to methodology and analyses. Thus, researchers should continue to use these datasets while remaining cautious of this conundrum.

In sum, despite several non-significant findings the current study provides significant contributions to the literature. First, within preliminary analyses this study assessed factorial invariance of the latent maternal sensitivity measure. Assessing factorial invariance is often overlooked in longitudinal research - despite invariance assumptions of longitudinal analyses.

Results indicated that although this measure was appropriate to assess relationships, future research utilizing this measure should exercise caution. The current study was also one of few to assess longitudinal predictive relationships between parenting behaviors and executive functioning in middle childhood. Though effects of this relationship were small, evidence suggests that parenting behaviors remain a part of the environmental contribution to executive functioning development, thus warranting continuous attention. Lastly, the current study also sought to extend previous etiological models of anxiety by integrating maternal sensitivity and executive functioning (a previously excluded domain) into one potential bidirectional pathway of anxiety development. Though results did not support this hypothesized model, they do spur considerable suggestion for future research.

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Table 1

Child Sample Characteristics

	N (%)	M (SD)	Sample Min	Sample Max	Scale Min-Max
Age					
1st grade	--	6.45 (.503)	6	8	--
3rd grade	--	8.42 (.506)	8	10	--
5th grade	--	10.16 (.377)	9	12	--
Gender					
Female	547 (49.4%)	--	--	--	--
Male	560 (50.6%)	--	--	--	--
Ethnicity					
White	905 (81.8%)	--	--	--	--
Black	129 (11.7%)	--	--	--	--
Asian	16 (1.4%)		--	--	--
Other	57 (5.2%)	--	--	--	--
Anxiety Scores					0-2
1st grade	--	.196 (.196)	.00	1.25	--
3rd grade	--	.208 (.216)	.00	1.50	--
5th grade	--	.205 (214)	.00	1.58	--
Planning Score					0-36
1st grade	--	14.4 (6.8)	.00	34.00	--
3rd grade	--	17.16 (7.70)	.00	35.00	--
5th grade	--	22.94 (7.6)	.00	36.00	--
IQ	--	106.95 (14.40)	62.00	147.00	40-160

Table 2

Mother Sample Characteristics

	N (%)	M (SD)	Sample Min	Sample Max	Scale Min-Mx
Age at 1 month	--	28.47 (5.59)	18	46	--
Ethnicity					
White	931 (84.1%)	--	--	--	--
Black	128 (11,6%)	--	--	--	--
Asian	23 (2.1%)	--	--	--	--
Other	25 (2.2%)	--	--	--	--
Education					--
11th grade or below	92 (8.3%)	--	--	--	--
High School Diploma / GED	219 (19.8%)	--	--	--	--
Some College / Associates	368 (33.2%)				--
Bachelor's Degree	252 (22.8%)	--	--	--	--
Graduate/Law Degree	176 (15.9%)	--	--	--	--
Income Needs Ratio	--	3.95 (3.03)	.07	21.28	--
Anxiety Score	--	17.45	10.00	39.00	10-40
Hostility Score (reverse coded)					0-7
1st grade	--	6.47 (.93)	2.00	7.00	--
3rd grade	--	6.46 (.83)	1.00	7.00	--
5th grade	--	6.41 (.87)	2.00	7.00	--
Respect for Autonomy Score					0-7
1st grade	--	5.26 (1.16)	1.00	7.00	--
3rd grade	--	4.89 (1.02)	1.00	7.00	--
5th grade	--	4.97 (.93)	2.00	7.00	--
Supportive Presence Score					0-7
1st grade	--	5.16 (1.39)	1.00	7.00	--
3rd grade	--	4.99 (1.07)	1.00	7.00	--
5th grade	--	5.11 (.94)	2.00	7.00	--

Table 3

Bivariate Correlations for Main Study Variables

Variable	1	2	3	4	5	6	7
1. Hostility 1st Gr.	--						
2. Hostility 3rd Gr.	.264***	--					
3. Hostility 5th Gr.	.305***	.324***	--				
4. Respect for Autonomy 1st Gr.	.585***	.272***	.313***	--			
5. Respect for Autonomy 3rd Gr.	.248***	.435***	.288***	.378***	--		
6. Respect for Autonomy 5th Gr.	.251***	.233***	.533***	.371***	.380***	--	
7. Supportive Presence 1st Gr.	.559***	.217***	.286***	.715*	.311***	.304***	--
8. Supportive Presence 3rd Gr.	.318***	.438***	.302***	.450***	.767***	.399***	.419***
9. Supportive Presence 5th Gr.	.300***	.270***	.646***	.418***	.373***	.761***	.414***
10. Planning 1st Gr.	.122***	.129***	.027	.157***	.124**	.094*	.114**
11. Planning 3rd Gr.	.094*	.093*	.048	.174***	.139***	.189***	.185***
12. Planning 5th Gr.	.146***	.120**	.138***	.234***	.198***	.196***	.185***
13. Anxiety 1st Gr.	.011	-.050	-.047	-.040	.021	-.061	-.022
14. Anxiety 3rd Gr.	-.043	-.071	-.085*	-.066	-.026	-.056	-.052
15. Anxiety 5th Gr.	-.008	-.046	-.028	-.039	.029	-.040	-.066

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

Table 3

Continued

Variable	8	9	10	11	12	13	14
8. Supportive Presence 3rd Gr.	--						
9. Supportive Presence 5th Gr.	.397***	--					
10. Planning 1st Gr.	.095*	.088*	--				
11. Planning 3rd Gr.	.122**	.149***	.407***	--			
12. Planning 5th Gr.	.169***	.226***	.386***	.520***	--		
13. Anxiety 1st Gr.	-.010	-.059	.015	-.049	-.050	--	
14. Anxiety 3rd Gr.	-.055	-.079*	-.044	-.041	-.039	.560***	--
15. Anxiety 5th Gr.	-.018	-.041	.006	-.078*	-.047	.492***	.659***

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

Table 4

Bivariate Correlation Matrix for Potential Covariates Under Consideration for Planning Outcomes

Variable	1	2	3
1. Socioeconomic Status	--		
2. Maternal Education	.524***	--	
3. Child IQ	.296***	.418***	--
4. Planning 1st Gr.	.132**	.167***	.289***
5. Planning 3rd Gr.	.289***	.210***	.289***
6. Planning 5th Gr.	.370***	.169***	.370***

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

Table 5

Bivariate Correlation Matrix for Potential Covariates Under Consideration for Anxiety Outcomes

Variable	1	2	3	4	5	6	7
1. Maternal Anxiety	--						
2. Intestinal Problems	.019	--					
3. Repeat Diarreah	.053	.212***	--				
4. Food Allergies	.072	.086*	-.026	--			
5. Skin Allergies	.072	.062	.049	.155***	--		
6. Asthma	.045	.053	.003	.144***	.189***	--	
7. Respiratory Problems	.019	.128**	-.013	.012	.059	.138***	--
8. Anxiety 1st Gr.	.233***	.095*	.016	.080*	.144***	.096*	.068
9. Anxiety 3rd Gr.	.188***	.079*	.068	.102**	.142***	.081*	.090
10. Anxiety 5th Gr.	.206***	.100*	.077*	.125**	.105**	.045	.051

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

Table 6

Summary Fit Statistics for Maternal Sensitvity Confirmatory Factor Analysis and Cross Lagged Panel Analyses

Model	χ^2	df	P	RMSEA	90% CI	CFI
Maternal Sensitivity CFA						
Model 1: Configural Invariance	21.990	15	.11	.021	.000 - .038	.998
Model 2: Weak Invariance	55.408	19	.00	.042	.029 - .055	.991
Model 2a: Partial Weak Invariance	22.810	17	.16	.018	.000 - .035	.999
Model 3: Partial Strong Invariance	73.084	19	.00	.051	.039 - .063	.986
Model 3a: Partial Strong Invariance	22.810	17	.16	.018	.000 - .035	.999
Cross Lagged Panel Analysis						
Model 1: Autoregressive	364.886	93	.000	.051	.046 - .057	.953
Model 2: Cross lagged	315.817	89	.000	.048	.042 - .054	.961
Model 3: Reciprocal Cross Lagged	310.526	85	.000	.049	.043 - .055	.961

