CHILD CHARACTERISTICS AND TRAJECTORIES OF ACHIEVEMENT: A FOCUS ON LEARNING-RELATED SOCIAL SKILLS AND ACADEMIC ACHIEVEMENT IN MIDDLE CHILDHOOD

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There has been a growing emphasis on understanding the links between children's social characteristics and academic achievement. Socio-emotional characteristics linked with academic performance are known as learning-related social skills (LRSS). Prior research has mostly examined the links between LRSS in early childhood and short-term assessments of academic achievement. More recent studies have begun to examine trajectories of achievement, but they have primarily been linked with early LRSS. Given that children interact with several potential socializing agents such as teachers and peers when they are in school, links between middle childhood LRSS and academic trajectories require attention. In this study, links between three indices of LRSS (attention, self-regulation, and behavior problems) and trajectories of reading, vocabulary, and math were examined from first through fifth grade. Early LRSS and demographic factors were also considered. It was expected that *between-children* differences in middle childhood attention problems, self-regulation, and behavior problems would be associated with average levels of achievement and growth over time. *Within-child* changes in attention problems, self-regulation, and behavior problems were also expected to be associated with changes in achievement. Another goal of the study was to examine whether LRSS moderated the links between family income and achievement and between gender and achievement. It was expected that having higher LRSS would be associated with a lower risk of

poor achievement for children from low income families and for boys. Using HLM 6.03, these links were tested in a subset of the data from the NICHD SECCYD (n = 1123). Missing data were imputed by subgroups of race/ethnicity. *Between-children* differences on teacher-reports of attention problems displayed significant negative links with the average levels, but not with the slopes, of reading, math, and vocabulary. Early LRSS were better predictors of the intercepts of achievement but not after taking demographic factors into account. *Within-child* changes in LRSS during middle childhood were not significantly associated with changes in achievement. Interactions between poverty and LRSS were also not significant. However, higher levels of teacher-reported attention problems were associated with higher levels of math scores for girls. Implications and directions for future research are discussed.

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1.0 OVERVIEW

1.1 LEARNING-RELATED SOCIAL SKILLS AND ACADEMIC ACHIEVEMENT

For successful academic performance, a wide variety of skills are important. Traditionally, emphasis was placed on understanding disparities in academic achievement due to individual differences in early cognitive skills. Recent evidence indicates that children's socio-emotional characteristics are also very important for school performance (Alexander, Entwisle, & Dauber, 1993; Raver, 2002; Raver & Zigler, 1997; Rutter, 1985).

Socio-emotional characteristics such as self-regulation, attention, persistence, cooperation, and cooperation are called learning-related social skills (LRSS) and have been linked with school performance (McClelland & Morrison, 2003; McClelland, Morrison & Holmes, 2000). For example, being able to sit still in the classroom, paying attention to the teacher and following along, working with other children cooperatively, and waiting for one's turn seem to facilitate better performance at school. Conversely, children who lack these social skills are likely to be at an academic disadvantage (Cooper & Farran, 1988; Ladd, Kochenderfer, & Coleman, 1997).

The primary aim of this paper was to examine links between children's learning-related social skills in middle childhood and trajectories of academic achievement from first through fifth grade. Specifically, learning-related social skills as indexed by teacher-reports of self-

regulation, attention problems, and behavior problems were expected to be associated with trajectories of reading, vocabulary, and math from first through fifth grades. A related aim was to investigate whether Learning-related social skills moderate the relationship between family income and achievement and between gender and achievement.

1.2 STATEMENT OF PROBLEM

1.2.1 LRSS and Trajectories of Academic Achievement in Middle Childhood

Children enter school with different levels of learning-related social skills (Foulks & Morrow, 1989; Rimm-Kauffman, Pianta, & Cox, 2000) and these skills are positively associated with short-term assessments of academic achievement from preschool through first grade (Bub, McCartney, & Willett, 2007; Bronson et al. 1995; Ladd, Birch, & Buhs, 1999; McClelland & Hansen, 2001). Substantial literature exists supporting the associations between early learning-related social skills (at or prior to school entry) and academic achievement in the short term. However, it remains unclear whether early learning-related social skills continue to be associated with trajectories of academic achievement throughout elementary school (spanning middle childhood), or whether learning-related social skills during middle childhood are associated with academic achievement concurrently.

Based on the ecological (Bronfrenbrenner & Morris, 1998) and transactional frameworks (Sameroff, 1995) of development, we expect a reciprocal relationship between children's social characteristics and the broader social, physical, and environmental contexts they live in. When considering academic achievement, it is believed that children bring unique characteristics with

them to the learning process and interactions between these child characteristics and their experiences in different contexts shape their academic trajectories (Morrison, Bachman, & Connor, 2005). Specifically, the transactional framework (Sameroff, 1995) would posit that learning-related social skills are likely to be modified over time due to the increasing interactions with other socializing agents such as teachers and peers and with the increasing demands of school. Whether or not early learning-related social skills continue to be associated with academic achievement throughout middle childhood, we expect to observe concurrent associations between learning-related social skills and academic achievement in middle childhood. However, little research in the extant literature has examined concurrent associations between learning-related social skills and trajectories of academic achievement spanning middle childhood.

1.2.2 LRSS as a Moderator

Despite substantial evidence favoring positive associations between various aspects of learning-related social skills and academic achievement, few studies have systematically investigated whether higher levels of learning-related social skills are associated with decreased risk of poorer academic achievement for children with lower family income or with greater gains in academic achievement for boys.

1.2.2.1 Family Income, Academic Achievement, and LRSS

Persistent poverty has been linked with multiple developmental domains in childhood including achievement and socio-emotional skills (Dearing, McCartney & Taylor, 2001; Duncan, Brooks-Gunn, Yeung, & Smith, 1998; Votruba-Drzal, 2006). Past studies have repeatedly found

links between economic hardships in early childhood and lower academic performance (Duncan & Brooks-Gunn, 1997; Duncan & Brooks-Gunn, 2000; Votruba-Drzal, 2006), as well as associations among poverty in middle childhood and decreased achievement (NICHD ECCRN, 2005a). Lower family income levels appear to pose risk of poorer achievement but not all children from low income families fare badly (Egeland, Carlson, & Sroufe, 1993). Evidence suggests that lower-income children fare significantly better academically if they also exhibit higher attention span (Alexander, Entwisle, & Dauber, 1993) or higher social competence and lower aggression (Bierman et al., 2008). Based on what is known about the links between family income, academic achievement, and learning-related social skills it is surprising that very few studies have examined whether learning-related skills moderate the links between lower family income and trajectories of achievement.

1.2.2.2 Gender, Academic Achievement, and LRSS

Research in past decades more commonly demonstrated girls' better performance on verbal tasks and boys' superior performance on mathematical abilities, however recent work has revealed less of a difference. Although the gender gap in achievement has been narrowing over the years, boys' performance at school has become a growing concern. Increasingly, boys with lower levels of learning-related social skills are being identified as exhibiting poorer academic achievement. Again, very few studies have examined whether having higher levels of learning-related social skills are more strongly associated with a lower risk of compromised achievement for boys.

1.3 GOALS OF THIS STUDY

The primary goal of this study was to examine whether learning-related social skills in middle childhood are associated with trajectories of academic achievement during elementary school. *Between-children differences* in learning-related social skills and their links with academic achievement in middle childhood were examined to determine whether interindividual differences among children in teacher-reported attention problems, self-regulation, and behavior problems were associated with average reading, vocabulary, and math scores and with growth in these skills in elementary school. In addition, *within-child changes* in learning-related social skills during middle childhood and corresponding changes in reading, vocabulary, and math scores were examined to determine if improved social functioning was associated with improved academic achievement. All associations were examined over and above early learning-related social skills, and net of child and family demographic and cognitive characteristics.

An additional goal was to identify whether links between family income and academic achievement and between gender and achievement are moderated by learning-related social skills. Interactions between family income in middle childhood (*poor* and *non-poor* categories based on 200% poverty level) and all three indices of learning-related social skills were analyzed. Similarly, interactions between family income in early childhood and teacher-reported learning-related social skills were also examined.

To examine whether having higher levels of learning-related social skills during middle childhood was associated more strongly with boys' academic achievement compared to girls', multi-group analyses by gender were conducted. The coefficients linking self-regulation, attention, and behavior problems with reading, vocabulary, and math were compared for boys and girls.

1.4 SUMMARY OF PRESENT STUDY

In order to accomplish these research goals a subset of the data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD) were used. Academic achievement outcomes were available at first, third, and fifth grades. Learning-related social skills in middle childhood were measured concurrently with achievement outcomes. Early learning-related social skills were indexed at 54-months. Various child and family demographic and cognitive factors were available throughout the first 54 months of the target children's lives.

Academic achievement outcomes of reading, math, and vocabulary were assessed using the Woodcock Johnson Revised Test Battery (Woodcock & Johnson, 1989, 1990). Learning-related social skills in middle childhood as indexed by self-regulation, attention, and behavior problems were based on teacher-reports obtained at first, third, and fifth grades. Mother's reports of attention problems, self-regulation, and behavior problems at 54 months were used as indicators of learning-related social skills in early childhood.

Covariates included child characteristics (race/ethnicity, gender, birth weight, age at first grade, cognitive ability in early childhood), maternal characteristics (maternal age, education, employment, marital transitions, verbal skills), and family factors such as residential transitions, number of children at home, and family income.

To examine the two research questions, these longitudinal data were analyzed using Hierarchical Linear Modeling (HLM 6.03; Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004). Missing data were imputed using chained equations in STATA 9.0 (Royston, 2005), resulting in five imputed data sets. Missing data were imputed separately for each of the three racial/ethnic subgroups (White/other, non-Hispanic Black,

Hispanic). For each model that was tested, the HLM program provided combined results based on all five datasets. Data dependence due to children nested within classrooms was also taken into account in the analyses.

To examine the research questions, all analyses were conducted using the imputed and the unimputed datasets. In all, four sets of analyses were compared: imputed and unimputed models that included or excluded a level-3 adjustment for data dependence in classrooms. Due to the similarity across the results, this paper presents results of the analyses of 2-level models with imputed data.

1.5 RESEARCH QUESTIONS & HYPOTHESES

Four hypotheses associated with the two research questions addressed in this study are presented below:

1.5.1 Research Question 1

This first question examined whether earning-related skills in middle childhood are linked with trajectories of academic achievement from first through fifth grade over and above early learning-related social skills and child and family demographic and cognitive factors. Since this study aims to address *between-children* differences in learning-related social skills and *within-child* changes in these skills and their associations with academic trajectories, two hypotheses were formulated.

1.5.1.1 Hypothesis 1

With respect to *between-children* differences in learning-related social skills during middle childhood and trajectories of achievement from first through fifth grade, it is expected that measures of self-regulation, attention, and behavior problems in middle childhood will be associated with trajectories of reading, math, and vocabulary skills from first through fifth grade.

Specifically, higher levels of self-regulation and lower levels of attention problems and behavior problems will be associated with higher intercept and growth in all three academic trajectories. In addition, all associations will be significant even after controlling for early childhood self-regulation, attention, and behavior problems and over and above child and family demographic and cognitive factors.

1.5.1.2 Hypothesis 2

With respect to *within-child* changes in learning-related social skills during middle childhood and academic achievement from first through fifth grade, it is expected that changes in self-regulation, attention, and behavior problems during middle childhood will be associated with corresponding changes in reading, math, and vocabulary scores from first through fifth grade.

Increases in self-regulation or positive change in scores during middle childhood are expected to be associated positive changes in reading, math, and vocabulary scores. On the other hand, increases in attention or behavior problem scores during middle childhood will be associated with decreases in reading, math, and vocabulary scores.

1.5.2 Research Question 2

The second question examined whether learning-related social skills moderate the links between family income levels and academic achievement and between gender and achievement. The aim was to investigate whether lower levels of attention and behavior problems and higher levels of self-regulation were associated with decreased risk of poorer academic achievement for children from lower income families. Additionally, it was examined whether higher learning-related social skills were associated with decreased risk of poorer academic achievement for boys.

1.5.2.1 Hypothesis 3

With respect to learning-related social skills in middle childhood as a moderator of the links between family income and trajectories of academic achievement, it is expected that children who experience economic hardships during middle childhood will have higher intercept and slopes for reading, math, and vocabulary skills if they also exhibit higher levels of self-regulation, and lower levels of attention and behavior problems compared to children who experienced economic hardships during middle childhood and exhibit lower levels of self-regulation, and higher levels of attention and behavior problems. Similar patterns of achievement are expected for children who experienced economic hardships in early childhood.

1.5.2.2 Hypothesis 4

With respect to learning-related social skills in middle childhood as a moderator of the links between gender and trajectories of academic achievement, it is expected that the coefficient linking average attention problems, average behavior problems, and average self-regulation to the intercepts of reading, vocabulary, and math will be significantly higher for boys than for

girls. This would indicate that lower levels of attention problems and behavior problems will be associated with significantly higher average reading, vocabulary, and math scores for boys than for girls. Conversely, higher levels of self-regulation will be associated with significantly higher average reading, vocabulary, and math scores for boys than for girls. Similarly, improvements in attention problems, self-regulation, and behavior problems will be associated with greater improvements in reading, vocabulary, and math scores for boys than for girls.

1.6 SIGNIFICANCE OF THIS STUDY

This paper extends previous research in several significant ways. A major contribution has been the examination of the associations between learning-related social skills in middle childhood and trajectories of academic achievement throughout elementary school. Research thus far seems to have focused primarily on the links between early-learning-related social skills and academic achievement. In addition, the present study examined associations between inter-individual as well as intra-individual differences in learning-related social skills and trajectories of achievement. Additionally, distinguishing between various indices of learning-related social skills allowed for an investigation of differential links between social skills and achievement. Moreover, the longitudinal nature of this study allowed for examination of concurrent links between learning-related social skills and achievement in middle childhood while taking into account early childhood learning-related social skills.

This study also addresses important moderational questions that may be relevant for policy and practice. First, given growing concerns about boys' disengagement in school and underperformance, this study examines the potential effect of higher LRSS for boys. Similar

educational concerns are also commonly raised for children from lower income backgrounds, and this study also addresses the potential benefit of having of higher LRSS for children facing contextual risks such as lower levels of family income.

Additionally, this study also contains several important methodological improvements including rigorous examination of the trajectories of academic achievement and accounting for data dependence due to children's nesting within classrooms. Another methodological improvement was the imputation of missing data, particularly imputing missing data by racial subgroups which allowed the ability to maintain the race/ethnicity differences inherent in the original data. Lastly, although findings from this non-experimental, longitudinal study will not justify/capture causal influence, our understanding of the associations between children's socio-emotional characteristics and their academic achievement is enhanced.

2.0 INTRODUCTION

2.1 LEARNING RELATED SOCIAL SKILLS

Social characteristics that have the capacity to facilitate or interfere with children's engagement in learning activities or participation in the classroom are considered learning-related social skills (Ladd, Birch, & Buhs, 1999). Learning-related social skills are characterized by behaviors such as paying attention, listening and following directions, staying on task, staying organized, cooperating, and working well in groups (McClelland, Morrison, & Holmes, 2000). These distinctive characteristics are displayed while children engage in educational activities (McDermott, Leigh, & Perry, 2002).

Learning-related social skills are also known as work-related skills, mastery behaviors, or learning behaviors and they encompass dimensions such as self-regulation, attention, cooperation, independence, and responsibility (Cooper & Farran, 1988). Extant research examining the links between learning-related social skills and later academic achievement has investigated a whole host of social characteristics such as attention, ability to follow directions, persistence, non-compliance, cooperation, competence motivation, attitude toward learning, flexibility, socially responsible behavior, sociometric status, goal setting, and problem solving behaviors (Cooper & Farran, 1988; Cooper & Speece, 1988; Foulk & Morrow, 1989).

The present study will focus on the associations among three primary dimensions of learning-related social skills (LRSS): self-regulation, attention, and behavior problems. These aspects of LRSS have repeatedly demonstrated importance for children's academic progress in early elementary school.

2.2 LEARNING-RELATED SOCIAL SKILLS IN SCHOOL CONTEXT

Imagine a child sitting on his or her desk, listening attentively to the teacher's directions, focused on the task at hand, or working collaboratively with his classmates on a group activity. One might be more likely to conclude, whether the case or not, that this child is performing well in class. On the other hand, another child who appears distracted when the teacher is talking, fidgets and moves around when he or she is supposed to be sitting on the desk, or has difficulty working with other children in group, gives the impression of a child struggling in the classroom.

In addition to general cognitive ability, these social characteristics, described earlier as learning-related social skills, are also deemed critical for successful academic performance (Raver, 2002). Scholars have recommended that, "in addition to the focus on literacy and mathematics skills, resources should be dedicated to fostering development in social-emotional skills and self-regulation" (Shonkoff & Philips, 2000).

Individual differences in learning-related social skills such as self-regulation, attention, and behavior problems have been found to consistently distinguish between children with higher or lower academic performance (Alexander, Entwisle & Dauber, 1993; McClelland, Acock, & Morrison, 2006; Miles & Stipek, 2006). The next sections briefly summarize how self-regulation, attention, and behavior problems might facilitate or impede academic performance.

2.2.1 Self-Regulation

Various aspects of self-regulation are deemed critical for adaptive functioning in school, including both academic and social adjustment (Blair & Razza, 2007; Kochanska & Knaack, 2003; McDowell, O'Neill, & Parke, 2000; Patrick, 1997). Delay of gratification, one facet of self-regulatory ability, has been significantly linked with cognitive development (Mischel, Shoda, & Peake, 1989). Being able to delay immediate and attractive rewards in order to attain more important but less appealing objectives reflects effortful control over one's actions. Effortful control, also considered an index of self-regulation, is defined as the ability to withhold predominant responses to be able to perform sub-dominant responses (Rothbart & Bates, 1998). Similarly, children's cognitive self-control, which is defined as "an ability to plan, evaluate, and to self-regulate one's problem-solving activities and one's attention to the task," are self-regulatory processes oriented toward the attainment of academic goals (Normandeau & Guay, 1998). Children who experience academic difficulties may be more likely to follow strategies for improvement by monitoring and evaluating their performance and taking steps to make desired changes if they possess higher levels of self-regulatory abilities (Patrick, 1997). For example, they may be likely spend more time working on challenging material and seek help instead of giving up.

Whether termed "cognitive self-control" or "effortful control" it appears that general self-regulation involves the voluntary ability to modulate one's behavioral tendencies and emotions in order to accomplish tasks which have long-term benefits as opposed to short-term gratification. Furthermore these self-regulatory skills appear important for children's school success. The current school environment, with ever-increasing expectations to meet higher academic standards at younger ages, is considered to pose risks for young children with low self-

regulation (Miech, Essex, & Goldsmith, 2006). On the other hand, presence of good self-regulatory abilities is likely to support engagement in learning-related endeavors.

2.2.2 Attention Skills

In the first few years of life there is gradual development in young children's ability to focus and sustain attention or shift and redirect it as desired (Ruff & Rothbart, 1996). According to Ruff and colleagues, attention involves flexibility in orienting, selecting, and sustaining focus on objects and events (Lawson & Ruff, 2004). Attention skills are considered vital for learning processes because they allow the learner to attend to the ongoing activity without being easily distracted as well as shift attention from one activity to another when needed (Lawson & Ruff, 1994).

With increasing focus on instruction and testing in grades as early as kindergarten (*No Child Left Behind* Act of 2001), it has become imperative that young children not only be able to sit still for longer periods of time but also be able to engage, disengage, shift, and sustain their attention as required. These classroom demands on children's attention skills are likely to pose a greater risk of decreased academic competence for children with attention problems.

2.2.3 Behavior Problems

Behavior problems are primarily seen as interpersonal skills rather than work-related skills (Cooper & Farran, 1988). They affect children's academic performance by hindering their ability to work cooperatively with other children and teachers. Extreme levels of behavior problems are linked with academic performance primarily via their associations with peer relationships

(Parker & Asher, 1987). Aggressive and disruptive behaviors are consistently linked with peer rejection, compromised academic achievement, grade retention, school drop-out, and juvenile delinquency (Kuperschmidt & Coie, 1990; NICHD ECCRN, 2004; Vitaro, Laroque, Janosz, & Tremblay, 2001). Raver (2002) notes that, children who exhibit aggressive tendencies face a number of challenges that ultimately become hurdles in performing well at school. Children with severe behavioral difficulties are often distracted, resulting in their not participating properly in classroom activities. They are less likely to work well in group activities, thereby losing out on the benefit of learning from other children (Ladd, Birch & Buhs, 1999). Children with higher levels of behavior problems are also more likely to have conflictual relationships with their teachers and receive more negative feedback from teachers which may result in academic difficulties, school avoidance and dislike for learning (Birch & Ladd, 1997; Hamre & Pianta, 2001).

A substantial body of work has examined the links between learning-related social skills and academic achievement in early childhood. Relatively fewer studies investigated these links into middle childhood. To understand the nature of the associations between learning-related social skills and academic achievement, research focused on early childhood will be discussed first. Research bearing on academic achievement and learning-related social skills during middle childhood will be discussed subsequently.

2.3 LEARNING-RELATED SOCIAL SKILLS AND ACADEMIC ACHIEVEMENT IN EARLY CHILDHOOD

Accumulating evidence has detected significant associations among learning-related social skills in early childhood and later academic achievement (Alexander, Entwisle, & Dauber, 1993; Duncan et al., 2007; Ladd, Birch, & Buhs, 1999; McClelland & Hansen, 2001; McClelland & Morrison, 2003; Duncan et al. 2007; Li-Grining, Votruba-Drzal, & Maldonado, manuscript revise-resubmit 2009). Learning-related social skills at kindergarten have been positively associated with alphabet knowledge, reading, math, receptive vocabulary, and general knowledge at the beginning of kindergarten, over and above the effects of parental education, home learning environment, age at school entry, amount of preschool attended, and child IQ (McClelland, Morrison, & Holmes, 2000). Learning-related social skills have also been associated with reading and math, but not vocabulary skills, at the end of second grade (McClelland et al., 2000) after controlling for academic skills in kindergarten and child and family factors. Research in this area has evolved in the two main ways: (1) recent work increasingly distinguishes components of LRSS rather than relying on single composites, and (2) concurrent analyses have been steadily replaced by longitudinal investigations of academic and social trajectories.

2.3.1 Distinguishing between Components of LRSS

Whereas, initial studies assessed learning-related social skills as a composite of several skills, many later studies disaggregated links between specific social skills and achievement. In many studies components of learning-related social skills such a self-regulation, attention span,

behavior problems, behavioral regulation, cooperation, and interest and participation were individually linked with academic skills such as reading and math. Unique links between different components of learning-related social skills and academic achievement were observed (Alexander, Entwisle, & Dauber, 1993; Bub, McCartney, & Willett, 2007; Duncan et al, 2007; McClelland, et al. 2007). Children's behavior regulation, as measured by a laboratory-based assessment tapping into inhibitory control, attention, and working memory, has been related to literacy, vocabulary, and math skills at the beginning and the end of prekindergarten (McCelland et al., 2006). Changes in this measure of behavioral regulation during the prekindergarten year were also associated with changes in literacy, vocabulary, and math during that year. Internalizing and externalizing behavior problems at 24-months were negatively associated with Woodcock Johnson cognitive ability and achievement at first grade and changes in internalizing but not externalizing behavior between 24-months and first grade were linked with first grade cognitive ability (Bub, McCartney, & Willett, 2007).

Several aspects of self-regulation have also been found to be linked with school success. Blair and Razza (2007) found that performance on executive functioning tasks that involved inhibitory control, attention shifting, and working memory during preschool and kindergarten were positively linked with letter-knowledge, phonemic awareness, and math knowledge in kindergarten (Blair & Razza, 2007). In another work, associations between emotion regulation and academic competence in kindergarten and first grade children were mediated by teacher's ratings of attention (Trentacosta & Izard, 2007).

2.3.2 Longitudinal Links between LRSS and Academic Achievement

Whereas, some earlier studies focused on concurrent or short-term linkages between learning-related social skills and achievement, subsequent research has examined associations at multiple time points throughout elementary school. For example, Duncan and colleagues (2007), assessed reading and math achievement measured by the Woodcock Johnson Test Battery and teacher-reports of literacy and mathematical thinking at first, third, and fifth grades. Using six different national datasets, they examined the links between these achievement outcomes and observations of sustained attention and impulsivity, teacher-reports of attention problems, aggression, and internalizing problems, and teacher-reports of cooperation, self-control, and assertion using the Social Skills Rating System. At first grade, teacher-report of attention in kindergarten and aggressive behavior predicted math test scores. Higher performance on observed sustained attention task at 54 months and teacher-rated classroom behavior predicted teacher-ratings of math and reading. At third grade, higher teacher-ratings of attention predicted reading and math. Teacher-report of internalizing behavior also predicted reading. At fifth grade, teacher-rated attention predicted math and observations of sustained attention predicted reading.

Yet other studies began assessing links between early childhood learning-related social skills with trajectories of achievement during elementary school. In these studies learning-related social skills were typically assessed at or prior to school entry and achievement trajectories in middle childhood were modeled. In an examination of the links between learning-related social skills (a composite measure of self-regulation, attentiveness, and persistence) at kindergarten and trajectories of reading and math throughout elementary school, Li-Grining and colleagues (Li-Grining, Votruba-Drzal, & Maldonado, manuscript revise-resubmit, 2009) found this composite measure of learning-related social skills linked not only with the initial levels of reading and

math achievement but also with growth in both reading and math. Alexander, Entwisle, and Dauber (1993) also identified concurrent and long-term links among attention and interest-participation with reading and math achievement in first, second, and fourth years of school.

Moreover, McClelland and colleagues (2006) found links between learning-related social skills and trajectories of achievement from kindergarten to sixth grade. In this study learning-related social skills were assessed at kindergarten using the work-related subscale of the Cooper-Farran Behavioral Rating Scales (1991) which includes self-regulation, responsibility, independence, and cooperation. However, two separate measured were used to assess achievement. Subscales of the Peabody Individual Achievement Test - Revised (Markwardt, 1989) were used to assess reading and math between kindergarten and second grade; teacher-reports of reading and math skills were obtained using the North Carolina End-of-Grade Tests (North Carolina Department of Public Instruction) between third and sixth grades. Since two different measures were used to assess reading and math two separate trajectories were estimated: one from kindergarten to second grade and the other from third to sixth grade. McClelland and colleagues (2006) found links between learning-related social skills and intercept and growth in children's academic achievement between kindergarten and second grade. In this study, early learning-related social skills were found to be associated with the intercept only and not growth between third and sixth grades.

Prior research has demonstrated that characteristics such as self-regulation, behavior regulation, attention flexibility, interest and participation, or a combination of these are linked with standardized assessments or school reports of academic outcomes. This research has provided some very important perspectives to developmental science; however, several

methodological limitations remain. The next section discusses some shortcomings of previous literature that were addressed by more recent studies but need further attention.

2.3.3 Limitations of Prior Research and Modifications Addressed in Recent Studies

2.3.3.1 *Between-children* versus *Within-child* Differences in LRSS

Between-children associations test for inter-individual difference among children on predictors and their association with outcomes. Within-child associations test for corresponding changes in outcomes when changes in predictors occur.

Between-children analyses are more commonly addressed in studies as they tell us how differences among children on a given characteristic are associated with differences in outcomes. However, *between-children* analyses are susceptible to omitted variable bias since positive associations between two variables due to third variables may be overlooked (Dearing, Krieder, Simpkins, & Weiss, 2006; Duncan, Magnuson, & Ludwig, 2004). For example, we may consistently observe disparities in academic performance between children from poor and non-poor families. However, we may be failing to take into account the fact that children from poor families may be enrolled in lower quality schools than children from non-poor families. In contrast, factors that are linked with children and families but are fixed over time may be a cause of less concern in *within-child* analyses. In the above example, being enrolled in a poor quality school will be less likely to impact the links between *within-family* changes in involvement in a child's school over the course of time and his or her academic performance during that time, because if school quality is stable over time it can be ruled out as a potential influence (Dearing et al., 2006).

In the context of this topic, significant links between inter-individual differences on self-regulation, attention problems or behavior problems and academic outcomes such as math, reading, or vocabulary will indicate that having higher or lower levels of certain social skills are associated with differences in average levels of achievement. Whereas, intra-individual changes in the above mentioned skills will indicate whether changes in social skills are associated with corresponding increases or decreases in achievement.

As noted earlier, most studies on LRSS have focused on examining inter-individual differences in learning-related social skills but only two studies examined intra-individual differences on social behavior and links with achievement (Bub, McCartney, & Willett, 2007; McClelland, Acock, & Morrison, 2006). In addition to linking internalizing and externalizing behavior problems at 24 months with achievement and cognitive ability at first grade, Bubs, McCartney, and Willett (2007) examined the associations between rates of changes in internalizing and externalizing behavior problems from 24 months through first grade and achievement and cognitive ability at first grade. McClelland, Acock, and Morrison (2006) examined links between growth in behavior regulation during the prekindergarten year and growth in emergent literacy, vocabulary, and early math during that time. However, it should be noted that both studies ended the within-child examination by Pre-K or early elementary school. Examination of both between-children and within-child changes over a longer period of time, especially as children progress through school, is warranted. In the present study, both between-children differences in learning-related social skills and within-child changes in these skills were linked with academic achievement.

2.3.3.2 Composite Measures of LRSS versus Distinguishing between Different Skills

As noted earlier, most early work did not distinguish among the different components of learning-related social skills. Many studies employed composites of learning-related social skills (Li-Grining, Votruba-Drzal, & Maldonado, manuscript revise-resubmit 2009; McClelland, Acock, & Morrison, 2006) and some focused on individual components (Bub, McCartney, & Willett, 2007; McClelland, et al. 2007). A single composite measure of learning-related social skills doesn't allow for understanding the relative association between its different aspects and academic achievement. A few recent studies have focused on differential links between various aspects of learning-related social skills and achievement.

Duncan and colleagues' (2007) comprehensive analysis of school readiness and later achievement (Duncan et al., 2007) included many aspects of early learning-related behaviors such as self-control, prosocial behavior, and teacher's reports of behavior and attention problems. They further distinguished between emotional self-control and cognitive self-control (measured by observations of attention and impulsivity). Differential patterns with achievement were found. Attention, in this study, was a better predictor of math and reading skills than were self-regulation measures.

Although a handful of studies have distinguished between various components of learning-related social skills, more work will add to our understanding of unique links between different aspects of learning-related social skills and academic achievement to guide practice and policy efforts. In addition to evidence from other studies demonstrating differential links between components of learning-related social skills and achievement, correlations among the components in the data would also provide a basis for whether or not to aggregate them. In the present study, three components of learning-related social skills: self-regulation, attention, and

behavior problems, assessed by teacher-reports during middle childhood, were individually linked with reading, vocabulary, and math trajectories. Maternal reports of these three components of learning-related social skills in early childhood were also included without combining them together.

2.3.3.3 Short-term versus Multiple Estimates of Academic Achievement

Earlier research focused on understanding whether social indicators of school readiness were linked with academic achievement. Hence, achievement outcomes were typically assessed during that same year or within a year or two. Therefore, social skills were usually assessed at or prior to school entry, typically measured in preschool or kindergarten. Achievement outcomes were more commonly assessed at the end of kindergarten year or in first or second grades (McClelland & Morrison, 2003). Only a few recent studies have examined long-term associations between learning-related social skills and achievement by estimating academic trajectories (Li-Grining, Votruba-Drzal, & Maldonaldo, manuscript revise-resubmit 2009; Mcclelland et al. 2007). Short-term assessments of the association between learning-related social skills and trajectories of achievement are limited in helping determine the course of achievement over time. Skills predicting achievement over a longer term have practical significance by allowing for opportunities for intervention.

A few other studies examined concurrent links between learning-related social skills and achievement at multiple time points rather than examining growth trajectories of academic functioning. In a study by Duncan and colleagues (2007) links between emotional self-control, cognitive self-control as measured by observations of attention and impulsivity, and teacher reports of behavior problems, attention problems, and prosocial behaviors, and achievement outcomes such as math and reading were tested individually at first, third, and fifth grades.

Alexander, Entwisle, and Dauber (1993) investigated concurrent links between classroom behaviors such as interest-participation, cooperation-compliance, and attention span-restlessness and achievement outcomes as measured by teacher-reports and performance on standardized tests at first, second, and fourth grades.

Although studies have begun to assess links at multiple time-points throughout elementary school, it appears that trajectories of achievement have been modeled only infrequently. Estimation of trajectories of achievement will allow for an understanding of their longer-term associations with learning-related social skills. In the present study trajectories of reading, vocabulary, and math skills were estimated from first through fifth grades, that is spanning elementary school.

2.3.3.4 Controlling for Student Nesting within Classrooms

When examining academic achievement it is important to look at data dependence due to children's nesting within classrooms. Children may perform similarly to other children due to being in the same classroom, because they share the same teacher, peers, and curriculum. Past studies of children's LRSS and achievement varied widely in acknowledging that systematic differences between classrooms, school districts, states, or private versus public schools may be linked with differences in academic achievement observed among children.