Table 7

Parameter Estimates from Final Maternal Sensitivity Partial Strong Invariance Model

Indicator	1st Grade			3rd Grade			5th Grade		
	b	SE	B	b	SE	β	b	SE	β
Hostility	.642	.042	.693	.523	.044	.536	.776	.047	.689
Respect for Autonomy	1.005	.032	.869	1.005	.032	.839	1.005	.032	.829
Supportive Presence	1.141	.036	.816	1.141	.036	.915	1.141	.036	.940

Note. All indicators are significant at p = .000

Table 8

Directional Path Estimates for Cross Lagged Panel Analysis Model 1 (Autoregressive)

	Dependent Variable											
	Sensitivity				Planning				Anxiety			
Predictor	*b*	SE	β	p	*b*	SE	β	p	*b*	SE	β	p
	3rd grade											
Sensitivity 1	.731	.070	.861	.00	--	--	--	--	--	--	--	--
Planning 1	--	--	--	--	.373	.034	.328	.00	--	--	--	--
Anxiety 1	--	--	--	--	--	--	--	--	.625	.045	.571	.00
IQ	--	--	--	--	.114	.016	.213	.00	--	--	--	--
	5th grade											
Sensitivity 3	.870	.092	.957	.000	--	--	--	--	--	--	--	--
Planning 3	--	--	--	--	.493	.028	.502	.00	--	--	--	--
Anxiety 3	--	--	--	--	--	--	--	--	.624	.039	.636	.00
Maternal Anxiety	--	--	--	--	--	--	--	--	.003	.001	.084	.004

Table 9

Directional Path Estimates for Cross Lagged Panel Analysis Model 2 (Cross Lagged)

	Dependent Variable											
	Sensitivity				Planning				Anxiety			
Predictor	*b*	SE	β	p	*b*	SE	β	p	*b*	SE	β	p
	3rd grade											
Sensitivity 1	.746	.071	.878	.00	.732	.276	.095	.008	--	--	--	--
Planning 1	--	--	--	--	.369	.033	.324	.00	-.002	.001	-.070	.017
Anxiety 1	--	--	--	--	--	--	--	--	.625	.045	.571	.00
IQ	--	--	--	--	.091	.018	.171	.00	--	--	--	--
	5th grade											
Sensitivity 3	.866	.090	.949	.000	1.577	.283	.176	.00	--	--	--	--
Planning 3	--	--	--	--	.459	.028	.466	.00	-.001	.001	-.045	.067
Anxiety 3	--	--	--	--	--	--	--	--	.621	.038	.634	.00
Maternal Anxiety	--	--	--	--	--	--	--	--	.003	.001	.080	.007

Table 10

Mediation Analysis

	Dependent Variable			
	Anxiety			
Predictor	*b*	SE	β	p
Indirect Effect				
Sensitivity → Planning	-.001	.001	-.004	.136

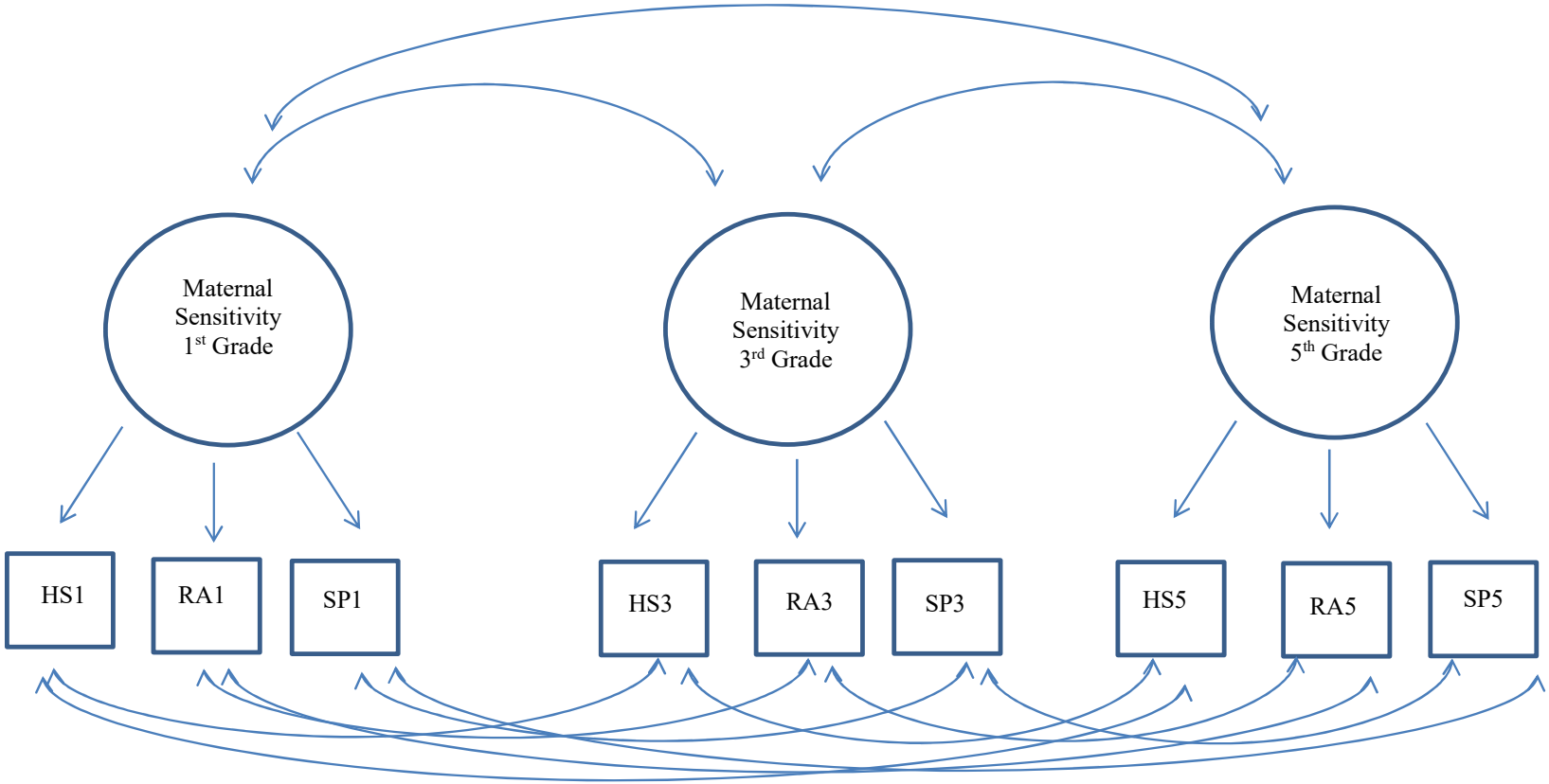
Table 11

Directional Path Estimates for Cross Lagged Panel Analysis Model 3 (Reciprocal Cross Lagged)

	Dependent Variable											
	Sensitivity				Planning				Anxiety			
Predictor	*b*	SE	β	p	*b*	SE	β	p	*b*	SE	β	p
	3rd grade											
Sensitivity 1	.760	.075	.894	.00	.708	.274	.092	.010	--	--	--	--
Planning 1	-.002	.004	-.019	.562	.367	.034	.323	.00	-.002	.001	-.068	.020
Anxiety 1	--	--	--	--	-2.036	1.131	-.052	.072	.626	.045	.571	.00
IQ	--	--	--	--	.093	.018	.173	.00	--	--	--	--
	5th grade											
Sensitivity 3	.869	.100	.951	.000	1.545	.283	.173	.00	--	--	--	--
Planning 3	.000	.004	.002	.969	.457	.028	.465	.00	-.001	.001	-.045	.066
Anxiety 3	--	--	--	--	-1.216	.990	-.035	.219	.621	.038	.633	.00
Maternal Anxiety	--	--	--	--	--	--	--	--	.003	.001	.080	.007