In the study by McClelland and colleagues (2007) data dependence due to nesting within classrooms was taken into account and Hierarchical Linear Modeling was employed to investigate its effects. It was found that there was variability in children's math and vocabulary scores were associated with nesting within classrooms. Similarly, Bierman and colleagues (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008) took into account four levels of data

dependence. In this study, repeated measures were nested within students, students were nested within classrooms, and classrooms were nested within teachers.

2.3.3.5 LRSS as a Moderator

Prior research has established conclusive links between early learning-related social skills and academic achievement indicating that higher levels of learning-related social skills are associated with higher levels of achievement and sometimes with rate of growth in achievement. Some recent intervention studies have demonstrated that children facing poverty improve academically if their learning-related social skills improve (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008; Webster-Stratton, Reid, & Stoolmiller, 2008).

Knowledge about moderating role of social skills has much practical significance. Although, not pointing towards causal evidence, it provides us with information about potential sources of resilience for children. If risk and resilience factors are on a continuum (Sameroff, Seifer, & Bartko, 1997) then intervention efforts could be targeted on areas where skills appear depleted. Some research has examined the moderating role of early learning-related social skills for subgroups of children who experience compromised academic performance due to contextual characteristics such as low family income in early childhood (Li-Grining, Votruba-Drzal, & Maldonado, manuscript revise-resubmit 2009). The present study will add to this work by further examining whether higher levels of learning-related social skills in middle childhood moderate the links between middle childhood family income and trajectories of achievement. Moreover, it will be examined whether higher levels of learning-related social skills in middle childhood moderate the links between early childhood family income and trajectories of achievement. It will also be examined whether these skills moderate the links between gender and achievement.

2.3.4 Summary of Research on Early LRSS and Academic Achievement

With respect to the association between early learning-related social skills and academic achievement, it can be concluded that consistent links between early learning-related social skills with short-term assessments of reading and math skills abound. Studies demonstrating the association of early learning-related social skills with longer-term growth in math and reading skills have only recently surfaced. The more recent studies provide significant improvements over earlier studies such that different aspects of learning-related social skills were measured (Duncan et al. 2007); observations were included rather than just using reports from parents or teachers (Duncan et al. 2007; McClelland, et al. 2007); achievement over a longer period was examined (Alexander, Entwisle, & Dauber, 1993; Duncan, et al. 2007; Li-Grining, Votruba-Drzal, & Maldonado, manuscript revise-resubmit 2009; McClelland, Acock, & Morrison, 2006); and nesting of students within classrooms was taken into account in the analyses (McClelland et al,. 2007).

This body of work demonstrates that early learning-related social skills are associated with achievement throughout middle childhood, whether assessed at individual time-points or as trajectories. However, it may be noted that none of these studies examined whether trajectories of achievement during middle childhood are associated with concurrent learning-related social skills. In the face of increased interactions with teachers and peers and with increasing complexity of the cognitive and social demands of school, children's early skills may or may not remain stable over time. Children may enter school with differing levels of learning-related social skills; however, development is not static. We may be missing a part of the picture by overlooking how achievement in middle childhood is associated with concurrent social skills. Further analyses of trajectories of achievement throughout middle childhood and their links with

learning-related social skills in middle childhood will add to the recently emerging body of evidence. The next section will review literature that bears on the links between learning-related social skills and academic achievement during middle childhood.

2.4 LEARNING-RELATED SOCIAL SKILLS AND ACADEMIC ACHIEVEMENT IN MIDDLE CHILDHOOD

A large literature has described the development of self-regulation, attention, and behavior problems in children spanning infancy to middle childhood; continuity and change in these skills, associated risk and correlates, and associations with other indices of socioemotional development (Denham, 1998; Hinshaw, 1992; Kopp, 1992; Posner & Rothbart, 1998; Anselmi et al., 2008; Kochanska, Murray, Harlan, 2002; NICHD Early Child Care Research Network, 2005b).

On the other hand, work focusing on school age children's functioning at school pertains to instructional, emotional, and structural characteristics such as quality and quantity of instruction, teacher-child relationships, peer relationships; amount of kindergarten, length of day and class size among several other characteristics (Hamre & Pianta, 2000; Burchinal, Peisner-Feinberg, Painta, & Howes, 2002; Klibanoff, Levine, Huttenlocher, Vasilveva, & Hedges, 2006; NICHD ECCRN, 2004). With respect to child characteristics, children's conceptions of ability, development of academic self-efficacy, and gender or race/ethnic gaps in achievement have been examined (Alexander, Entwisle, & Olsen, 2007; Dweck, 2002; Shunck & Pajares, 2002). Less emphasis has been on understanding the links between children's academic performance and their socio-emotional skills while they are in school.

Research linking academic achievement in middle childhood with concurrent learning-related social skills is not as abundant and rich as the work examining the links between early childhood learning-related social skills and achievement. Children make tremendous gains in cognitive and social skills during middle childhood. Their self-regulatory and attention capacities continue to develop past early childhood (Brown, Bransford, Ferrera, & Campione, 1983; Ruff & Rothbart, 1996). Given that social skills do not stabilize in early childhood (Anselmi et al., 2008; Rafaelli, Crockett, & Shen, 2005) but rather develop gradually, it may be that behaviors concurrent with academic achievement during middle childhood are linked more strongly than early learning-related social skills. However, few studies have examined the associations between middle-childhood learning-related social skills with trajectories of academic achievement during elementary school.

In a few studies concurrent or short-term associations among different aspects of self-regulation and academic outcomes were examined. In a sample of 7 to 12-year old children, parent and child reports of effortful control were found to be significantly associated with teacher and child reports of classroom participation and report cards (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). In a sample of third graders from low income families, end-of-year reading and math scored based on report cards were associated with ratings of social competence, a composite of cooperation, assertion, and self-control of the Social Skills Rating System (SSRS, Gresham & Eliott, 1990), assessed at the beginning of third grade (Elias & Haynes, 2008). The reading and math outcomes were also associated with change in social competence ratings over the course of third grade and with perceptions of teacher support. These results were especially true of African-American population which was in higher proportion in this sample compared to the Whites.

Concurrent or short-term relations between children's attention and academic achievement were also examined. Similar to the research during early childhood, links between attention and achievement were found. In a sample of 6-12 year old children with asthma (Annett, Bender, & Gordon, 2007) sustained attention as measured by the Continuous Performance Test (CPT: Mirsky, Anthony, Duncan, Ahearn, & Kellam, 1991) was associated with Word-Identification, Dictation, and Applied Problems subscales of the Woodcock-Johnson psychoeducational battery-revised (Woodcock & Johnson, 1990). Sustained attention as measured by Continuous Performance Test was found to be linked with teacher's ratings of academic development in kindergarten (Edley & Knopf, 1987). Greater attention problems have also been found to be negatively correlated with academic scores (Jimerson, Durbow, Adam, Gunnar, & Bozoky, 2006). In this study greater levels of cortisol reactivity at school were correlated with attention problems in a sample of 5 to 12 year old children.

Associations between learning-related social skills and academic achievement were analyzed in a handful of studies (Alexander, Entwisle, & Dauber, 1993; Master et al., 2005). Alexander and colleagues investigated links between early attention span-restlessness, interest-participation, and cooperation-compliance and achievement at first, second, and fourth grades. In addition to several concurrent links, they found attention span and interest-participation in first grade to be associated with standardized assessment of math performance at fourth grade. In a longitudinal framework spanning over 20-years, links among academic achievement, externalizing and internalizing behaviors were examined. (Masten et al., 2005). Initial assessments of academic achievement were conducted when the children were 8 to 12 years old. However, follow up assessments were conducted 7, 10, and 13 years later, much past middle childhood. It was found that functioning in one domain was associated with functioning in

another domain from childhood to adolescence. Specifically, focusing on the links during middle childhood-adolescence time frame, externalizing problems and academic achievement were negatively correlated with concurrent achievement during middle childhood and adolescence. Moreover, initial externalizing problems were associated with poorer academic functioning in adolescence.

A noteworthy work is by Kowaleski-Jones and Duncan (1999) where trajectories of behavior and achievement were modeled throughout elementary school but links between the two were not examined. Gender differences in patterns of trajectories and boys' and girls' response to statistical 'shocks' to academic trajectories were also analyzed. In a sample of 6-7 year old children, curvilinear growth in math and reading but no net change in mean behavior problems scores were observed throughout middle childhood. The patterns of academic and behavior problem trajectories were similar for both boys and girls. After administering "shocks" to reading and math trajectories, girls had a greater difficulty recovering to their original trajectories than the boys.

In summary, it can be said that academic skills were found to be linked with self-regulation, attention, externalizing behavior problems in mostly short-term and in a few longitudinal studies. The two studies that employed longitudinal framework did not estimate trajectories of achievement (Alexander, Entwisle, & Dauber, 1993; Master et al. 2005). One study that did model trajectories of behavior and academic skills did not examine their links. Hence, it is not clear whether learning-related social skills in middle childhood are associated with long-term academic performance, that is, with the rates of growth in academic trajectories. In the present study links between self-regulation, attention, and behavior problems and trajectories of reading, math, and vocabulary from first through fifth-grade will be examined.

Research thus far provides some support for the positive associations between higher levels of learning-related social skills and higher academic performance. The results are more conclusive in early childhood period and are beginning to emerge in middle childhood. Much research on resilience has focused on identifying factors that promote competence in several domains of functioning (Garmezy, Masten, and Tellegen, 1984; Masten, et al., 1988). Whether or not middle childhood learning-related social skills, as assessed by self-regulation, attention, and behavior problems, moderate the links between family income and achievement will be reviewed next, followed by evidence of these skills serving as a moderator of the links between gender and achievement.

2.5 LEARNING-RELATED SOCIAL SKILLS AS A MODERATOR

In addition to investigating the links between learning-related social skills and academic achievement, this paper will extend previous research by attempting to understand whether learning-related social skills are associated with the risk of poorer academic achievement due to contextual and individual factors. As discussed earlier, the ecological and transactional frameworks of development (Bronfrenbrenner & Morris, 1998; Sameroff, 1995.) suggest that children's developing competencies are a result of their individual characteristics, interactions with others, and properties of the context they live in. Much emphasis in past psychological and educational research has been devoted to identifying the sources of risk for children's development (Gutman, Morrison, Sameroff & Cole, 2004; Rutter, 1979, 1990; Sameroff, Seifer, Baldwin, & Baldwin, 1993). Research on protective factors and resilience has provided some

insights into children's adjustment in adverse circumstances (Garmezy, 1985; Luthar, et al. 2000; Masten and Coatsworth, 1998; Rutter, 1995).

According to the concept of *compensatory effects* (Garmezy, Masten, and Tellegen, 1984; Masten, et al., 1988), the effect of risk factors in development could be offset by protective factors. Masten (2001) notes that research on resilience has generated a small set of global factors that are linked with better adjustment in face of adversities, some of which include: presence of sensitive and responsive adults, possessing self-regulatory abilities, cognitive capabilities, and high motivation. In the light of these findings, it would be expected that having better self-regulatory abilities and lower attention and behavioral problems would be associated with a reduced risk of lower academic achievement for children facing economic hardships or for boys exhibiting lower levels of learning-related social skills.

The next sections will briefly summarize the findings on the links between family income and academic achievement and on gender differences in achievement.

2.5.1 Family Income and Academic Achievement

Low family income has consistently been linked with compromised competence in various domains including academic achievement (Duncan & Brooks-Gunn, 1997; Duncan, Brooks-Gunn, & Klebanov, 1994; NICHD ECCRN, 2005; Entwisle, Alexander, & Olson, 2007). Persistent poverty has been found to be associated with not only lower IQ and poorer school achievement but also with decreased socio-emotional functioning (McLoyd, 1998). For example, positive associations between income level and Woodcock Johnson Letter-Word Identification, as well as between stability of income and Woodcock Johnson Applied Problems and behavior problems have been reported (Yeung, Linver, & Brooks-Gunn, 2002). The 2007 report from the

National Center for Educational Statistics also states that children who are eligible for free or reduced lunch performed less well on math and reading assessments at 4th and 8th grades (US Department of Education, 2007) compared to the children who are ineligible due to higher levels of family income.

Children from families experiencing extreme poverty are especially at risk for academic achievement (Dearing, McCartney & Taylor, 2001; Duncan, Brooks-Gunn, Yeung & Smith, 1998; Votruba-Drzal, 2006), but, not all children from impoverished backgrounds exhibit poor academic achievement. There is great heterogeneity in the academic achievement of children from economically disadvantaged backgrounds (Egeland, Carlson, & Sroufe, 1993). Children from low-income families have been found to do better academically if they have longer attention spans (Alexander Entwisle, & Dauber, 1993) and children with better self-regulation display better social adjustment despite facing economic hardships (Buckner, Mezzacappa, & Beardslee, 2003). An important question arises as to whether children from low income families would show higher levels of achievement if they also exhibit higher levels of learning-related social skills.

Research examining the effects of poverty on children's functioning has focused heavily on understanding the mechanisms, such as parenting practices and parental psychological well-being that explain the detrimental effects of poverty on children's development (Berlin, Brooks-Gunn, Spiker, & Zaslow, 1995; Evans & English, 2002; Mistry, Vandewater, Huston, & McLoyd, 2002; Smith, Brooks-Gunn, & Klebanov, 1997). Some recent intervention studies have demonstrated that children facing poverty improve academically if their learning-related social skills improve (Bierman, Nix, Greenberg, Blair, & Domitrovich, 2008).

In a sample of socio-economically disadvantaged children, Bierman and colleagues (2008) investigated the effects of intervention on five executive function measures in a randomized-controlled intervention that was an integral part of Head Start programs. In an intervention designed to help teachers promote children's language and emergent literacy skills and socio-emotional skills, extensive training and coaching was provided. To assess executive functioning, children were measured on three cognitive performance task and two behavioral performance tasks. Outcomes tapped into cognitive and behavioral school readiness as indexed by language/emergent literacy and observer ratings of social competence, aggressive, and disruptive behaviors, respectively. Initially, cognitive performance tasks predicted language and emergent literacy and the behavioral performance tasks predicted the social-emotional outcomes. Additionally, executive functions mediated the relations between the intervention and school readiness skills.

Another intervention addressed promotion of children's social competence and emotion self-regulation and decreasing conduct problems in a sample of children facing high rates of poverty (Webster-Stratton, Reid, & Stoolmiller, 2008). The underlying premise of this intervention was that improvements in socio-emotional skills should be associated with higher school readiness skills and thereby with later academic success. Teachers were trained in using positive classroom management skills. The effects of improved teacher skills on improvements in children's skills were evaluated in a randomized trial. These children were enrolled in Head Start kindergarten and first grade. The general findings indicated that teachers who were receiving training through intervention used more positive classroom management techniques and their low-income students exhibited lower levels of conduct problems and higher levels of

emotion self-regulation. Increases in teacher-parent involvement in the intervention group were also reported.

An important variable to consider is the timing of poverty and when it is particularly detrimental for children's development. Negative effects of early poverty have been greater than poverty faced after early childhood on cognitive, behavioral, and mental health outcomes (Duncan & Brooks-Gunn, 2000). Likewise, early childhood income (birth through age 5-6), but not middle childhood income, has been significantly associated with negative academic outcomes during middle childhood (Votruba-Drzal, 2006). Votruba-Drzal (2006) found middle childhood income to be associated with parent-repots of behavior problems but not with academic outcomes. In the NICHD Early Child Care Research Network (2005) also poverty experienced in late childhood was found to be associated with externalizing and internalizing problems but not with cognitive outcomes or teacher-rated behavior problems. Late childhood was defined as 4-9 years versus early childhood as earlier than 3-years in the NICHD ECCRN (2005). On the other hand, middle childhood income has been found to be significantly linked with academic achievement during adolescence (Duncan et al., 1998; Pungello et al., 1996).

The current study will examine whether having high levels of self-regulatory abilities and lower attention and behavioral problems is associated with a reduced risk of lower academic achievement in middle childhood for children who face economic hardships during childhood. It will be examined whether learning-related social skills in middle childhood moderate the links between middle childhood family income and academic achievement. Likewise, interactions between middle childhood learning-related social skills and family income in early childhood in predicting trajectories of academic achievement will also be analyzed.

2.5.2 Child Gender and Academic Achievement

In the previous decades, boys were found to perform better than girls on mathematics abilities, while girls demonstrated an edge over boys in reading and vocabulary skills (Chatterji, 2006; Hedges & Nowell, 1995; Hyde, Fennema, & Lamon, 1990). However, in the recent years, gender differences in academic achievement have been narrowing, especially in math (Herbert & Stipek, 2005).

Traditionally, gender differences in literacy (Herbert & Stipek, 2005) and reading skills (Chatterji, 2006) were consistently reported, with girls' outperforming boys. In contrast, other recent studies have found negligible differences between boys and girls on verbal skills (Entwisle, Alexander, & Olson, 2007; Hyde & Linn; 1988). Entwisle, Alexander, and Olson (2007) did not find significant differences in boys' and girls' reading scores in first grade. They reported that girls and boys scored roughly equally at first grade. Girls scored almost 18 points higher than boys at the end of elementary school but their findings were qualified by the fact that this gender difference in reading was obvious only among children receiving subsidies. However, The National Center for Education Statistics' reading report indicates that significant gender differences remain. Girls on average scored seven points higher than boys on both reading for literacy experience and reading for information (US Department of Education, 2007a). In eighth grade, girls scored significantly higher on all three subtests. Compared to boys, girls scored 11 points higher in reading for literary experience, 8 points higher in reading for information, and 13 points higher in reading to perform a task.

Traditionally, gender differences on math performance were reported (Hedges & Nowell, 1995). However, based on more recent studies, girls' performance in math domain is evidenced to be parallel to boys (Herbert & Stipek, 2005; US Department of Education, 2007b). The 2007

report from the National Center for Educational Statistics (US Department of Education, 2007b) also demonstrates that girls' and boys' performance on various math subtests varied by content area. In 4th grade girls scored higher than boys in geometry whereas boys scored higher in all other content areas. In 8th grade, boys scored two-points higher in algebra, measurement, and number properties and operations. Girls performed better on probability and data analysis but the two did not differ on geometry. It should be noted that, despite the lead, boys scored only two-points higher than the girls in both 4th and 8th grades.

From the existing studies it may be concluded that patterns of gender differences in academic achievement may favor girls' superior performance in reading. However, gender differences in math do not conclusively support boys' superior performance. Performance on math has been shown to depend upon the content area tested, with girls outperforming boys on some subtests and boys' performing better on others but not significantly better. It appears that gender differences in math performance are disappearing, with girls performing equally well, if not better than boys.

In the recent years the academic performance of boys' has raised some concerns (Epstein et al., 1998). Not only are girls observed to outperform boys in general, a difference in attitudes toward school work and has also been noticed (Warrington et al. 2000). Entwisle, Alexander, and Olson (2007) report that not only academic performance but also non-cognitive factors such as conduct in the classroom influence teacher's evaluation of students. Entwisle and colleagues (2007) found that boys, especially from impoverished backgrounds, received lower conduct scores in the classroom. Gender differences are noted on socio-emotional skills. Compared to girls, boys are more likely to display behavior problems in childhood (Cole, Teti, & Zahn-Waxler, 2003; Ensminger & Slusarcick, 1992; Garmezy & Rutter, 1983; Masten et al., 1987;

NICHD ECCRN, 2004), more likely to be diagnosed with attention difficulties than girls (Wilson, 2003), and display less self-regulation (Raffaelli, Crockett, & Shen, 2005). Li-Grining and colleagues (2007) found that having better learning-related social skills was especially protective for boys, with steeper reading trajectories evident for boys with high levels of Learning-related social skills than girls. Although the LRSS effects were not as strong for girls, having better learning-related social skills was associated with an advantage for girls' trajectories of math achievement.

This study will examine whether having higher levels self-regulation and lower levels of attention and behavior problems will be associated with higher average levels and with greater gains in reading, math, and vocabulary scores for boys than girls.

2.6 PRESENT STUDY

Considering the dearth of studies investigating the concurrent links between learning-related social skills and achievement in middle childhood, the present study will aim to fill this gap in literature. Using the data from the National Institute of Child and Human Development Study of Early Child Care and Youth Development, this study will examine whether learning-related social skills in middle childhood are associated with trajectories of math, reading, and vocabulary skills from first through fifth grade after controlling for learning-related social skills in early childhood and child and family demographic and cognitive factors.

Several extensions over previous studies will also be attempted. First, in addition to examining between-children differences in learning-related social skills and their links with trajectories of math, reading, and vocabulary, within-child changes in learning-related social

skills and associated changes in achievement will also be tested. Second, rather than examining academic achievement at a single time point this study will model trajectories of achievement throughout elementary school. Third, data dependence due to nesting of students within classrooms will be taken into account. Finally, learning-related social skills as a moderator of the links between family income and academic achievement and between gender and achievement will be investigated.

2.6.1 Research Question 1

The first question will examine whether learning-related social skills in middle childhood are associated with trajectories of academic achievement across middle childhood. Two aspects of this question will be analyzed: *between-children* differences and *within-child* changes in teacher-reported attention problems, self-regulation, and behavior problems and their links with trajectories of math, reading, and vocabulary from first through fifth grades.

Links between middle childhood indices of learning-related social skills and trajectories of achievement will be examined after controlling for early learning-related social skills. Controlling for early learning-related social skills will test for the unique associations between middle childhood learning-related social skills and academic trajectories. However, taking into account early skills will also give us insight into whether they are linked with achievement over a short term or do they continue to be linked with achievement throughout elementary school. Early learning-related social skills may be associated with later achievement for several reasons. Early skills may "set the stage" for later achievement via continuity in social skills into middle childhood, or by early positive associations with achievement making way for continued success (Entwisle, Alexander, & Olson, 2005; McClelland & Morrison, 2003). Children with higher

levels of behavior problems are less likely to perform well academically for a multitude of reasons such as teacher's negative perceptions or experiencing difficulty working well in groups (Ladd, Birch & Buhs, 1999; Pianta, Steinberg, & Rollins, 1995).

Additionally, early childhood demographic and family factors, and maternal and child early cognitive ability, factors such as child sex, race, age in first grade, birth-weight and health, maternal age, education, marital status, hours of employment, family economic status, number of children at home, children's cognitive skills, and mothers' verbal abilities will be controlled for in the analyses. Alexander, Entwisle, and Horsey (1997) reported that background characteristics such as lower family socioeconomic status, low maternal age, having a single parent, having several siblings, disruptions in family, residential transitions and related school transitions, and being male pose a greater risk of school dropout. Therefore, taking demographic, child, and family factors will help us understand the links between learning-related social skills and academic achievement without the possible confounds that are likely to be presented by environmental and individual factors.

Between-children differences as well as *within-child* differences in learning-related social skills and their links with trajectories of achievement from first through fifth grade will be examined.

2.6.2 Research Question 2

The second question aims to determine whether better ability to sustain and focus attention and regulate behavior may be likely to diminish the risk of poorer academic achievement posed by facing economic hardships. This question will also examine whether having higher levels of self-

regulation abilities and lower levels of attention and behavior problems will be associated with a diminished risk of poorer academic achievement for boys.

In the first set of analyses, interactions between middle childhood indices of learning-related social skills and family income will be conducted to examine whether children displaying higher levels of self-regulation and lower levels of attention and behavior problems perform better on reading, math, and vocabulary despite facing poverty in middle childhood (or early childhood) compared to children displaying lower level of self-regulation and higher levels of attention and behavior problems.

Multi-group analysis by gender will be conducted separately to investigate *between-children* differences as well as *within-child* changes in learning-related social skills and their links with trajectories of achievement from first through fifth grade.

2.7 HYPOTHESES

The following predictions were made about the links between learning-related social skills and trajectories of achievement in middle childhood and about the moderating role of learning-related social skills for the associations between family income, gender, and academic achievement.

Hypothesis 1: With respect to *between-children* differences in learning-related social skills during middle childhood and trajectories of achievement from first through fifth grade, it is expected that measures of self-regulation, attention, and behavior problems in middle childhood will be associated with trajectories of reading, math, and vocabulary skills from first through fifth grade.

Specifically, higher levels of self-regulation and lower levels of attention problems and behavior problems will be associated with higher intercept and growth in all three academic trajectories. In addition, all associations will be significant even after controlling for early childhood self-regulation, attention, and behavior problems and over and above child and family demographic and cognitive factors.

Hypothesis 2: With respect to *within-child* changes in learning-related social skills during middle childhood and academic achievement from first through fifth grade, it is expected that changes in self-regulation, attention, and behavior problems during middle childhood will be associated with corresponding changes in reading, math, and vocabulary scores from first through fifth grade.

Increases in self-regulation or positive changes in scores during middle childhood are expected to be associated positive changes in reading, math, and vocabulary scores. On the other hand, increases in attention or behavior problem scores during middle childhood will be associated with decreases in reading, math, and vocabulary scores.

Hypothesis 3: With respect to learning-related social skills in middle childhood as a moderator of the links between family income and trajectories of academic achievement, it is expected that children who experience economic hardships during middle childhood will have higher intercept and slopes for reading, math, and vocabulary skills if they also exhibit higher levels of self-regulation, and lower levels of attention and behavior problems compared to children who experienced economic hardships during middle childhood and exhibit lower levels of self-regulation, and higher levels of attention and behavior problems. Similar patterns of achievement are expected for children who experienced economic hardships in early childhood.

Hypothesis 4: With respect to learning-related social skills in middle childhood as a moderator of the links between gender and trajectories of academic achievement, it is expected that the coefficient linking average attention problems, average behavior problems, and average self-regulation to the intercepts of reading, vocabulary, and math will be significantly higher for boys than for girls. This would indicate that lower levels of attention problems and behavior problems will be associated with significantly higher average reading, vocabulary, and math scores for boys than for girls. Conversely, higher levels of self-regulation will be associated with significantly higher average reading, vocabulary, and math scores for boys than for girls.

Similarly, improvements in attention problems, self-regulation, and behavior problems will be associated with greater improvements in reading, vocabulary, and math scores for boys than for girls.

3.0 METHOD

3.1 PARTICIPANTS

The analyses for this study are based on data from an on-going, multi-site study, the NICHD Study of Early Child Care and Youth Development. Children participating in this study were born between 1990 and 1991 in hospitals at 10 data collection sites across the U.S.: Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC; Seattle, WA; and Madison, WI. These children and their families were followed from birth through fifth grade.

Families were recruited during hospital visits to mothers shortly after their child's birth. During selected 24-hour sampling intervals, 8,986 women giving birth were screened for eligibility and willingness to be contacted again. Of these women 5,416 (60%) agreed to be called in 2 weeks and met the following eligibility criteria: the mother was over 18 years of age and could speak English; the family did not plan to move within the next three years; the child was a singleton, was not hospitalized for more than 7 days, and did not have obvious disabilities; the mother did not have a known substance abuse problem. A total of 1,364 mothers, who completed a home interview when their infant was 1 month old, became the study participants. The recruited sample was diverse, including 24% ethnic minority children, 11% mothers with

less than a high school education, and 14% single mothers. More details on sample recruitment and methods can be found at the study website (http://secc.rti.org/).

Of the original 1,364 participants, 1123 mothers and their children were included in the current study. These 1123 children were included because they have valid academic achievement data for each of the outcomes (math, reading, and vocabulary) for at least one out of the three assessments at 1st, 3rd, and 5th grade.

3.2 OVERVIEW OF DATA COLLECTION

Data were initially collected when the children were 1 month old and again at 6, 15, 24, 36, 54 months and at kindergarten, 1st, 3rd, and 5th grades. Home visits were conducted when the study children were 1 month old. During this visit, demographic information including child gender, race/ethnicity, health, birth weight, number of children at home, maternal age and education level, mother's marital status, maternal employment, and the family income was collected. Demographic data on the family were updated during phone calls and face-to-face contacts with mothers at regular intervals. Information on children's characteristics such as attention, self-regulation, and behavior problems were collected using maternal and teacher reports. Academic achievement outcome measures at first, third, and fifth grades were obtained during the laboratory visits at those time points.

3.3 MEASURES

3.3.1 Maternal, Child and Family Characteristics

The following sections present information about the covariates and control variables used to take into account distal and proximal factors of the child's environment that may be linked with predictors and outcomes in this study. Several factors encompassing child, family, and maternal demographic characteristics were used to indicate early childhood demographics and were controlled for in the analyses. Child cognitive and maternal verbal ability were also included as control variables. Assessments of family income, child health, number of children in the family, and maternal employment at first, third, and fifth grades were included as time-varying covariates. Initially, all early childhood composite variables were computed only if 2/3 of the data were available for a given case.

3.3.1.1 Demographic Variables

Several factors representing child, family, and maternal characteristics that are typically associated with child outcomes were included in the analyses.

Child Gender

Child gender was coded as a categorical variable where 0 represents *females* and 1 represents *males*.

Child Race/Ethnicity

Based on the 1 month information, a categorical variable was created to represent children who were Hispanic in origin, non-Hispanic white, non-Hispanic Black, and non-Hispanic other (e.g., Asian or Pacific Islander, American Indian, Eskimo, or Aleut). This variable

was further dummy coded with the "non-Hispanic White" combined with "Other" group as the omitted variable. The current analysis sample comprises of approximately 80% White children, 10% African-American, and 6% Hispanic.

Child Health

Information about children's birth weight at 1 month was dummy coded to distinguish between children of normal and low birth weights. Birthweight less than 2500 grams were coded as 1 and birthweight greater than or equal to 2500 grams was coded as 0. Only 2.4% of the children were identified as low birth weight.

Mothers also rated children's health at 1, 6, 15, 24, 36, and 54 months on a 4-point Likert scale ranging from 1 (poor health) to 4 (excellent health). An average child health rating from 1 through 54 months was computed only if 4 out of 6 assessments of the child heath ratings were available. Maternal ratings of children's health at first, third, and fifth grade assessments were used as time-varying indicators of child health during middle childhood.

Child Age

In the present study, child's age in months was used from the first grade achievement assessment. The mean age at first grade is approximately 83.7 months.

Maternal Age and Education at One Month

Among the maternal characteristics, information about maternal age and education is available from maternal reports during the assessment of family demographic information when the target children were one-month old.

Mother's ranged in age from 18 to 46 years with mean age approximately 28.4 years. Roughly 19% of the mothers were 22 years-old or below and 2% of the mothers were 40 or older.

Maternal education ranges from 7 to 21 years with mean at 14.4 years. Approximately 20% of the mothers completed high school degree, 8.6 % of mothers competed 11 years of school or less, about 16% of the mothers had 4 years of college education, and 16% of the mothers had up to 21 years of post-graduate education.

Maternal Marital Status

Maternal marital status was coded as the number of marital transitions experienced by mothers during the first 54 months of the child's life. Marital status information (*married, single, partnered, divorced, separated, widowed, and other*) was collected fairly regularly from birth through 54 months. During the first 15 months of the child's life, mothers' marital status information was collected every three months and roughly once a year after that. Marital transition information was available at 1, 3, 6, 9, 12, 15, 24, 36, and 54 months. The number of marital transitions included a count of both marital formations and dissolutions between timepoints. In this sample, approximately 10% of the mothers experienced two or more marital transitions during the first 54 months of the children's lives. Maternal ratings of marital status at first, third, and fifth grade assessments were used as time-varying indicators of marital status during middle childhood.

Maternal Employment Hours

The number of hours per week of maternal employment was reported at 1, 6, 15, 24, 36, and 54 months. An average was computed if employment information was available at 4 out of 6 time points. Approximately 53% of mothers worked 20 hours or less per week during the first 54 months of the target child's life and roughly 4% of the mothers worked 40 hours or more per week.

Number of Children in the Household

Mothers reported on the number of children at home available at 1, 6, 15, 24, 36, and 54 months. The average number of children in the household variable was computed only if data were available at 4 out of 6 time points. Approximately 18% of the families had 3 or more children living in the household during the first 54 months of the target child's life. Maternal reports of number of children in the household at first, third, and fifth grade assessments were used as time-varying indicators of number of children in the household during middle childhood.

Number of Residential Transitions Experienced by the Target Child

Number of residential transitions experienced by the target child was determined based on the census information available in the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development. The census information lists each address the target child has resided in since birth. Number of residential transitions was computed by counting the number of residences lived in during the first 54 months of life and subtracting 1.

Family Income-to-Needs Ratio

Information on family income-to-needs ratio is available from birth through 5th grade. In the NICHD SECCYD, income-to-needs ratios for each family were computed by dividing the total family income (mother's income + husband/partner's income if he lives at home, and any other income) by the appropriate poverty threshold determined by the year income is earned, the total number of members in the household, and the number of full-time children living in the home.

In the present study, income-to-needs ratios were averaged from 6 through 54-months to reflect a cumulative index of early childhood family income. An average was computed only if income-to-needs were available at 3 out of 5 assessments. Based on the average income-to-needs

ratios from 6-54 months, families below 200% of the federal poverty level were considered *poor* and families at or above 200% of the poverty level were considered *non-poor*.