Figure 1

Model for Maternal Sensitivity Confirmatory Factor Analysis



Note. **HS1**: Hostility at 1st grade, **RA1**: Respect for autonomy at 1st grade, **SP1**: Supportive presence at 1st grade, **HS2**: Hostility at 2nd grade, **RA2**: Respect for autonomy at 2nd grade, **SP2**: Supportive presence at 2nd grade, **HS3**: Hostility at 3rd grade, **RA3**: Respect for autonomy at 3rd grade, **SP3**: Supportive presence at 3rd grade

Figure 2

Model 1: Autoregressive Model

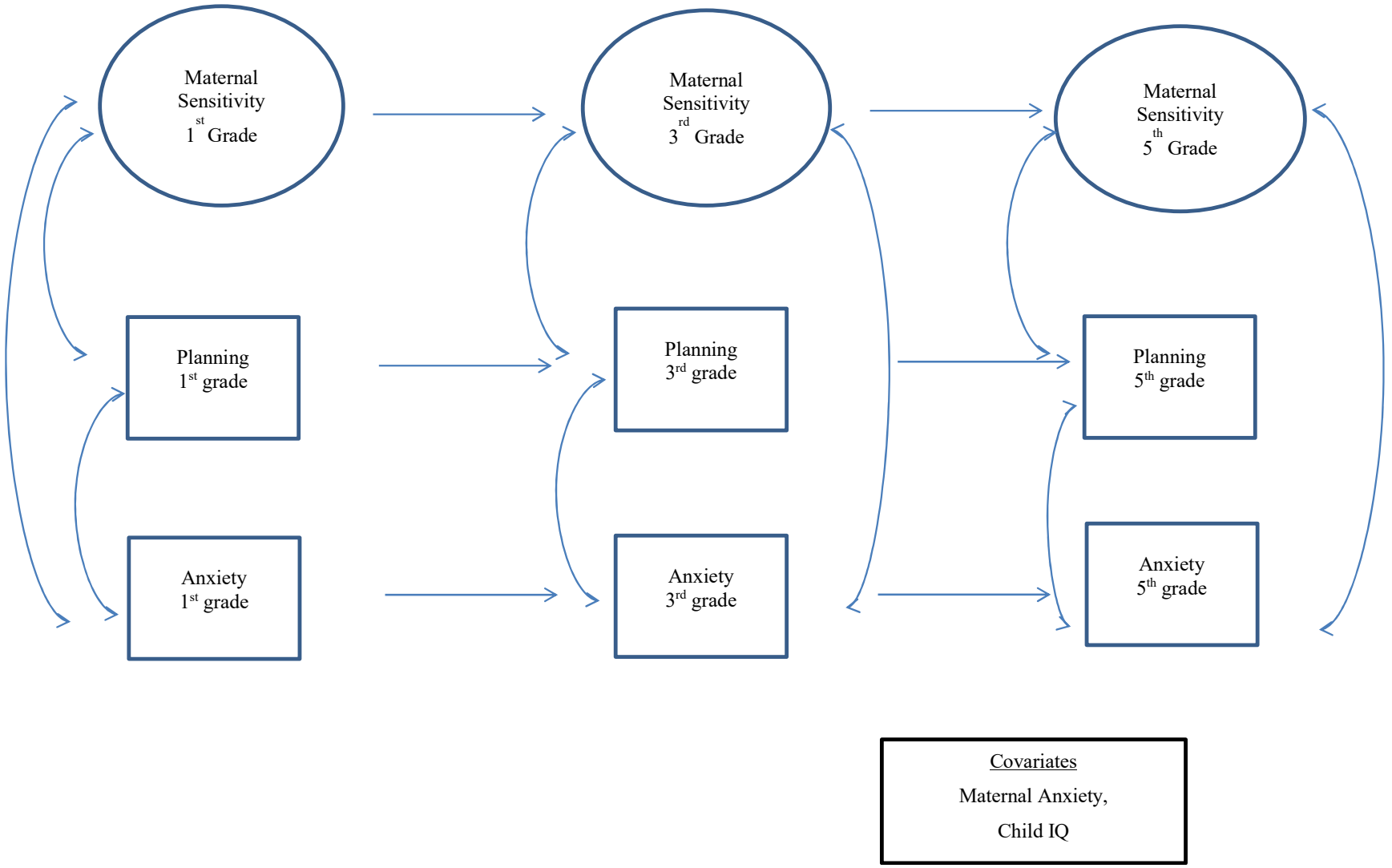


Figure 3

Model 2: Cross Lagged (i.e. Autolagged pathways, cross-lagged pathways, & indirect effect)

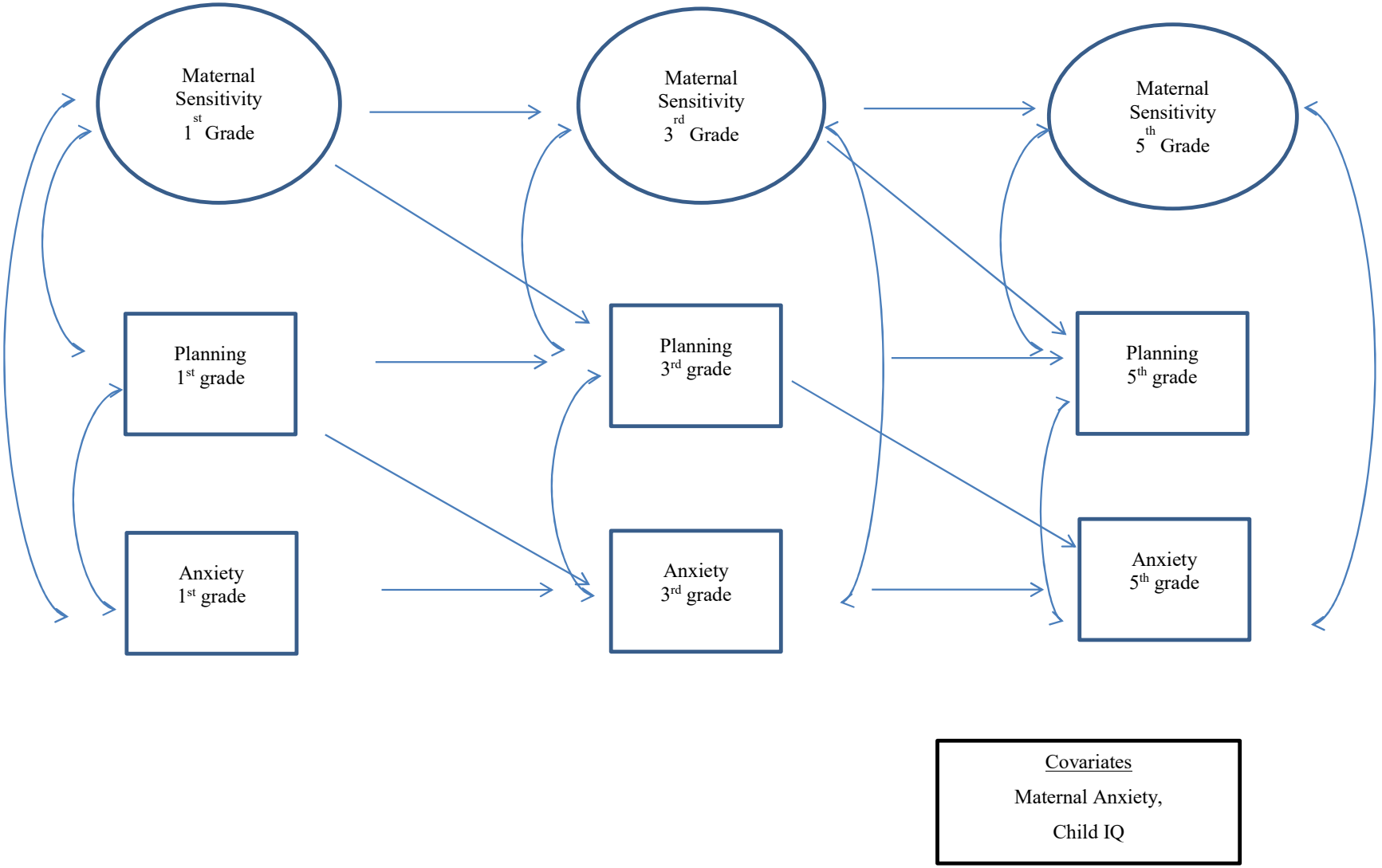


Figure 4

Model 3: Reciprocal Cross Lagged (i.e. Autolagged pathways, cross lagged pathways, and reciprocal pathways)