To index cumulative family income during middle childhood, income-to-needs ratios obtained at the first, third, and fifth grade assessments were averaged. Similar to the categorical indicator if early childhood family income, this average was converted into *poor* and *non-poor* categories based on 200% of poverty level. However, the individual income-to-needs ratios at first, third, and fifth grade assessments were used as time-varying indicators of family income during middle childhood.

3.3.1.2 Maternal Verbal Ability and Child Cognitive Ability

The Bayley Scales of Infant Development (Mental Development Index) was used as an index of children's early cognitive ability and the Peabody Picture Vocabulary scores was used as an index of maternal verbal ability.

The *Bayley MDI* (Bayley, 1969) is a widely used measure of child's developmental status in the first two years of life assessing memory, learning, problem-solving, early verbal communications, sensory-perceptual acuity, and the ability to form generalizations and classification. The Split-half reliability coefficients are above 0.80 for all ages in the standardization sample. The original version of the test was administered to target children in the laboratory at 15 months and the revised version was administered at 24 months. The revised version of the *Bayley* test extends the age of testing. At 24 months a small subset of the children (n = 126) were administered the standardized version of the revised *Bayley* Scale. The average of the *Bayley (MDI)* scores at 15 and 24 months was used as an indicator of target child's early mental development. In this sample the mean of *average Bayley* score ranged from 54.2 to 140.5 points with the mean at 100.7 points.

Mothers' scores on the *Peabody Picture Vocabulary Test* were used as an indicator of maternal verbal ability. Mothers of target children were administered the *Peabody Picture Vocabulary Test – Revised* (PPVT-R Form M; Dunn & Dunn, 1981) when the children were three years old. The PPVT-R, similar to the original edition, is a norm-referenced test of receptive vocabulary. The PPVT-R was designed for persons between the ages of 2 1/2 through 40 years. It is individually administered to those who not only understand English but also can see and hear reasonably well. The test, available in two parallel forms L and M, contains 175 test items which are administered after providing the five training items. The test items are organized in increasing order of difficulty and are presented orally to the subject. The mother's task was to select the picture that depicts the test word from among four black and white figures that are considered to illustrate the word. Higher scores on this test reflect better picture vocabulary. The internal consistency of the PPVT – R is high with split-half correlation coefficients ranging from 0.80 to 0.83 for form L.

3.3.2 Learning-Related Social Skills in Early Childhood

In this study, children's learning-related social skills are comprised of attention problems, self-regulation, and behavior problems. These three learning-related social skills were not aggregated for both conceptual and statistical reasons. Aggregation of predictors does not allow for testing their individual links with outcomes. However if variables are highly correlated with each other they could be formed into a composite as individually they would not provide much additional information than their composite. In this dataset, correlations among middle childhood indices of learning-related social skills range from 0.45 to 0.64 in magnitude and the correlations among early childhood indices of learning-related social skills range from 0.50 to 0.53 in magnitude.

Since all correlations are moderate it is indicative of only a moderate degree of overlap among attention-problems, self-regulation, and behavior problems. Given that the components do not correlate very highly they were not aggregated in order to maintain their differential links with achievement.

3.3.2.1 Early Attention Problems

Early Attention Problems were computed by averaging standardized scores of maternal-report of attention focusing from the Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, and Fisher, 1994) and maternal-reports of attention problems on the Child Behavior Checklist. Both measures were administered at 54 months.

Attention focusing was assessed using the Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, and Fisher, 1994). The CBQ is a parent-report of children's temperament. This measure was developed for children ages 3-8 and it includes 196 items and 15 scales. An adapted version of this measure was administered to mothers at 54 months. The mother version included only 80 items and 8 scales from the original version. On a 7-point Likert scale mothers rated how applicable each item was to their child. Attention focusing score comprises of average maternal ratings on eight items. The attention focusing subscale assesses concentration, distractibility, and degree of involvement in activities. Scores range from 1.25 to 6.88. Higher scores indicate increased ability to maintain focus on the task at hand. Internal consistency as reflected by Chronbach's alpha ($\alpha = 0.74$) is moderate.

Attention Problems were measured using the Child Behavior Checklist. Maternal reports of children's attention problems using the CBCL- 4/18 (Achenbach, Edelbrock, & Howell, 1987) were obtained when the children were 54 months old. The CBCL is widely used for assessing children's functioning in various domains including Externalizing Problems, Internalizing

Problems, Somatic Complaints, Aggression, and Attention Problems. In the current report, Total Raw Scores of the Attention Problems subscale were used. On 3-point scales mothers rated how characteristic each behavior was of the child over the past 2 months (*not true*, *sometimes true*, and *very true*). The behaviors that characterize attention problems in this subscale include lack of concentration, impulsivity, nervousness, physical agitation, and quality of school work. The range of possible scores is 0 to 22. Higher scores indicate higher attention problems. Child Behavior Checklist has high validity and reliability. Internal consistency of the CBCL ranges from 0.78 to 0.97.

For each child, an average of the two assessments was computed. Since both indicators of early attention problems are in different units of measurement, they were converted to z-scores prior to computing their average. Prior to converting the two variables into z-scores and computing their average, maternal reports of attention focusing from the CBQ were multiplied by (-1) to reverse the scores. Higher scores on maternal reports of attention focusing indicate better attentional ability, whereas higher scores on maternal reports of behavior attentional problems indicate difficulty concentrating and staying on task.

3.3.2.2 Early Self-Regulation

Early Self-Regulation was computed by averaging maternal reports of inhibitory control assessed using the Child Behavior Questionnaire and maternal report of self-control assessed using the Social Skills Rating System.

Inhibitory control was assessed using the Child behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, and Fisher, 1994) at 54 months. The CBQ is a parent report of children's temperament. This measure which was developed for children ages 3-8 includes 196 items and 15 scales. An adapted version of this measure was administered to mothers at 54 months. The

mother version included only 80 items and 8 scales from the original version. On a 7-point Likert scale mothers rated whether each item was applicable to their child or not. Ten items comprise Inhibitory Control score. Scores range from 2.0 to 6.7. Higher scores indicate increased capacity to plan and to suppress inappropriate responses in novel or uncertain situations or when guided. The internal consistency of this scale as reflected by Cronbach's alpha is moderate ($\alpha = 0.75$).

Self-control was assessed at 54 months using the mother version of the Social Skills Rating System (SSRS; Gresham & Elliot, 1991). The SSRS identifies two broad dimensions of functioning for children aged 3-4: social skills and problems behaviors. Social Skills is further grouped in to four subscales: Assertion, Cooperation, Responsibility, and Self-Control. These four subscales of the Social Skills dimension tap into behaviors such as sharing, helping, controlling one's temper, and initiating relation ships. Of the thirty items measuring social skills, ten items assess children's ability to demonstrate self-control as perceived by their teachers. For each item, mothers rate the frequency of behaviors on a Likert scale (*never*, *sometimes*, and *very often*). The Self-Control subscale assesses the ability to follow instructions, following rules, handling disagreements, and controlling temper. The possible range of score is from 1-20. The internal consistency of this scale is moderate (Chronbach's $\alpha = 0.79$).

Both indicators of self-regulation were converted to z-scores prior to averaging them. Higher average scores indicate greater self-regulatory ability such as better ability to follow rules and instructions and the ability to suppress inappropriate responses by controlling anger.

3.3.2.3 Early Behavior Problems

Early Behavior Problems was computed by averaging maternal reports of children's externalizing problems using the Child Behavior Checklist at 54 months and maternal ratings of behavior problems using the Social Skills Rating System at 54 months.

As noted earlier, the CBCL (4/18) is a widely used instrument containing 118 items used to assess behavior problems in children ages 4 to 18 (Achenbach, 1991). In the current report, the Externalizing Scale was used. Items assessing aggressive and destructive behavior make up the externalizing scale. On a 3-point scale mothers rated how characteristic each behavior was of her child over the past 2 months on 3-point scales (0 = "*not true*", 1 = "*sometimes true*", 2 = "*very true*"). The Externalizing Scale assesses disobedient behavior at home and school, lying, stealing, cheating, destroying one's own and others property, physically attacks others, and getting into physical fights with others. The Child Behavior Checklist has high validity and reliability. Internal consistency of the CBCL ranges from moderate to high (Chronbach's α = 0.78 to 0.97).

Mothers completed the SSRS (Gresham & Elliot, 1991) at 54-months. The SSRS is a 49-item inventory used to assess children's behavior across two dimensions: social skills and behavior problems. The Problem Behaviors Total Raw Score, which is the sum of Externalizing and Internalizing subscales, was used as another indicator of behavior problems. Maternal reports of the frequency of behavior on items 40 to 49 (*never, sometimes*, and *very often*) were used to create the Problem Behavior Subscales. The higher scores indicate a stronger tendency to demonstrate both external and internal problem behaviors as perceived by the child's mother or alternate primary caregiver. The Problem Behavior Subscale assesses physical agitation, disruptive behavior, temper tantrums, disagreements with others, likeability, and perceptions of loneliness. Possible scored range from 0-20. The internal consistency of this scale is not amply high (Cronbach's $\alpha = 0.69$).

Both indicators of behavior problems were converted to z-scores prior to averaging them. Higher average scores indicate problematic behaviors.

3.3.3 Learning-Related Social Skills in Middle Childhood

3.3.3.1 Attention Problems in Middle Childhood

Teachers' ratings of children's attention problems were used to index attention problems in middle childhood. At first, third, and fifth grade assessments teachers' ratings of several dimensions of children's attention problems were obtained using the Teacher-Report Form (TRF 4/18; Achenbach, 1991). The TRF consists of eight syndrome scales: Withdrawn, Somatic Complaints, Anxious/Depressed, Social problems, Thought Problems, Attention Problems, Delinquent Behavior, and Aggressive Behavior. These eight scales are based on teacher-reports on items encompassing a broad range of emotional and behavioral problems. At fifth grade the TRF includes 123 items but only 120 items at first and third grades. Each item asked the teacher to respond based on her impressions of how well the item describes the child currently or within the last two months. The responses were obtained on a three-point scale that was coded as *not true*, *somewhat or sometimes true*, and *very true or often true*.

The Attention Problem scale of the TRF was used to index attention problems as a component of Learning-related social skills in middle childhood. Twenty items from the TRF 4/18 characterize the Attention Problems subscale. This subscale assesses difficulty with concentrating or paying attention for long durations, distractibility and inattentiveness, restlessness and hyperactivity, difficulty following directions, and the inability to complete school work and other assigned tasks. The range of possible T scores is 50 to 100. Higher scores indicate higher attention problems. The items underlying this subscale have high internal reliability (Cronbach's $\alpha = 0.94$ at third and fifth grades).

In order to test for *between-children* differences in middle childhood attention problems and its association with trajectories of academic achievement the scores at the first, third and

fifth grade assessments were averaged. To examine *within-child* effects, these three scores were used as time-varying indicators of attention problems in middle childhood.

3.3.3.2 Self-Regulation in Middle Childhood

Teacher ratings of self- control (raw score) on the Social Skills Rating System at first, third, and fifth grades (SSRS; Gresham & Elliot, 1991) were used to index self-regulation in middle childhood. The teacher version of the SSRS measures three broad dimensions of children's functioning during elementary school which includes social skills, problems behaviors, and academic competence.

The Social Skills scale comprises of three subscales: Assertion, Cooperation, and Self-Control. Together these three subscales assess deficits in social behaviors by tapping into sharing and helping behaviors, initiating relationships, and controlling one's temper. Of the thirty items measuring social skills, ten items assess children's ability to demonstrate self-control as perceived by their teachers, such as the ability to respond appropriately to peer-pressure, the ability to maintain an even temper during conflicts with peers, the ability to receive negative feedback or criticism, and the ability to cooperate with others.

Teachers rate the frequency of behaviors demonstrating social competence and adaptive functioning on a three-point Likert scale (*never*, *sometimes*, and *very often*). The possible range of score is from 1-20. Higher scores indicate better self-control. The internal consistency of this scale is high at all three grades (Cronbach's $\alpha = 0.87$ at first grades and 0.89 at third and fifth grades).

In order to test for *between-children* differences in middle childhood self-regulation and its association with trajectories of academic achievement, the scores at the first, third, and fifth

grade assessments were averaged. To examine *within-child* effects these three scores used as time-varying indicators of self-regulation in middle childhood.

3.3.3.3 Behavior Problems in Middle Childhood

Ratings of behavior problems (T scores) using the Teacher Report Form (CBCL 4/18, Achenbach, 1991) were used to index behavior problems in middle childhood. Teachers' ratings of several dimensions of children's behavior were obtained when the children were in first, third, and fifth grades. The Teacher Report Form is described in detail above. Of the eight syndrome scales mentioned above the Externalizing Behavior scale was used as an indicator of behavior problems in middle childhood.

The Externalizing Behavior scale is a composite of Delinquent Behavior and Aggressive Behavior Syndrome Scales. The Externalizing behavior scale assesses defiance, disobedience, disruptive behavior, bullying behavior, unpredictability in behavior, and use of obscene language among other problem behaviors. The range of possible scores is 39-100. Higher scores indicate a higher tendency to display delinquent and aggressive behaviors. The internal consistency of the items is very high (Cronbach's $\alpha = 0.95$at third and fifth grades).

In order to test for *between-children* differences in middle childhood behavior problems and its association with trajectories of academic achievement the scores at the first, third and fifth grade assessments were averaged. To examine *within-child* effects, these three scores were used as time-varying indicators of behavior problems in middle childhood.

3.3.4 Children's Academic Achievement

In the NICHD SECCYD children's cognitive and achievement skills were assessed using the Woodcock-Johnson Psycho-Educational Battery Revised edition (Woodcock & Johnson, 1989, 1990). Children's academic achievement at first, third, and fifth grades were indexed using the Letter-Word Identification, Applied Problems, and Picture Vocabulary subscales. Specifically, Letter-Word Identification reflected reading skills, Applied Problems reflected math skills, and Picture Vocabulary reflected vocabulary skills.

The Letter-Word identification subscale assesses children's ability to match a pictorial representation of a word with an actual picture of the object and their ability to identify individual letters and words. Higher scores on this subscale indicate greater skills in these two domains as the successive items become more and more difficult. The Applied Problems subscale measures children's ability to analyze and solve mathematical problems using simple mathematical calculations. The Picture Vocabulary subscale is a measure of verbal comprehension. This test measures children's ability to recognize or to name familiar and unfamiliar objects shown in pictures.

In each subscale the items are presented in ascending order of difficulty. In order to capture a child's operative range, basal and ceiling levels of performance on each subscale are established. A basal level is achieved when a child has a 100% chance of answering correctly below those set of questions and a ceiling level is achieved when the child has a 0% chance of answering questions of that level of difficulty or higher. Points for all items below the basal level are included in the scoring of the subscale. All items are scored by designating either a 1 or a 0 for correct and incorrect responses, respectively.

Raw scores are converted to W scores. The W scores which have equal interval units are a special transformation of the Rasch ability scale. The W score is centered at 500 to approximate the performance of students beginning fifth grade.

In this study, children were included in the analyses if they provided data on at least one of the three assessments for each subscale. Based on this criterion the size of the analytic sample equals 1123. Approximately 93% of the cases have two or more data available for each of the three academic achievement outcomes.

3.4 ANALYTIC DECISIONS AND STRATEGY

3.4.1 Non-Response and Attrition Analysis

Non-response and attrition analyses were conducted to verify whether there exist any systematic differences between families who continued to participate in the NICHD Study of Early Child Care and Youth Development and those who opted to drop out of the study or simply did not participate during different assessment despite remaining in the study.

As mentioned earlier, the NICHD SECCYD collected information on 1364 children and families. For the 2-level HLM models, a total of 886 cases have complete data on all the level 2 variables. The level 2 variables include average middle childhood attention, self-regulation, and behavior problems composites, early childhood averages for attention, self-regulation, and behavior problems, all early childhood demographic variables, and mother verbal ability and child mental development index.

When non-response and attrition analyses were conducted, 886 cases that have complete information available were compared to two groups: (1) cases who were part of the study at fifth grade data collection but did not provide information on all measures (non-responders; $n = 205$), and (2) cases who did not participate in any aspect of the fifth grade data collection procedure and are not part of the analytic sample (attrition sample; $n = 273$).

The analysis sample of 886 cases were compared with the non-responders (n=205) and the attrition group ($n = 273$). The groups did not differ on the child sex such that all three groups have similar distributions of males and females ($\chi^2_{2, 1123} = 1.9$, $p > 0.05$). The three groups also did not differ on birth weight of target children ($\chi^2_{2, 1123} = 0.29$, $p > 0.05$) such that each group had about only 2-2.6% of children of low birth-weight. However, the non-responders and the attrition group did differ significantly from the analysis sample on several other demographic and family characteristics. There are significant race/ethnic differences in the three groups ($\chi^2_{6, 1123} = 39.67$, $p < 0.05$***). As noted earlier, the current analysis sample comprises of approximately 80% Whites, 10% African-Americans, and 6% Hispanics. The non-response group comprises of only 62% Whites but 18% African-Americans and 8.5% Hispanic children. The attrition group consists of 78% White children, 8% African-American and 3% Hispanics.

Mothers of children who were part of the analysis were significantly older than the non-responders and the attrition group ($F_{2, 1120} = 14.25$, $p < 0.05$***). Mothers of the participating families were almost 28.9 years old at target child's birth compared to the non-responders who were 26.8 years old and the attrition group who were 26.3 years old. Non-responders and the attrition group were not significantly different from each other on maternal age. There were statistically significant differences on maternal education when target children were one-month old ($F_{2, 1120} = 5.75$, $p < 0.05$***). Mother's of children who were part of the analysis had 14.5

years of education compared to non-responder's 13.9 years and attrition group 14.11 years of education. Mothers significantly differed on the vocabulary scores ($F_{2, 1086} = 10.52$, $p < 0.05$***). On the PPVT-R assessed at 36-months, mothers of children on the analytic sample scored 100.7 points compared to the 93.3 points scored by the mothers in the non-responder group and 96.0 points scored by the mothers in the attrition group.

There were statistically significant differences on the proportion of children from each group who lived below 200% of poverty level during early childhood (($\chi^2_{2, 1116} = 23.4$, $p < 0.05$***). In the analysis sample approximately 26% of the children were under 200% below poverty level during early childhood compared to 43% of non-responders and 26% of the attrition group. Similarly, there were statistically significant differences on the proportion of children from each group who lived below 200% of poverty level during middle childhood (($\chi^2_{2, 1106} = 30.6$, $p < 0.05$***). 21% of children from the analytic sample, 38% from the non-responders, and 46% from the attrition group lived below 200% of poverty level during middle childhood.

The number of marital transitions experienced by the mothers during early childhood were also significantly different (($\chi^2_{10, 1098} = 20.75$, $p < 0.05$**). 9% of the analysis sample had 2 or more marital transitions during early childhood compared to 21% of the non-responders and 19% of the attrition group. The number of residential transitions experienced were also significantly different (($\chi^2_{18, 1106} = 42.5$, $p > 0.05$). 11% of the children in the analysis sample and 11% in the attrition group had three or more residential transitions during early childhood compared to 19% of non-responders.

In summary, it appears that the families who stayed in the study until fifth grade but did not participate in all assessments fared the worst with regards to financial, educational, and

personal resources. Compared to the other two groups the non-responding group has the highest proportion of minority, especially African-Americans, a higher proportion of poor families, has younger mothers and those with somewhat lower levels of education, and a greater proportion of target children experiencing residential transitions. The attrition group doesn't appear to be significantly different than the analytic sample.

Attrition analysis was also conducted by subgroups of race/ethnicity. Appendix A tabulates information about cases with and without complete data.

3.4.2 Missing Data Imputation

Since non-response and attrition are a concern in the NICHD SECCYD dataset, missing data were imputed. As noted earlier, of the original 1,364 participants, 1123 mothers and their children were included in the current study. These 1123 children were included because they have valid academic achievement data for each of the outcomes (math, reading, and vocabulary) for at least one out of the three assessments at 1st, 3rd, and 5th grade. Of these 1123 cases only 886 cases have complete data. Therefore missing data were imputed up to 1123 cases. Of the 1123 cases, a comparison of cases that have complete data versus those who do not, reveals that the two group differed statistically significantly on mother's age and education at 1 month, and on maternal verbal ability at 36 months. Specifically, participants with complete data had mothers who were significantly older ($t_{1121} = 5.317$, $p < 0.05$***), were more educated ($t_{1121} = 3.36$, $p < 0.05$***), and had a higher verbal ability ($t_{1057} = 4.52$, $p < 0.05$***) than those who did not. The two groups did not differ on child gender ($\chi^2_{2, 1123} = 1.43$, $p > 0.05$), birthweight ($\chi^2_{2, 1123} = 0.67$, $p > 0.05$), or cognitive ability as measured by the Bayley MDI (($t_{2, 1086} = 0.65$, $p > 0.05$).

Prior to imputation of missing data descriptive analysis was conducted to check whether there were systematic patterns of missing data by different subgroups of race/ethnicity. Appendix A tabulates information about proportion of missing data on learning-related social skills, achievement, and demographic variables by different racial/ethnic groups. One pattern that was common across all groups revealed data missing on learning-related social skills and achievement variables than the demographics. The pattern reveals that among all four groups approximately 13% of the *Hispanics* and 21% of the *Other*s had missing data on average early childhood learning-related social skills compared to 6.5% of the Whites and approximately 10% of the Blacks. Although all groups are missing data on average middle childhood learning-related social skills, there is less variability in the proportion of cases with missing information. Roughly 8-9% *Hispanics, Blacks,* and *Whites* versus 12-14% of *Others* have missing data. However, on the middle childhood learning-related social skill variables a greater proportion of *Hispanics, Whites*, and *Others* are missing data on at third grade compared to the first and fifth grade assessments. A greater proportion of *Blacks* are missing data on learning-related social skills at fifth grade. On achievement outcomes a greater proportion of *Hispanics* and *Whites* are missing data at fifth grade but a greater proportion of *Blacks* and *Others* are missing data at first grade compared to third and fifth grades. Intragroup comparisons of cases within each race/ethnic category based on cases that provided data versus that did not participate in the data collection could not be conducted for two reasons. First, most families stayed in the study until fifth grade rather than dropping out entirely, and, second, the number of cases within each race/ethnic category that did not participate in the data collection but did not drop out either, is relatively very small compared to the cases that did participate in the data collection (3 out of 68 Hispanic families and 8 out of 132 Black families stayed in the study but provided only demographic

information and do not have data on other relevant variables). It appears that some families merely provided the demographic information and did not always participate in the collection of other data.

After conducting descriptive analysis of data, missing data imputation by subgroups of race/ethnicity was performed. Mean differences on predictors and demographics variables were maintained even after data imputation among sub-groups of race/ethnicity. Listwise deletion or imputing means were some traditional techniques for handling missing data. However, these techniques have been criticized for producing biased estimates and leading to invalid conclusions (Acock, 2005 Rubin, 1987; Widaman, 2006). Therefore, multiple imputations of missing values were performed. The imputation procedure was conducted in STATA 9.0 (STATA Corp, 2005) using the multivariate imputation by chained equations (ICE; Royston, 2004, 2005) method. Appendix B presents the syntax created to impute missing data in STATA program. All independent variables and demographic variables were imputed. Missing data on the dependent variables were not imputed. It has been suggested that the values of dependent data should be deleted if imputed (von Hippel, 2007). Early childhood independent variables were imputed at the individual component level. Thereafter, the variables were converted into Z scores and averaged. All composite demographic variables, except for marital transitions, were also imputed at the item level. The composites were computed again with the imputed components. The marital status variables were individually imputed in addition to the marital transition composite. However, the imputed composite was retained in the analyses.

To avoid imposing the covariance structure of the majority group (2/3 of the sample consists of subjects who are White) on the minority subjects (Hispanic and African-American groups), data were imputed separately for subgroups of race/ethnicity. *White* and *Other*

categories were combined when imputing their missing data. These two race/ethnic categories were combined because the *Other* category is very small (n = 66) and consists primarily of Asians whose academic performance is often similar to or higher than the Whites (US Department of Education, 2007a & 2007b). Missing data for the *Hispanic* group and the *African-American* group were individually imputed. After imputation, data for each subgroup were merged to compile the final dataset for each of the 5 imputations. Appendix B provides the syntax that was used in imputing missing data in STATA.

Prior to conducting data analyses, variables in all five imputed datasets were top-and bottom-coded to exclude outliers and to reflect the ranges of variables in the original dataset. Subsequently, data analyses were performed using the 5 imputed datasets. For each model tested, the results of all 5 individual datasets were combined using the HLM 6.03 software (Raudenbush & Bryk, 2002).

3.4.3 Data Dependence

In this study, assessments were nested within children and children were nested within classrooms. Since academic achievement was assessed at three time-points assessments are nested within students. Similarly, student level measures are not independent of each other. Due to having the same teacher, peers, and the same curriculum some children have more similar experiences than other children. Therefore, nesting within classrooms using teacher IDs was considered when examining children's academic achievement trajectories in 3 level HLM models.

In the NICHD SECCYD dataset, the nesting of students within classrooms (estimated using teacher ID numbers) ranges 11-14% during first (14%), third (12%), and fifth (11%) grades. The ICC values are as follows:

Table 1: Intra-class correlation (ICC) values for data dependence due to students nested within classrooms at grades 1, 3, and 5

Teacher ID	ICC values, (*n*)		
	Reading	Math	Vocabulary
Grade 1	0.49, (847)	0.51, (847)	0.20, (814)
Grade 3	0.07, (809)	0.13, (808)	0.33, (809)
Grade 5	0.06, (787)	0.14, (787)	0.17, (786)

Note: n represents cases which have teacher ID information as well as academic outcomes available at each grade.

It was decided to use teacher ID information at first grade to take into account nesting of students within classrooms due to two reasons: (1) as can be seen in table 1, a higher number of teacher information was available at first grade as compared to the other two grades, and (2) because the ICC values are higher at first grade compared to the other two grades (indicating greater data dependence).

The appropriate strategy to take into account data dependence is to use the classroom level information across all three time points. However, because teacher ID information is not complete for all cases across the three assessments, teacher ID at grade 1 was used as classroom

level information at all three time points. Using a static measure of teacher id throughout elementary school worked under the assumption that there is no change in nesting structure over the years. The results of the two-level models that did not take data dependence into account and of the three-level models where data dependence was estimated were essentially similar. Since the results are similar, the findings presented in this paper are those based on the more parsimonious two-level models. However, the results based on all analyses conducted with unimputed and imputed data, with and without data dependence taken into account are tabulated in Appendices C, D, and E. Therefore, the HLM model building strategy presented next only describes the equations that were used for testing two-level models.

3.4.4 HLM Model Building Strategy

Growth trajectories of math, reading, and vocabulary were estimated using two-level Hierarchical Linear Models (HLM, Raudenbush & Bryk, 2002). The models were estimated in HLM 6.03 using Full-Maximum Likelihood (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004).

3.4.4.1 Unconditional (null) Model

As a first step in the HLM analyses, unconditional models estimating the shape of trajectories of reading, math, and vocabulary were explored. Since outcomes are available at only three time-points, linear growth trajectories were explored. Level 1 model was represented as follows:

$$Y_{ijk} = \beta_{0jk} + \beta_{1jk}\text{time} + r_{ijk} \quad (3.1)$$

$$r_{ijk} \sim N(0, \sigma^2)$$

The academic achievement of child i at time j was modeled as a function of the average academic achievement across elementary school (β_{0jk}) and an average rate of change that takes place as a function of time (β_{1jk}). For each assessment 'time' reflects child's age in months and was centered on average age (average of ages at grades 1, 3, and 5). Thus, time 1 became (age at grade 1 assessment – average age), time 2 became (age at grade 3 assessment – average age), and time 3 became (age at grade 5 – average age). By centering time, the average intercept reflects average academic achievement of child i during elementary school rather than initial achievement at first grade. In this case, the average intercept turns out to be set close to third grade. The slope represents average rate of growth during elementary school.

At level 2, the regression coefficients on the intercept and the linear term were estimated as random effects. The equations at level 2 were represented as follows:

$$\beta_{0jk} = \beta_{00k} + u_{0jk} \quad (3.2)$$

$$u_{0jk} \sim N(0, \tau_{00}^{(2)})$$

$$\beta_{1jk} = \beta_{10k} + u_{1jk} \quad (3.3)$$

$$u_{1jk} \sim N(0, \tau_{10}^{(2)})$$

In the unconditional models no predictors at level 2 have been specified for either the intercept β_0 or the slope β_1, thus allowing for proper specification of individual growth equations and for evaluating baseline statistics for level 2 equations in the subsequent conditional models (Raudenbush & Bryk, 2002). β_{0jk}, the average academic achievement during elementary school is comprised of $\beta_{00k,}$ true average achievement, and u_{0jk}, the variability in mean achievement. $\beta_{1jk,}$ the average rate of change in achievement, is comprised of $\beta_{10k,}$ true average rate of change during elementary school, and u_{1jk}, the variability associated with the rate of change.

After testing for significant variability in the level 1 growth parameters, conditional models were estimated to explain variability in trajectories of academic achievement from first through fifth grade. A bottom-up approach of model building was adopted to include predictors of the intercept and slopes in order to test for relevant research questions.

3.4.4.2 Conditional Models (Examination of Research Questions)

Research Question 1. Are learning-related social skills in middle childhood associated with trajectories of academic achievement across middle childhood?

Two aspects of this question were examined. The first part tested whether *between-children* differences on self-regulation, attention problems, and behavior problems during middle childhood are associated with differential trajectories of achievement during elementary school. The second part of this question examined whether *within-child* changes in self-regulation, attention problems, and behavior problems during middle childhood are associated with corresponding changes in academic achievement.

To test the links between inter-individual differences (*between-child*) on learning-related social skills and trajectories of academic achievement, averages of teacher-reported self-regulation, attention problems, and behavior problems at grades, 1, 3, and 5 were entered at level 2 in the HLM model. To test *within-child* changes in learning-related social skills and trajectories of academic achievement, teacher-reports of attention problems, self-regulation, and at behavior problems grade 1, grade 3, and grade 5 were added as time-varying predictors at level 1.

Several early childhood demographic and family characteristics (such as maternal age, education, marital status, employment, child age at first grade, child gender, race/ethnicity, residential mobility experienced by the target child, psychological distress experienced by the mother, mother and child early cognitive and verbal ability, and number of children at home)

were entered in the equations as level 2 predictors. Early childhood variables represent child, family, and maternal information from birth through kindergarten. All predictors at level 2 were grand mean centered. Enders and Tofighi (2007) demonstrate that when level 2 predictors are of substantive interest and variables at level 1 are primarily used as covariates, grand mean centering of the level 2 variables is optimal (Raudenbush & Bryk, 2002; Enders & Tofighi, 2007). Moreover they state that if both level l and level 2 variables are of interest, grand mean and group mean centering produce equivalent parameter estimates hence either approach for centering is appropriate.

In addition to the time-varying components of attention problems, self-regulation, and behavior problems in middle childhood, maternal, child, and family characteristics such as maternal marital status, child health, and number of children at home were also included as time-varying characteristics at level 1. All time-varying covariate at level 1 were group mean centered. Group mean centering of predictors at level 1 helps decrease the residual variance at level 1. Also, the interpretation of the effect of predictors is at the person level which helps decrease the confounding between between-group and within-group effects. When the level 1 predictors are group mean centered the intercept β_{0j} becomes the unadjusted mean for group j and the variance is the variance among the means of level-2 units (Raudenbush & Bryk, 2002).

The random intercepts and slopes model with level 1 and level 2 predictors are represented below.

Level 1 equation:

$$Y_{ijk} = \beta_{0jk} + \beta_{1jk}\text{time} + \beta_{2jk}\text{MCAttention} + \beta_{3jk}\text{MCSReg} + \beta_{4jk}\text{BehProblems} + \beta_{5jk}\text{MCChildHealth} + \beta_{6jk}\text{MCNChildren} + \beta_{7jk}\text{MCMarital} + r_{ijk} \quad (3.6)$$

$r_{ijk} \sim N(0, \sigma^2)$

The coefficient for average intercept indicates that for average time the mean achievement equals β_{0jk}. The coefficient for slope, $\beta_{1j,k,}$ indicates the rate of change in achievement as a function of increasing time. Since *time* was centered, the slope represents average rate of change in achievement.

The coefficients $\beta_{2jk} - \beta_{4jk}$ indicates whether change in teacher-reported LRSS skills (attention problems, self-regulation, and behavior problems) in middle childhood are significantly associated with change in the predicted outcome after controlling for all other variables in the model.

Coefficients β_{5jk} - β_{7jk} indicate whether change in child health, number of children at home, and change in marital status during middle childhood, respectively, are significantly associated with change in predicted outcome.