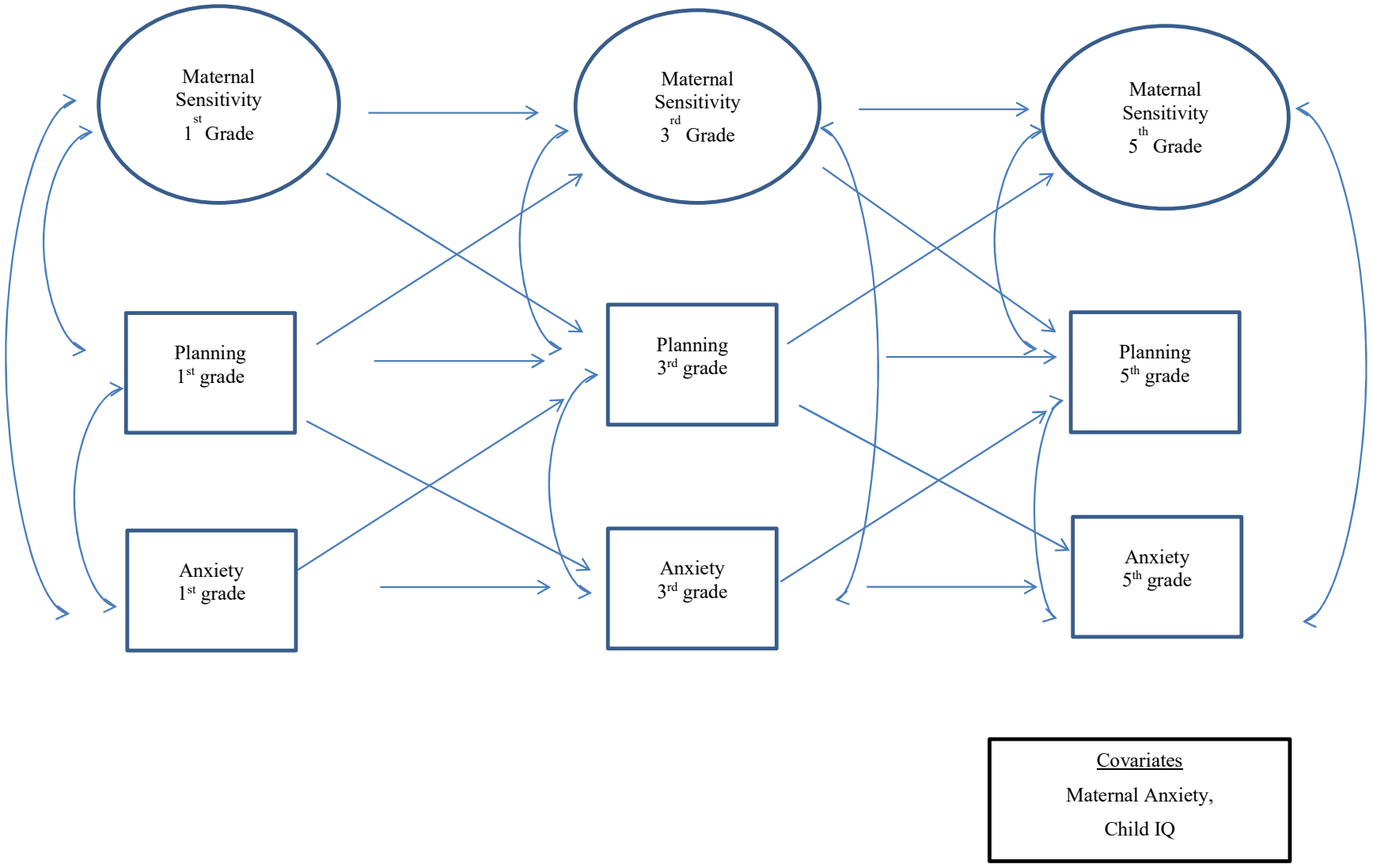
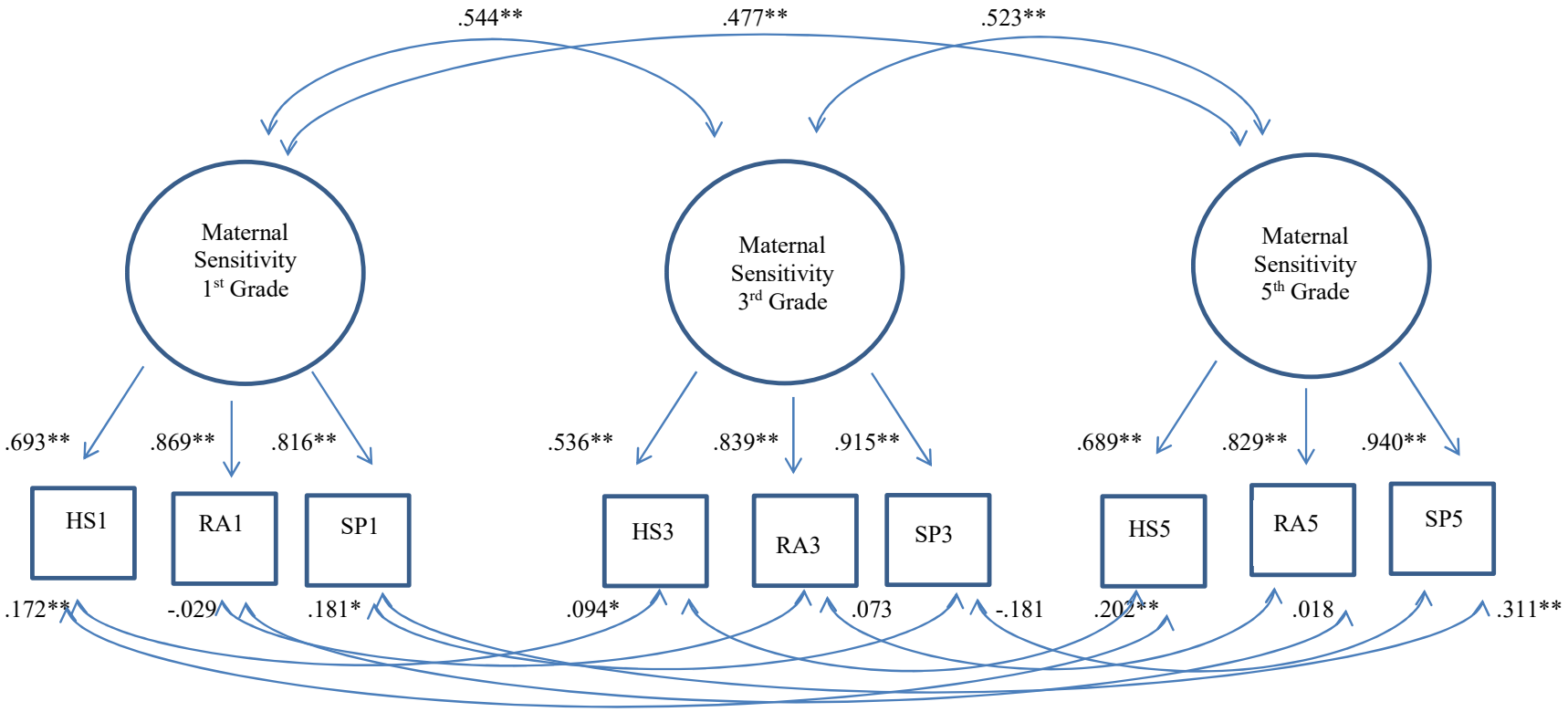