Level 2 equation representing intercepts as outcomes:

$$\beta_{0jk} = \beta_{00k} + \beta_{01k}\text{AverageAttention} + \beta_{02k}\text{AverageSReg} + \beta_{03k}\text{AverageBehProblems} +$$
$$\beta_{04k}\text{AverageAttention} + \beta_{05k}\text{AverageSReg} + \beta_{06k}\text{AverageBehProblems} +$$
$$\beta_{07k}\text{Child} + \beta_{08k}\text{Family} + u_{0jk} \qquad (3.7)$$

$u_{0jk} \sim N(0, \tau_{00}^{(2)})$

Coefficients β_{01k} - β_{03k} indicate whether inter-individual differences among children in teacher-reported attention problems, self-regulation, and behavior problems during middle childhood, respectively, are associated with the average achievement score after controlling for all other variables in the model.

Coefficients β_{04k} - β_{06k} indicate whether inter-individual differences among children in mother-reported attention problems, self-regulation, and behavior problems during early childhood, respectively, are associated with the average intercept of achievement outcomes.

Coefficient β_{07k} indicates whether inter-individual differences in child demographic and cognitive factors are associated with the average intercept of achievement outcomes. Coefficient β_{08k} indicates whether inter-individual differences in family factors during early childhood is associated with the average intercept of achievement outcomes.

Level 2 equation representing slopes as outcomes:

$$\beta_{1jk} = \beta_{10k} + \beta_{11k}\text{AverageATT} + \beta_{12k}\text{AverageSREG} + \beta_{13k}\text{AverageBP} +$$
$$\beta_{14k}\text{EarlyAttention} + \beta_{15k}\text{EarlySReg} + \beta_{16k}\text{EarlyBehProblems} + \beta_{17k}\text{Child} +$$
$$\beta_{18k}\text{Family} + u_{1jk} \quad (3.8)$$

$$u_{1jk} \sim N(0, \tau_{10}^{(2)})$$

Coefficients β_{11k} - β_{13k} indicate whether inter-individual differences among children in teacher-reported attention problems, self-regulation, and behavior problems during middle childhood are associated with the average rates of growth in achievement outcomes controlling for all other variables in the model.

Coefficient β_{14k} - β_{16k} indicates whether inter-individual differences among children in mother-reported attention problems, self-regulation, and behavior problems during early childhood, respectively, are associated with the average rates of growth in achievement outcomes.

Coefficient β_{17k} indicates whether inter-individual differences in child demographic and cognitive factors are associated with the average rates of growth in achievement outcomes.

Coefficient β_{18k} indicates whether inter-individual differences in family factors during early childhood is associated with the average rates of growth in achievement outcomes.

Research Question 2 This question examines whether learning-related social skills moderate the links between family income and academic achievement and between gender and academic achievement.

LRSS as a moderator of the links between family income and achievement

Interactions between family income in middle childhood and all three indices of learning-related social skills in middle childhood were examined to investigate whether higher levels of self-regulation and lower levels of attention problems and behavior problems in middle childhood moderate the risk of poorer academic achievement due to low family income in middle childhood. Similarly, interactions between family income in early childhood and all three indices of leaning-social skills in middle childhood were examined.

Middle childhood LRSS X family income in middle childhood. The interaction terms were entered at level 2 as predictors of average intercept and that of average slope. Level 2 equations for testing the interaction between low family income in middle childhood and learning-related social skills in middle childhood are presented below.

Level 2 equations representing intercepts as outcomes:

$$\beta_{0jk} = \beta_{00k} + \beta_{01k}\text{AverageMCAttention} + \beta_{02k}\text{AverageMCSReg} + \beta_{03k}\text{AverageMCBehProblems} + \beta_{04k}\text{ECIncome} + \beta_{05k}\text{MCIncome} + \beta_{06k}(\text{AverageMCAttention X MCIncome}) + \beta_{07k}(\text{AverageMCSReg X MCIncome}) + \beta_{08k}(\text{AverageBehProblems X MCIncome}) + \beta_{09k}\text{Child} + \beta_{10k}\text{Family} + u_{0jk} \quad (3.9)$$

$$u_{0jk} \sim N(0, \tau_{00}^{(2)})$$

Coefficients $\beta_{06k,}$ $\beta_{07k,}$ and β_{08k} link average intercepts of achievement with the interactions between family income in middle childhood and teacher-reports of attention problems, self-regulation, and behavior problems, respectively. The middle childhood family income variable is binary coded with 1 reflecting *poor* and 0 reflecting non-poor. Higher scores on attention problems and behavior problems scales indicate greater attention and behavior problems whereas higher scores on self-regulation indicate greater self-regulatory capability. Therefore, we expect the interaction coefficient for the intercepts of reading, vocabulary, and math skills to be negative for attention problems X income and for behavior problems X income. We expect the coefficient to be positive for self-regulation X family income. Negative coefficients will indicate negative associations between attention problems or behavior problems and achievement outcomes and that the links are stronger for the *poor* category. In contrast, positive coefficient for self-regulation and achievement will indicate a positive association between the two variables and one that is stronger for the *poor* category. If the coefficients are significant and in the expected direction that would mean higher levels of LRSS would predict decreased risk of poorer academic achievement associated with lower family income in middle childhood.

The equation linking average rates of change in achievement outcomes and interactions between indices of learning-related social skills and family income in middle childhood is presented below.

Level 2 equation representing slopes as outcomes:

$$\beta_{1jk} = \beta_{10k} + \beta_{11k}\text{AverageMCAttention} + \beta_{12k}\text{AverageMCSReg} +$$
$$\beta_{13k}\text{AverageMCBehProblems} + \beta_{14k}\text{ECIncome} + \beta_{15k}\text{MCIncome} +$$
$$\beta_{16k}(\text{AverageMCAttention X MCIncome}) + \beta_{17k}(\text{AverageMCSReg X MCIncome}) +$$

$$\beta_{18k}(\text{AverageBehProblems X MCIncome}) + \beta_{19k}\text{Child} + \beta_{20k}\text{Family} + u_{1jk} \quad (3.10)$$

Coefficients $\beta_{16k,}$ $\beta_{17k,}$ and β_{18k} link average rates of change in achievement with the interactions between family income in middle childhood and teacher-reports of attention problems, self-regulation, and behavior problems, respectively. If statistically significant, coefficient β_{16k} would indicate a significant interaction between teacher-reported attention problems and family income in middle childhood in predicting the intercept. Similarly, a statistically significant β_{17k} would reflect a significant interaction between teacher-reported self-regulation and family income in middle childhood. Finally, significant β_{18k} would reflect a significant interaction between teacher-reported behavior problems and family income in middle childhood.

Middle childhood LRSS X family income in early childhood. The interactions between family income in early childhood and all three indices of learning-related social skills in middle childhood were also examined to investigate whether higher levels of self-regulation and lower levels of attention problems and behavior problems in middle childhood moderate the risk of poorer academic achievement due to lower levels of family income in early childhood. The procedure followed to conduct these interactions was similar to the one followed for testing interactions between middle childhood learning-related social skills and family income in middle childhood, hence it is not repeated here.

The early childhood family income variable is also binary coded with 1 reflecting *poor* and 0 reflecting non-poor. Higher scores on attention problems and behavior problems scales indicate greater attention and behavior problems whereas higher scores on self-regulation indicate greater self-regulatory capability. Therefore, we expect the interaction coefficient for the intercepts of reading, vocabulary, and math skills to be negative for attention problems X income

and for behavior problems X income. We expect the coefficient to be positive for self-regulation X family income. Negative coefficients will indicate negative links between attention problems and achievement outcomes and that the links are stronger for the *poor* category. Similarly, negative coefficient for behavior problems and achievement will indicate that the links are stronger for the *poor* category such that when behavior problems decrease, the intercepts for reading, vocabulary, and math increase. In contrast, positive coefficient for self-regulation and achievement will indicate a positive association between the two variables and one that is stronger for the *poor* category. If the coefficients are significant and in the expected direction that would mean higher levels of LRSS would predict decreased risk of poorer academic achievement associated with lower family income in early childhood.

LRSS as a moderator of gender and academic achievement

Multi-group analyses by gender, rather than interactions, were conducted to examine whether having higher levels of LRSS in middle childhood moderated the links between gender and academic self-regulation and lower levels of attention problems and behavior achievement. Equations 3.1 through 3.8 were examined separately for boys and girls. In testing the interaction between family income level and learning-related social skills the focus is on comparing whether children with one risk (lower family income but not lower levels of learning-related social skills) would display higher achievement than those with dual risk (lower family income and lower levels of learning-related social skills) whereas in gender comparison it is expected that having higher levels of learning-related social skills would be beneficial for both boys and girls but stronger for boys. Multi-group analysis would better serve the purpose of analyzing whether the models hold true for both gender but in different degrees. Additionally, the sample size for boys and girls is substantially large (n = 570 and 553, respectively) which allows for the ability to

conduct multi-group analyses. In contrast the sample size of *poor* category is significantly smaller than the *non-poor* category (a third during early childhood and a quarter during middle childhood), thus the decision to analyze family income X LRSS interactions but to conduct multi-group analyses by gender.

Since it was expected that having higher levels of self-regulation and lower levels of attention and behavior problems was associated with greater gains in academic achievement for boys, *standard mean difference t-test* were conducted. The t-test compared coefficients linking indices of LRSS with achievement for both groups. The following t-test formula was used to compare the coefficients:

$$t = \frac{(\beta_1 - \beta_2)}{\sqrt{(SE_{\beta_1})^2 + (SE_{\beta_2})^2}} \tag{3.11}$$

where,

β_1 = regression coefficient for group 1

β_2 = regression coefficient for group 2

$(SE_{\beta_1})^2$ = standard error of β_1 squared

$(SE_{\beta_2})^2$ = standard error of β_2 squared

the df for the test = df for β_1 + df for β_2.

The t-tests were expected to reveal whether statistically significant differences exist between the coefficients linking teacher-reported attention in middle childhood with reading, vocabulary, and math for boys and girls. For each outcome it is expected that the coefficients for boys will be significantly larger than the coefficient for girls. Since the coefficients for boys were

expected to be greater than the coefficients for girls one-tailed critical values of t statistic were used to determine whether the differences were statistically significant.

4.0 RESULTS

4.1 PRELIMINARY ANALYSES

4.1.1 Descriptive Information about the Sample

Table 2 presents the descriptive statistics for the imputed analytic sample (n = 1123). The information about variables is also presented by subgroups of race/ethnicity. The means and standard deviations were computed after stacking the five imputed datasets in SPSS. Means and standard deviations for early childhood demographic variables, maternal verbal ability, child cognitive ability, and learning-related social skills in early and middle childhood are presented in the table.

4.1.1.1 Description of Data

Examination of the current analytic sample reveals that it consists of 51% females. About 6% of the children are Hispanic and 12% are African-American. In this sample about 3% of the children were born with a low birthweight. About 42% of the children experienced no residential transitions during early childhood. Most children were rated as being healthy on average during the first four and a half years of their life. The average age of children in first grade was 83.72 months. Mothers were on average 28 years old at the birth of the target children. The average

number of years of maternal education at 1 month was approximately 14 years. Mothers worked an average of 19 hours per week between 0-54 months.

According to teachers' reports, attention and behavior problems rise from first to third grade and then drop slightly at fifth grade. On the other hand, self-regulation decreases from first to third grade and increases again at fifth grade. It is not clear whether this systematic pattern is an artifact of data owing to change in reporter at each assessment or a true reflection of children's development at each age.

4.1.1.2 Inter-correlations among Indices of LRSS

This section presents the inter-correlations among indices of learning-related social skills in the imputed dataset. As can be seen in table 3, correlations among self-regulation, attention problems, and behavior problems across *early* and *middle* childhood are statistically significant. The correlations are mostly small to modest, indicating a moderate degree of stability in skills between *early* and *middle* childhood. Average attention problems, self-regulation, and behavior problems in *early* childhood are moderately correlated with each other. Inter-correlations among average attention problems, self-regulation, and behavior problems in *middle* childhood are moderate to somewhat high.

However, during *middle* childhood, there appears to be a lack of stability in these skills. Teacher-reported attention, self-regulation, and behavior problems in first grade are correlated with their fifth grade counterparts; however, third grade teacher-reports are not correlated with the first and fifth grade teacher reports of the same skills. The correlation between teacher reports of attention in first and fifth grades is 0.34**. Teacher-reports of self-regulation in first and fifth grades correlate 0.29** and behavior problems correlate 0.37**. The lack of stability could be an artifact of reporters changing rather than children's actual social development.

At each grade, the three indices of learning-related social skills are correlated. First grade attention problems show moderate correlations with self-regulation (-0.39**) and behavior problems (0.51**). At third grade, attention correlates -0.32** with self-regulation and 0.39** with behavior problems. At fifth grade the correlations coefficients are -0.44** and 0.51**, respectively. At each of the three grades, self-regulation and behavior problems also exhibit moderately high correlations (-0.60**, -0.50**, and -0.60**). Since the majority of inter-correlations are mostly moderate in range multicollinearity was not a significant threat.

Table 2: Descriptive statistics for the imputed analysis sample (n = 1123) and by subgroups of race/ethnicity.

	Total Sample n= 1123		*White + Other n=866*		*Hispanic n=68*		*African-American n=132*	
	M	SD	M	SD	M	SD	M	SD
Child Characteristics								
Age at 1st grade	83.72	3.48	83.67	3.42	83.54	3.30	84.22	3.97
Child male	0.51		0.50		0.56		0.52	
Child Hispanic	0.06		0.00		1.00		0.00	
Child Black	0.12		0.00		0.00		1.00	
Child Other					0.00		0.00	
Low Birthweight	0.02	0.16	0.02	0.15	0.03	0.17	0.03	0.17
Demographic Characteristics in Early Childhood								
Families below 200% poverty level	0.30		0.23		0.44		0.75	
Child health rating 1-54 months	3.35	0.40	3.37	0.39	3.17	0.42	3.28	0.42
Number of children in household 1-54 months	2.00	0.93	1.94	0.84	2.17	0.91	2.44	1.35
Maternal age at 1-month	28.41	5.59	29.15	5.35	26.32	5.52	24.30	5.22
Maternal years of education at 1-month	14.42	2.47	14.70	2.48	13.40	2.32	12.99	1.74
Maternal hours of employment 1-54 months	18.92	13.10	19.01	13.05	20.64	13.00	17.42	13.43

Table 2 (continued)

Number of maternal partnership transitions 1-54 months	0.64	1.26	0.55	1.20	0.99	1.38	1.13	1.44
Number of residential transitions 1-54 months	1.11	1.40	1.03	1.37	1.32	1.39	1.61	1.53
Maternal Verbal and Child Cognitive Ability								
Maternal PPVT Score	99.16	18.56	102.5	16.86	92.24	19.02	79.30	16.11
Average Bayley MDI score	100.72	12.46	102.6	11.76	97.33	10.58	89.29	11.57
Learning-related social skills in Early Childhood								
Attention problems at 54months	-0.03	0.80	-0.09	0.77	0.02	0.82	0.37	0.90
Self-regulation at 54months	0.05	0.84	0.11	0.81	-0.03	0.93	-0.38	0.87
Behavior problems at 54mos.	-0.01	0.87	-0.03	0.86	0.00	0.88	0.12	0.98
Learning-related social skills in Middle Childhood								
Attention problems	53.19	4.15	53.76	3.75	54.30	4.14	57.17	5.40
Self-regulation	15.01	2.44	15.30	2.30	14.74	2.32	13.16	2.72
Behavior problems	51.16	5.87	50.43	5.44	50.97	5.25	56.32	6.47
Learning-related social skills in Middle Childhood								

Table 2 (continued):

Attention problems in 1st grade	53.81	6.21	53.27	5.65	53.62	5.69	57.70	8.41
Attention problems in 3rd grade	54.74	7.06	53.68	6.79	54.44	8.76	55.30	7.87
Attention problems in 5th grade	54.02	6.34	53.31	5.35	54.84	6.17	58.51	9.92
Self-regulation in 1st grade	15.18	3.71	15.48	3.53	14.57	4.08	13.39	4.19
Self-regulation in 3rd grade	14.95	3.82	14.96	3.76	15.92	3.75	14.36	4.17
Self-regulation in 5th grade	14.91	3.98	15.45	3.60	13.75	3.57	11.74	4.94
Behavior problems in 1st grade	50.73	8.66	49.94	8.36	50.59	8.00	56.32	9.02
Behavior problems in 3rd grade	51.54	9.24	51.38	9.12	49.78	9.44	53.57	9.67
Behavior problems in 5th grade	51.20	9.21	49.98	8.26	52.53	8.84	59.06	11.50