Figure 5

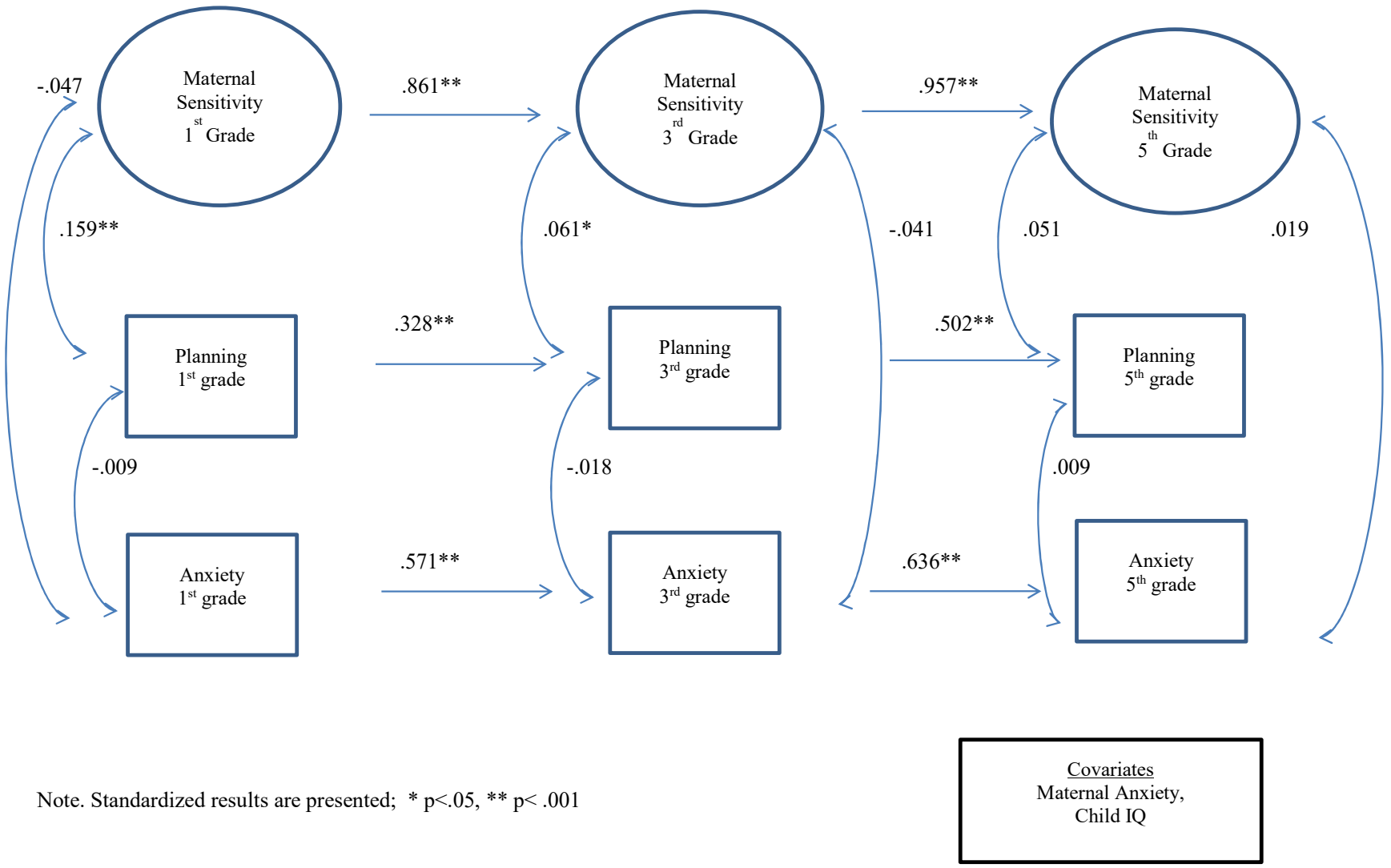
Final Maternal Sensitivity Partial Strong Invariance Model



Note. Standardized results are presented; * p<.05, ** p< .001; **HS1**: Hostility at 1st grade, **RA1**: Respect for autonomy at 1st grade, **SP1**: Supportive presence at 1st grade, **HS2**: Hostility at 2nd grade, **RA2**: Respect for autonomy at 2nd grade, **SP2**: Supportive presence at 2nd grade, **HS3**: Hostility at 3rd grade, **RA3**: Respect for autonomy at 3rd grade, **SP3**: Supportive presence at 3rd grade

Figure 6

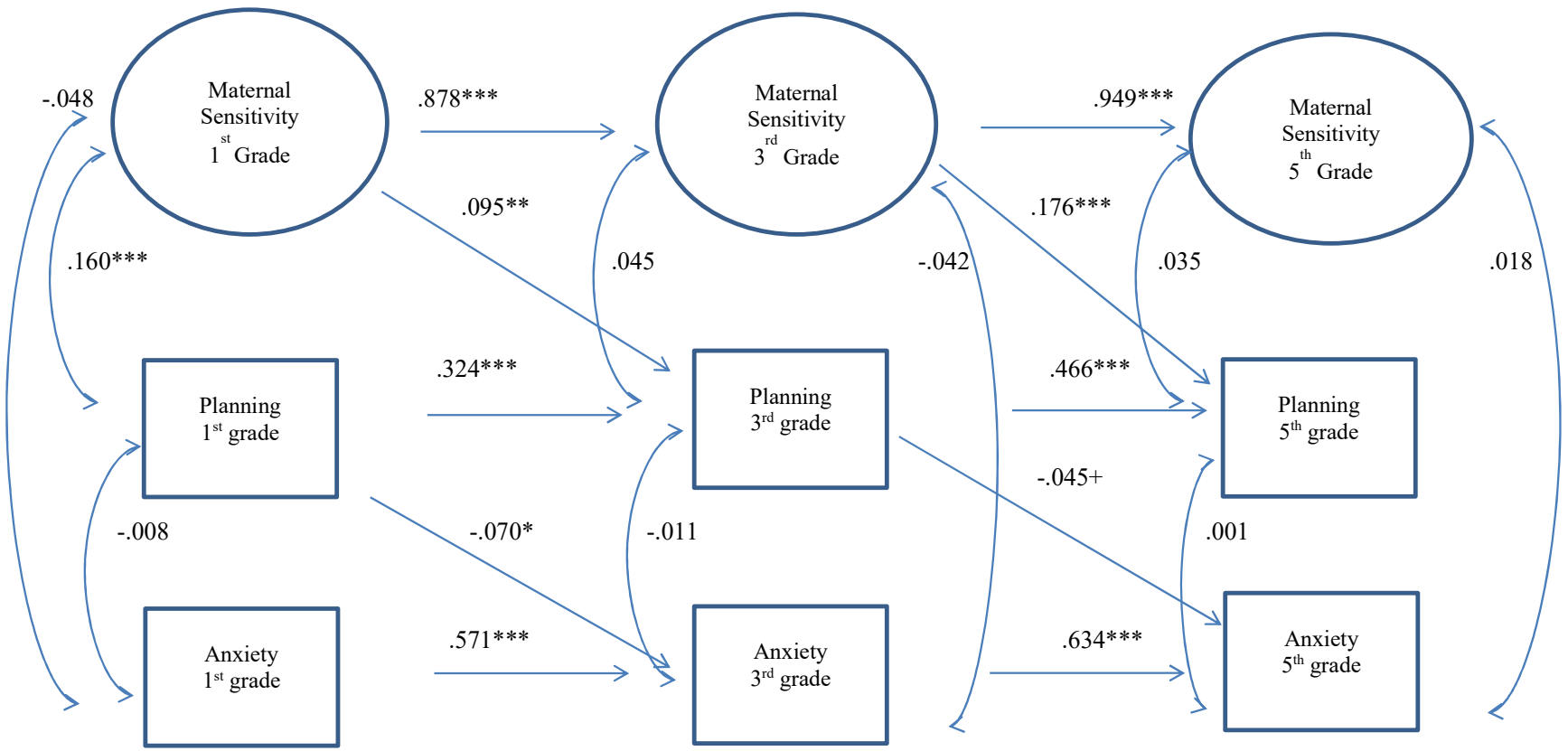
Coefficients for Cross Lagged Analyses Model 1: Autoregressive Model



Note. Standardized results are presented; * p<.05, ** p< .001

Figure 7

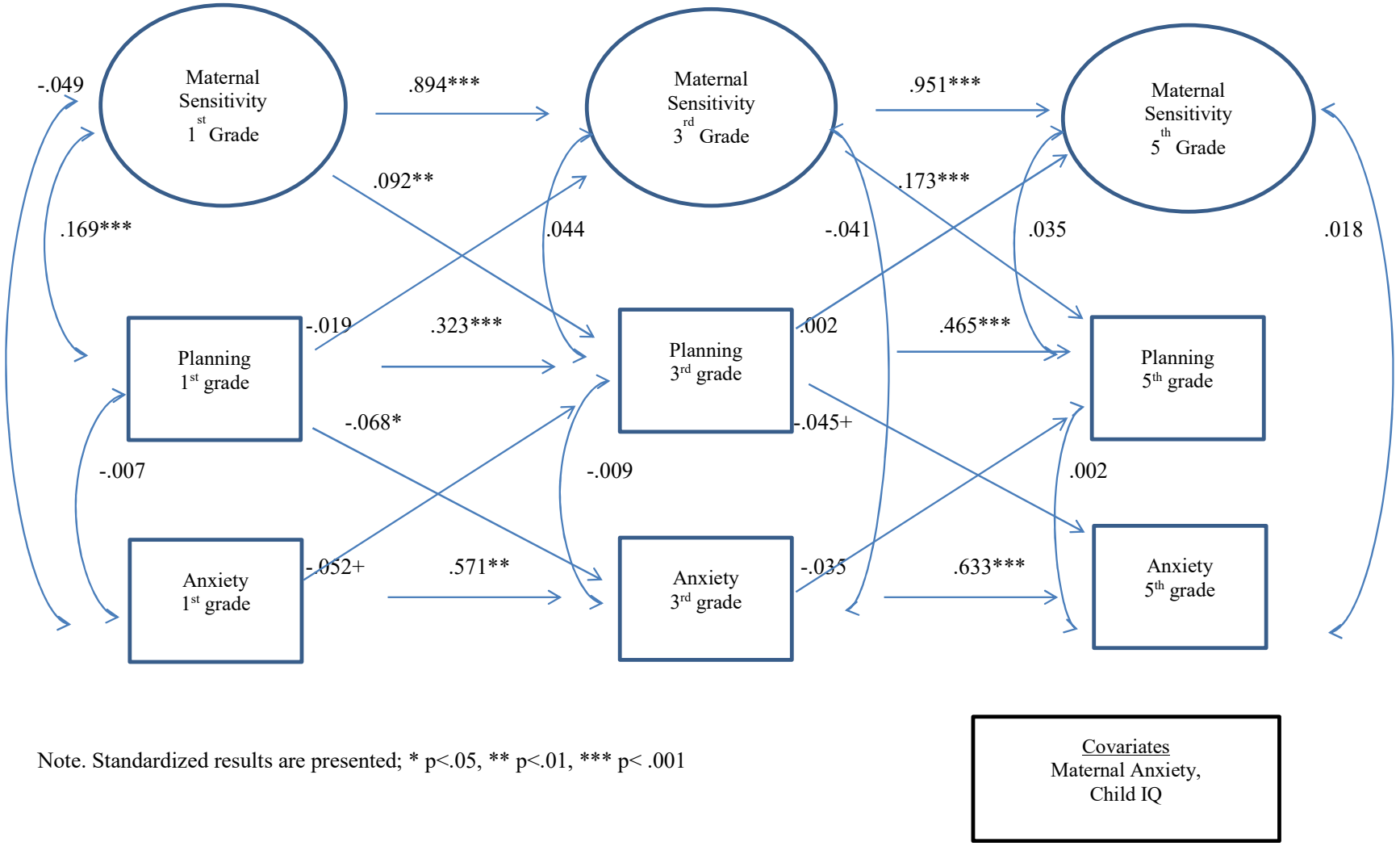
Coefficients for Cross Lagged Analyses Model 2: Cross Lagged (i.e. Autolagged pathways, cross-lagged pathways, & indirect effect)



Note. Standardized results are presented; + p<..10 * p<.05,** p <.01, *** p< .001

Figure 8

Coefficients for Cross Lagged Analyses Model 3: Reciprocal Cross Lagged (i.e. Autolagged pathways, cross lagged pathways, and reciprocal pathways)



Note. Standardized results are presented; * p<.05, ** p<.01, *** p< .001

Appendix A

Child Behavior Checklist Anxiety Scale Questions

* 12-item scale, including 8 items from the CBCL Depression/Anxiety scale (Items 31, 32, 34, 45, 50, 71, 89, and 112) and 4 additional CBCL items (Items 9, 29, 30, and 66).

Instructions: Below is a list of items that describe children and youths. For each item that describes your child now or within the past 6 months, please circle 2 if the item is very true or often true of your child. Circle the 1 if the item is somewhat or sometimes true of your child. If the item is not true of your child, circle the 0. Please answer all items as well as you can, even if some do not seem to apply to your child.

0 1 2 9. Can't get his/her mind of certain thoughts; obsessions.

0 1 2 29. Fears certain animals, situations, or places, other than school.

0 1 2 30. Fears going to school.

0 1 2 31. Fears he/she might do something bad.

0 1 2 32. Fells he/she has to be perfect.

0 1 2 34. Feels others are out to get him/her.

0 1 2 45. Nervous, high strung, or tense.

0 1 2 50. Too fearful or anxious.

0 1 2 66. Repeats certain acts over and over; compulsions .

0 1 2 71. Self-conscious or easily embarrassed.

0 1 2 89. Suspicious.

0 1 2 112. Worries.

Appendix B

Mother Child Interaction Task Rating Scales

Supportive Presence:

A parent scoring high on this scale expresses positive regard and emotional support to the child. This may occur by acknowledging the child's accomplishments on the task or unrelated tasks the child is doing, encouraging the child with positive emotional regard, (e.g. "Great idea", "You are so clever") listening and validating their child's ideas and opinions even if they disagree ("You make good decisions") and various other ways of letting the child know that he/she has his/her support and confidence to do well in the setting. If the child appears challenged by the task, the parent is reassuring and calm, providing an effectively positive "secure base" for the child, perhaps leaning closer to the child to give a physical sense of support. A parent scoring low on this scale fails to provide supportive cues: he/she might be passive, uninvolved, aloof, or otherwise unavailable to the child. Such a parent also might give observers the impression that he/she is more concerned about his/her own adequacy and task performance rather than concerned about the child's emotional needs. A potential difficulty in scoring this scale is the need to discount messages of parents that seemingly are supportive in verbal content but are contradicted by other aspects of the communication, e.g., the parent seems to be performing a supportive role for the camera and not really engaged in what the child is doing or feeling. Signs of such questionable support are improper timing of support, mismatch of verbal and bodily cues, and failure to have the child's attention in delivering the message. These types of supportive messages would not be weighted highly because such features suggest that supportive presence is not a well-practiced aspect of their interaction outside the observational situation. Conversely, parent may seem more supportive than he/she has appears in this situation because he/she has approached this task as a test of the child's achievement and has not used as much support as he/she otherwise might have. Yet, the qualitative features of his/her support would merit a high score.

1. Very Low. Parent completely fails to be supportive to the child, either being aloof and unavailable or being hostile toward the child when the child shows need of some support.

2. Low. Parent provides very little emotional support to the child. Whatever supportive presence he/she does display is minimal and not timed well, either being given when the child does not really need it, or only after the child has become upset.

3. Moderately Low. Parent gives some support but it is sporadic and poorly timed to the child's needs. The consistency of this support is uneven so as to make the parent unreliable as a supportive presence.

4. Moderate. This parent does a respectable job of being available when his/her child needs support, but he or she also has moments of inconsistency. He/she may lean closer and praise the child's efforts to show that he/she is available and supportive, but inconsistency in this style make his/her support unavailable during the session.

5. Moderately High. Parent provides good support, reassurance and confidence in the child's ability, but he/she falters in this at times when the child especially could use more support. Or, parent is universally supportive but rarely gives evidence of modulation of to the child's needs.
6. High. Parent establishes him/herself as supportive and encouraging toward the child and continues to provide support when the child needs it. If the child experiences more difficulty, his/her support increases in commensurate fashion. He/she has some lapses, however, in which the child's involvement in the activity wavers for lack of support. Yet, he/she then attempts to return the child to a level of involvement that is more optimal.

7. Very High. Parent skillfully provides support throughout the session. He/she sets up the situation from the beginning as one in which he/she is confident of the child's efforts. He/she may redirect the child when appropriate in a way that does not reduce his/her support and confidence in the child's ability to modify his or her behavior. If the child is having difficulty he/she finds ways to reward some sort of success by the child and encourage whatever solution the child can make. Parents not only emotionally supportive but also continuously reinforces the child's success.

Parent Respect for Child's Autonomy:

This scale reflects the degree to which the parent acted in a way that recognizes and respects the validity of the child's individuality, motives, and perspectives in the session.

A parent scoring low in this scale would be very intrusive in his/her interventions with the child exerting his/her expectations on the child in a way that makes the child a satellite or servant of the parent rather than a partner in a mutually negotiated relationship; or the parent might implicitly define his/her interactions in terms of a win-lose power struggle in which compliance by the child makes the parent the winner and the child submissive. Parents may intrude either harshly or with affection; in either case, his/her actions do not acknowledge the child's intentions as real or valid and communicate that it is better and safer to depend on him/her for direction than to attempt individuality.

In contrast, a parent scoring high on this scale acknowledges the child's perspectives and opinions about the different family rules and ideas for the errand planning task as a valid part of the child's individual identity. A parent scoring very high does this explicitly by negotiating rules with the child, verbalizing his/her acknowledgment of the child's intentions and ideas, does not deny the child's right to those desires, and models his/her individuality, too. Note: Parent can get a low score just by denying the child's individuality strongly (e.g. interrupting the child, doing things before the child can on his/her own, not allowing child to express his/her own opinion) even though it is not interrupting the child's behavior.

1. Very Low. Parent completely denies the child's individuality in the techniques he/she uses. Parent is very intrusive, physical and forceful in controlling the child.

2. Low. Parent strongly denies the child's individuality, but there are a few opportunities for the child to experience autonomy, whether by variation in parent's approach, or simply by

occasional absence of maternal controls over the child. Mostly, however, this parent's style denies the child's autonomy.

3. Moderately Low. Parent does not completely deny the child's individuality, but he/she effectively communicates that the child's intentions and opinions do not have validity compared to his/her own intentions and opinions for the child. He/she also intrudes strongly on the child's behavior, giving him/her little chance to do anything on his/her own.

4. Moderate. Parent shows moderate respect for child's autonomy; he/she is moderately intrusive. Although parent does not deny the child's separate identity, he/she does very little to support the validity of the child's individuality. He/she might communicate doubt to the child about the appropriateness of having his/her own intentions and opinions, or intrude abruptly on the child several times.

5. Moderately High. Parent does allow the child some autonomy of intentions and opinions, but he/she does not actively support and reinforce this perspective in the child. He/she may reflect the child's intentions and ideas by engaging the child, but he/she also exerts his/her will at times over the child in a way that shifts the child's perspective.

6. High. Parent respects child's autonomy. He/she is not intrusive over the child; instead, he/she acknowledges the child's intentions and opinions, communicates trust in the child's individuality, and allows a mutually negotiated interaction.

7. Very High. Parent very clearly interacts with the child in a way that acknowledges the validity of the child's perspective, encourages the child to acknowledge his/her intentions and opinions, and to negotiate the course of interactions in the session. This parent also models his/her individuality to the child in these negotiated interactions and may insist on the importance of his/her interventions being followed, but he/she does so while acknowledging the reality and validity of the child's differing perspective and never in an intrusive manner.

* Note: If a parent's respect for autonomy *during the discussion task* is rated as 5 or below, his or her *overall* respect for autonomy cannot be rated higher than a 5.

Parent Hostility:

This scale reflects the parent's expression of anger, discounting or rejecting of the child. A parent scoring high on this scale would clearly and overtly reject the child, blame him or her for mistakes, and otherwise make explicit the message that he/she does not support the child emotionally. A parent scoring low on this scale may be supportive or cold, but he/she does not blame or reject the child. A rejecting parent may also show some Supportive Presence (and the inconsistency of his/her behavior would be revealed by these two scores). Given the low frequency and the clinical relevance of rejecting one's child during a videotaped session, any events which are clearly hostile should be weighted strongly on this score.

1. Very Low. Parent shows no sign of rejection. He/she may or may not be supportive, but he/she does not try to put down the child or avoid the child in rejecting ways. Passive or emotionally uninvolved parents would be included in this scale point if the parent does not reject the child or communicate hostility towards the child.

2. Low. The parent conveys a little hostility once or twice. The messages are not overt but muted forms of hostility (e.g., pulling away, pulling something away from the child with a jerk, brief displays of exasperation, looking at the child coldly for a brief time, teasing with a negative content but with accompanying humor or warmth, parroting or mimicking the child). Or, the parent shows a diffuse level of discontent, discomfort, or boredom, but it is not directed at the child.

3. Moderately Low. Signs of hostility again are very fleeting, but they occurred on several occasions during the session, and at least one sign could be identified as clear and overt or an accumulating sense of unexpressed anger and avoidance toward the child was seen in the parent's behavior.

4. Moderate. Several instances of hostile or rejecting behaviors. Two or more of these events are reliably clear to observers, but expressions are brief and do not set the tone of the parent's interactions immediately following the episodes.

5. Moderately High. Parent is overly rejecting or hostile several times. Behaviors include overt and clearly communicated rejections of child and expressions of hostility or anger which appear intermittently through substantial periods of the session. This parent's behavior is more rejecting than not, either by the frequency of hostile behavior or by the potency by which rejection is communicated several times in the session.

6. High. This parent has frequent expression of rejections and hostility directed toward the child. There is little or no effort to show warmth during substantial portions of the session, especially after the parent becomes irritated with the child (e.g., parent may initially be warm and then rejects the child strongly). Parent is frankly and directly rejecting and hostile (e.g., telling the child he/she will leave him/her behind if he/she does not do the task, using negative performance feedback but little positive feedback, blaming the child for incompetence on the tasks, and overtly refusing to recognize the child's success, e.g., "You couldn't have done it without me showing you!"). Any warmth seems superficial related to the parent's distancing from the child, rejection is used as a control technique against the child.

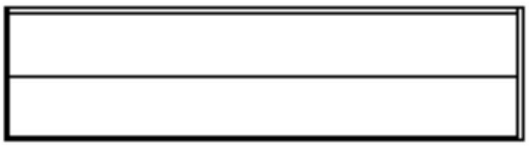
7. Very High. This parent shows characteristics of the previous scale, but expressions of anger toward the child are also accompanied by strong, barely controlled emotions, suggesting the possibility of physical abuse and neglect of the child in some situations.

*Note: If a parent's hostility *during the discussion task* is rated as a 2, his or her *overall* hostility cannot be rated as a 1. Similarly, if a parent's hostility *during the discussion task*, is rated as a 3, his or her *overall* hostility cannot be rated lower than a 3.

Appendix C

Tower of Hanoi

Example Rating Scale:



Let me pick these up and put them in different places. Remember, you want to get your board to look just like my board with all the rings over here in the same order with the largest on the bottom and the smallest on the top. And you want to do it in the fewest number of moves possible.

Task 1

S M L	S M L ___ ___
Start Position	Goal Position

V G B	Y G B ___ ___
Start Position	Goal Position

Correct Moves	#	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
— Y —							
B — —							
— — Y							
G — —							
Y — —							
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Example Visual Display:

Appendix D

State Trait Anger & Anxiety Scales

A number of statements that people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statements to indicate how you have felt during the past week. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer that seems to describe your feelings best.

1 = Not at all in the past week.
2 = Some or a little of the time (1-2 days a week)
3 = Occasionally or a moderate amount of time (3-4 days a week)
4 = Most or all of the time (5-7 days a week)

	Not at all	Somewhat	Moderately	Very much
During the past week:				
1. I felt calm.	1	2.	3	4
2. I was furious.	1	2.	3	4
3. I was tense.	1	2.	3	4
4. I felt like banging on the table.	1	2.	3	4
5. I felt at ease.	1	2.	3	4
6. I felt angry	1	2.	3	4
7. I was worrying over possible misfortune.	1	2.	3	4
8. I felt like yelling at somebody.	1	2.	3	4
9. I felt nervous	1	2.	3	4
10. I felt like breaking things	1	2.	3	4
11. I was jittery.	1	2.	3	4
12. I was mad.	1	2.	3	4
13. I was relaxed	1	2.	3	4
14. I felt irritated	1	2.	3	4
15. I was worried	1	2.	3	4
16. I felt like hitting someone	1	2.	3	4
17. I felt steady	1	2.	3	4
18. I was burned up.	1	2.	3	4
19. I felt frightened	1	2.	3	4
20. I felt like swearing	1	2.	3	4

Appendix E

Description of Wechsler Abbreviated Scale of Intelligence Tasks

WASI Full Scale IQ Score is the IQ equivalent of the sum of T-Scores for all four subtests of the WASI: Vocabulary, Similarity, Block Design and Matrix Reasoning. The raw scores are converted to T-Scores for each subtest, and the T-Scores are then summed and converted to the IQ score. Actual scores range from 62 to 147, with higher values indicating a higher IQ and greater cognitive abilities.

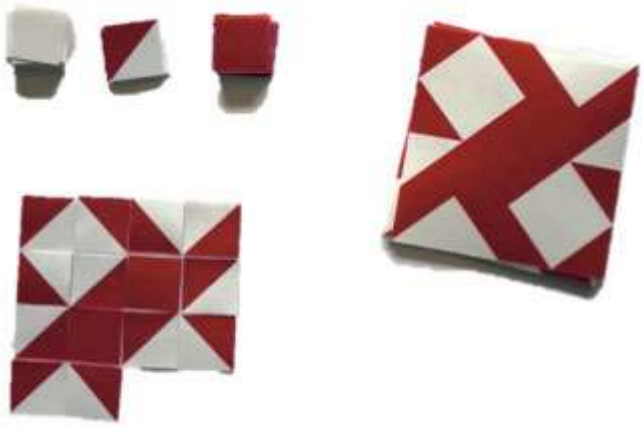
Vocabulary: The Vocabulary subtest consists of 31 items designed to assess word knowledge and verbal concept formation. In this test the examinee is presented with 31 items in succession (23 pictures and 28 verbal items). For picture items the examinee is asked to name the object presented. For verbal items, the examinee is asked to define the words. Example Question:

"What is a cow?"

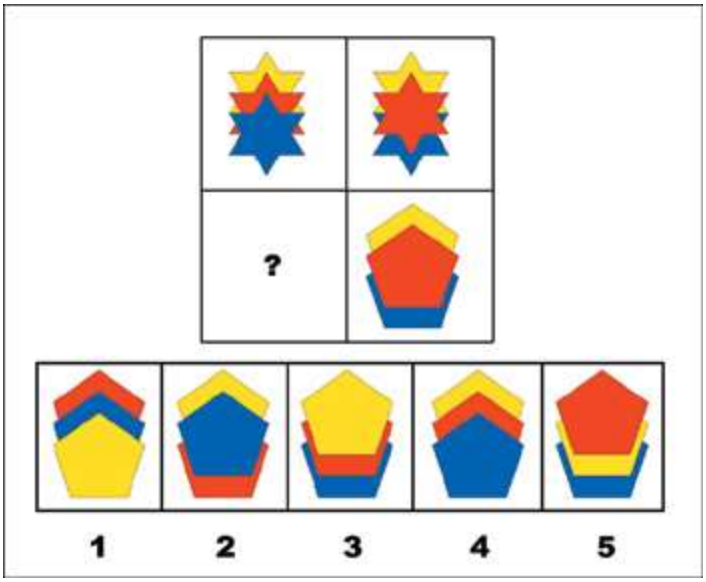
Similarity: The Similarity subtest consists of 24 items (3 picture items, 21 verbal items) designed to assess verbal concept formation and reasoning. For picture items the examinee is presented with several target objects that share a common characteristic. The examinee is then presented with several additional pictures and asked to pick the picture that also shares a common characteristic with the target objects. For verbal items the examinee is presented with two words representing common objects or concepts. The examinee is then asked to describe how these two words are similar. Example Question:

"In what way are anger and joy alike?

Block Design: The Block Design subtest consists of 13 Items designed to assess analysis and synthesis of abstract visual stimuli. In this test the examinee is presented with a constructed block model and pictures of a block model. The examinee is then asked to use red and white blocks to recreate the design within a specified time limit. Example Visual Display:



Matrix Reasoning: The Matrix Reasoning subtest consists of 30 items designed to assess spatial ability, perceptual organization and processing abilities. In this test the examinee is presented with an incomplete matrix and a choice of several additional pictures. The examinee is asked to choose the picture that best completes the matrix. Example Question:



Appendix F

Maternal Education and Socioeconomic Status Questions from Home Interview

- How far did you go in school? (Probe for details)
    - 1- < 12 yrs. 2- High School GED 3. Some College 4- BA level 5- Post Grad.

- . . . . HAND CARD 2 TO MOTHER. From these categories, choose the one that represents your income range. You can choose either the annual or monthly scale.
    - Was this your income before taxes?

- . . . HAND CARD 2 TO MOTHER. From these categories, choose the one that represents (HUSBAND/PARTNER'S) income range. You can choose either the annual or monthly scale.
    - Was this income before taxes?

Appendix G

Child Health Condition Follow-Up Questionnaire

* Based on mother verbal response, research assistant was required to code “No”, “Yes”, “Don’t Know” or “Refused” for each question.

- In the past 12 months, has a doctor prescribed iron medication to your child or told you that CHILD has anemia?
- In the past 12 months, has CHILD had tubes put in her ears ?
- In the past 12 months, has CHILD had conjunctivitis or pink eye ?
- In the past 12 months, did CHILD have: repeated tonsillitis or enlargement of the tonsils or adenoids ?
- In the past 12 months, did CHILD have: frequent or repeated ear infections?
- In the past 12 months, did CHILD have: any kind of food or digestive allergy?
- Has CHILD had any kind of food or digestive allergy for at least 3 months in CHILD 's lifetime?
- In the past 12 months, did CHILD have: FREQUENT or REPEATED diarrhea or colitis?
- In the past 12 months, did CHILD have: any other persistent bowel trouble?
- Has CHILD had [specified other persistent bowel trouble] for at least 3 months in CHILD 's lifetime?
- In the past 12 months, did CHILD have: sickle cell anemia?
- In the past 12 months, did CHILD have: asthma?
- In the past 12 months, did CHILD have: pneumonia?
- In the past 12 months, did CHILD have: hay fever?
- In the past 12 months, did CHILD have: any other kind of respiratory allergy ?
- In the past 12 months, did CHILD have: deafness or trouble hearing with one or both ears?
- Has CHILD had deafness or trouble hearing with [one ear/both ears] for at least 3 months in CHILD 's lifetime?
    RECORD WITHOUT ASKING:
    - IS IT AN OBVIOUSLY PERMANENT CONDITION THAT BEGAN LESS THAN 3 MONTHS AGO
- In the past 12 months, did CHILD have: blindness in one or both eyes?
- In the past 12 months, did CHILD have: eczema or any kind of skin allergy?
- Has CHILD had eczema or any kind of skin allergy for at least 3 months in CHILD 's lifetime?

- In the past 12 months, did CHILD have: epilepsy or repeated convulsions or seizures not associated with fever?
- In the past 12 months, did CHILD have: seizures associated with fever?
- In the past 12 months, did CHILD have: any other condition that lasted three months or more?
    - LIST CONDITION: _____