Table 3: Intercorrelations among the indices of learning-related social skills in early and middle childhood for the total -imputed sample (n = 1123)

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1. EarlyATT	_	-0.50**	0.53**	0.24**	-0.20**	0.22**	0.22**	0.03*	0.22**	-0.20**	-0.00	-0.19**	0.24**	0.02	0.17**
2.EarlyREG		_	-0.50**	-0.24**	0.22**	-0.24**	-0.22**	-0.05**	-0.20**	0.20**	0.01	0.20**	-0.24**	-0.04**	-0.20**
3. EarlyBEH			_	0.15**	-0.16**	0.18**	0.15**	0.03	0.12**	-0.18**	-0.01	-0.12**	0.21*	0.03*	0.12**
4. MiddleATT				_	-0.45**	0.52**	0.67**	0.57**	0.68**	-0.32**	-0.20**	-0.34**	0.39**	0.26**	0.38**
5.MiddleREG					_	-0.64**	-0.32**	-0.17**	-0.38**	0.67**	0.54**	0.70**	-0.48**	-0.30**	-0.47**
6. MiddleBEH						_	0.38**	0.20**	0.43**	-0.47**	-0.26**	-0.49**	0.69**	0.54**	0.72**
7. ATTgrade1							_	-0.01	0.34**	-0.39**	0.01	-0.24**	0.51**	0.02	0.23**
8. ATTgrade3								_	0.00	-0.01	-0.32**	-0.00	-0.01	0.39**	0.01
9. ATTgrade5									_	-0.23**	-0.04**	-0.44**	0.28**	0.04**	0.51**
10.REGgrade1										_	0.01	0.29**	-0.60**	-0.04**	-0.30**
11.REGgrade3											_	0.02	0.00	-0.50**	0.00
12.REGgrade5												_	-0.33**	-0.03*	-0.60**
13.BEHgrade1													_	0.01	0.37**
14.BEHgrade3														_	0.02
15.BEHgrade5															_

Note. The abbreviated variable names represent average attention problems in early childhood (EarlyATT), average self-regulation in early childhood (EarlyREG), average behavior problems in early childhood (EarlyBEH), average attention in middle childhood (MiddleATT), average self-regulation in middle childhood (MiddleREG), average behavior problems in middle childhood (MiddleBEH), attention problems in 1st grade, 3rd grade, and 5th grade (ATTgrade1, ATTgrade3, & ATTgrade3, respectively), self-regulation in 1st grade, 3rd grade, and 5th grade (REGgrade1, REGgrade3, & REGgrade5, respectively), and behavior problems in 1st grade, 3rd grade, and 5th grade (BEHgrade1, BEHgrade3, & BEHgrade5, respectively) . $^{\dagger}p < .10$, *** $p < .001$, ** $p < .01$, and * $p < .05$.

4.1.2 Descriptive Information about Academic Achievement Outcomes

Table 4 presents W scores for reading, math, and vocabulary skills in elementary school. The scores for all three outcomes increased from first to fifth grade. However, the greatest gains were observed in reading scores from first to third grade (41 points compared to 27 points increase in math and approximately, 13 points in vocabulary).

Table 4: WJ Letter-Word Identification, Applied Problems, and Picture Vocabulary scores in elementary school

Academic Achievement Outcomes in Middle Childhood	*n=1123*	
	M	SD
WJ Letter-Identification scores in1st grade	452.62	23.69
WJ Letter-Identification scores in 3rd grade	493.94	18.32
WJ Letter-Identification scores in 5th grade	510.25	17.06
WJ Applied Problems scores in 1st grade	470.05	15.51
WJ Applied Problems scores in 3rd grade	497.40	12.81
WJ Applied Problems scores in 5th grade	509.96	12.43
WJ Picture Vocabulary scores in 1st grade	483.95	12.25
WJ Picture Vocabulary scores in 3rd grade	496.96	11.44
WJ Picture Vocabulary scores in 5th grade	505.92	11.83

Table 5 presents the correlations between learning-related social skills and academic achievement. All correlations between the three indices of learning-related social skills and Woodcock Johnson Letter-Word Identification, Picture Vocabulary, and Applied problems at grades 1, 3, and 5 are small, with higher attention and behavior problems associated with lower achievement, and greater self-regulation skills related to higher achievement scores. Correlations between average learning-related social skills across middle childhood and achievement are significant, yet small. Similarly, correlations between average learning-related social skills across early childhood and achievement are significant but quite small. Concurrent correlations between learning-related social skills and achievement at grades 1 and 5 are also significant but small in magnitude. At third grade, correlations between attention problems and achievement and between behavior problems and achievement are of negligible magnitude. Self-regulation is unrelated to achievement in third grade.

Table 5: Correlations between indices of learning-related social skills and academic achievement

	WJ Letter-Word Identification at grade 1	WJ Letter-Word Identification at grade 3	WJ Letter-Word Identification at grade 5	WJ Applied Problems at grade 1	WJ Applied Problems at grade 3	WJ Applied Problems at grade 5	WJ Picture Vocabulary at grade 1	WJ Picture Vocabulary at grade 3	WJ Picture Vocabulary at grade 5
1. EarlyATT	-0.18**	-0.23**	-0.21**	-0.23**	-0.24**	-0.22**	-0.24**	-0.25**	0.20**
2.EarlyREG	0.19**	0.19**	0.21**	0.20**	0.18**	0.21**	0.22**	0.20**	0.19**
3. EarlyBEH	-0.11**	-0.11**	-0.10**	-0.08**	-0.08**	-0.11**	-0.10**	-0.12**	-0.07**
4. MiddleATT	-0.27**	-0.31**	-0.30**	-0.32**	-0.33**	-0.33**	-0.28**	-0.24**	-0.26**
5.MiddleREG	0.18**	0.20**	0.19**	0.16**	0.18**	0.20**	0.19**	0.17**	0.18**
6. MiddleBEH	-0.19**	-0.20**	-0.20**	-0.18**	-0.20**	-0.22**	-0.22**	-0.20**	-0.20**
7. ATTgrade1	-0.28**	-0.30**	0.30**	-0.32**	-0.33**	-0.31**	-0.27**	-0.26**	-0.26**
8. ATTgrade3	-0.02	0.03*	-0.03	-0.04**	-0.04**	-0.04**	-0.03	0.04**	0.03
9. ATTgrade5	-0.24**	-0.28**	-0.28**	-0.27**	-0.28**	-0.30**	-0.27**	-0.25**	-0.26**
10.REGgrade1	0.16**	0.16**	0.14**	0.14**	0.16**	0.14**	0.16**	0.14**	0.14**
11.REGgrade3	0.03	0.00	0.00	-0.01	0.00	0.00	-0.01	0.02	-0.01
12.REGgrade5	0.16**	0.21**	0.21**	0.16**	0.18**	0.24**	0.22**	0.21**	0.21**
13.BEHgrade1	-0.16**	-0.17**	-0.16**	-0.16**	-0.16**	-0.17**	-0.19**	-0.18**	-0.18**
14.BEHgrade3	-0.07**	0.05**	-0.06**	-0.03*	-0.04*	-0.06**	-0.03*	0.02	-0.01
15.BEHgrade5	-0.13**	-0.17**	-0.17**	-0.16**	-0.18**	-0.20**	-0.21**	-0.21**	-0.21**

Note. The abbreviated variable names represent average attention problems in early childhood (EarlyATT), average self-regulation in early childhood (EarlyREG), average behavior problems in early childhood (EarlyBEH), average attention in middle childhood (MiddleATT), average self-regulation in middle childhood (MiddleREG), average behavior problems in middle childhood (MiddleBEH), attention problems in 1st grade, 3rd grade, and 5th grade (ATTgrade1, ATTgrade3, & ATTgrade3, respectively), self-regulation in 1st grade, 3rd grade, and 5th grade (REGgrade1, REGgrade3, & REGgrade5, respectively), and behavior problems in 1st grade, 3rd grade, and 5th grade (BEHgrade1, BEHgrade3, & BEHgrade5, respectively) . † $p < .10$, *** $p < .001$, ** $p < .01$, and * $p < .05$.

4.2 UNCONDITIONAL TRAJECTORIES OF READING, VOCABULARY, AND MATH

As a first step in examining the research questions, the unconditional growth models of children's academic achievement trajectories during elementary school were estimated for reading, vocabulary, and math skills. The results presented below are based on the analysis of imputed data.

Table 6 represents the coefficients for the unconditional growth trajectories from first through fifth grades. For each outcome, the coefficient for the intercept represents children's average reading, vocabulary, and math scores during middle childhood. The coefficient for the linear slope term represents the rate of growth in reading, vocabulary, and math skills from first through fifth grade.

The coefficients for the intercepts reflect that the average reading, math, and vocabulary scores were 485.47, 492.36 and 495.58, respectively. Chi-squared tests indicate significant variability in the average intercepts of achievement trajectories for the three academic outcomes. The positive and significant coefficients on the linear slope terms suggest positive growth in children's academic trajectories overtime. The correlations between average scores and the rates of change were -0.98, -0.98, and -0.04 for reading, math, and vocabulary achievement, respectively. The negative correlations indicate that children with higher average achievement scores grew at a slower rate than children who had lower average achievement scores. Chi-squared tests indicate significant variability in the average intercepts of achievement trajectories for three academic outcomes. The slopes for

reading and math trajectories do not indicate significant variability. Significant variability is evidenced in the slope for vocabulary trajectory.

Table 6: Unconditional Growth Models of Academic Trajectories from 1st through 5th Grade: Estimation of Fixed Effects with Robust Standard Errors

Imputed data (n = 1123)	WJ Letter-Word Identification	WJ Picture Vocabulary	WJ Applied Problems
Average Intercept			
Coefficients (SE)	485.47*** (0.55)	495.58*** (0.33)	492.36*** (0.37)
Variance Chi-Sq (p)	6176.23 (p<0.05)	10289.29 (p<0.05)	5976.51 (p<0.05)
Average Slope			
Coefficient (SE)	1.21*** (0.01)	0.46*** (0.01)	0.84*** (0.01)
Variance Chi-Sq (p)	1092.15 (p>0.05)	1363.31 (p<0.05)	945.33 (p>0.05)

4.3 EXAMINATION OF RESEARCH QUESTION 1

(LRSS AND TRAJECTORIES OF ACADEMIC ACHIEVEMENT)

The first research question examined whether learning-related social skills in middle childhood, as indexed by teacher-reports of attention problems, self-regulation, and behavior problems, are associated with trajectories of reading, math, and vocabulary across middle childhood.

Two aspects of this question were examined. One, whether *between- children differences* on teacher-reports of attention problems, self-regulation, and behavior problems during middle childhood were associated with differences on trajectories of reading, vocabulary, and math from first through fifth grade. Two, whether *within-child changes* in teacher-reports of attention problems, self-regulation, and behavior problems during middle childhood are associated with changes in reading, vocabulary, and math outcomes during elementary school.

This first research question was examined in a series of hierarchical linear models. The models were examined sequentially. Between-children predictors of middle childhood learning-related social skills were entered at level 2 in HLM Model I. In Model II, between-children predictors of early learning-related social skills were added at level 2. Time-varying predictors of middle childhood learning-related social skills were entered at level 1 without any LRSS predictors at level 2. In Model IV, the between-children predictors of early and middle childhood learning-related social skills were added back in. In Model V, demographic variables including family income, child cognitive ability, and maternal verbal ability were added to the previous model. The models are presented in tables 7-9. Table 7 presents the coefficients for average intercept and slope for reading skills. Table 8 presents the coefficients for average intercept and slope for vocabulary skills. Table 9 presents the coefficients for average intercept and slope for math skills. All models presented below are based on imputed data. The coefficients presented in the text are presented in standard deviation units, hence the original coefficients were multiplied by appropriate standard deviations presented in Table 2. The coefficients linking teacher-reported attention problems, self-regulation, and behavior problems to reading, vocabulary, and math were multiplies by 4.15, 2.44, and 5.87 respectively. Likewise, the coefficients linking mother-reported attention problems, self-regulation, and behavior problems to reading, vocabulary, and math were multiplies by 0.80, 0.84, and 0.87 respectively.

4.3.1 Model I

Model I examines *between-children* differences on teacher-reported learning-related social skills in middle childhood and their associations with trajectories of reading, vocabulary, and math skills. Teacher reports of attention problems, self-regulation, and behavior problems were added

as level 2 predictors of intercept and slope. Coefficients linking middle childhood learning-related social skills with achievement outcomes are presented in tables 7-9. Average intercepts for reading, vocabulary, and math achievement were significantly lower for children who displayed higher average attention problems as reported by the teachers. Children who scored 1 SD higher in teacher-reported average attention problems during middle childhood scored 5.19 points lower in average reading scores, 2.53 points lower in average vocabulary scores, and 4.15 point lower in average math scores during elementary school. In contrast, teacher–reported average self-regulation and behavior problems in middle childhood were not found to be associated with the intercept of any of the achievement outcomes. Examination of the level-2 LRSS predictors of slopes revealed that growth in reading and vocabulary achievement were not predicted by any of the three indices of learning-related social skills in middle childhood. Math achievement during elementary school was predicted by average attention problems but not by self-regulation and behavior problems. With each unit increase in teacher-reported attention problems during middle childhood the math scores increased by a mere 0.04 points. This association between average attention in middle childhood and slope of math achievement, although significant, is quite small.

4.3.2 Model II

Model II examines *between-children* differences on teacher-reported social skills in middle childhood and their association with trajectories of reading, vocabulary, and math skills when early childhood learning-related social skills were taken into account. In the second model, maternal-reports of attention problems, self-regulation, and behavior problems were entered as predictors of intercept and slope at level-2 .Model II presents the coefficients linking middle

childhood learning-related social skills with trajectories of achievement as well as the coefficients linking early childhood learning-related social skills with achievement trajectories. As can be seen in model 2 in tables 7-9, the average intercept for reading, vocabulary, and math achievement continue to be predicted by teacher-reported attention problems. Children who scored 1 SD higher in average attention problems during middle childhood scored 4.57 points lower in average reading scores, 2.08 points lower in average vocabulary scores, and 3.57 points lower in average math scores in elementary school. A slight decrease in the strength of associations between middle childhood attention problems and intercepts for reading, vocabulary, and math are observed, however, these associations continue to be significant.

In addition to the teacher reports of attention problems in middle childhood, early childhood indicators of learning-related social skills, as reported by the mothers, also predict the intercept for reading, vocabulary, and math skills. Specifically, children who scored 1SD higher on mother-reported attention problems during early childhood scored 2.34 points lower in average reading scores, 2.07 points lower in average vocabulary scores, and 2.33 points lower in math scores. Children who scored 1SD higher on mother-reported self-regulation during early childhood scored 1.92 points higher in average reading scores, 1.35 points higher in average vocabulary scores, and 1.27 points higher in average math scores. Maternal reports of average behavior problems during early childhood only predicted the intercept for vocabulary and math achievement. Contrary to expectation, children scoring 1 SD higher on average behavior problems during early childhood scored 1.33 points higher on average vocabulary scores and 1.37 points higher on average math scores. Overall, when early childhood learning-related social skills were added to the models, the reading, vocabulary, and math slopes were not predicted by early or middle childhood learning-related social skills.

4.3.3 Model III

Model III examines *within-child* changes in teacher-reported learning-related social skills in middle childhood and corresponding changes in achievement. In this model**,** teacher-reports of attention problems, self-regulation, and behavior problems at grades 1, 3, and 5 were included at level 1 without any predictors of intercepts and slopes at level 2. Time-varying scores of attention, self-regulation, and behavior problems entered at level 1 of the HLM model indicated whether changes in these indices of learning-related social skills between first and fifth grades were associated with corresponding changes in achievement scores.

The results indicated that none of the time-varying measures of attention problems, self-regulation, and behavior problems were significantly associated with growth in academic achievement. In other words, changes in learning-related social skills are not associated with changes in reading, vocabulary, or math.

4.3.4 Model IV

The fourth model combines Models 2 and 3, including early and middle childhood LRSS at level-2 and time-varying LRSS at level-1. Time-varying indicators of teacher-reported attention problems, self-regulation, and behavior problems available at grades 1, 3, and 5 were entered at level 1 and average scores of attention problems, self-regulation, and behavior problems during middle and early childhood were entered at level 2 of the HLM model. This model tested whether inter-individual differences (*between-children*) in teacher-reported attention problems, self-regulation, and behavior problems were associated with trajectories of achievement when time-varying measures of middle childhood LRSS were taken into account.

The results are similar to the results for models II and III. Even after including attention problems, self-regulation, and, behavior problems at level 1 of the HLM models, the strength of coefficients linking inter-individual differences in learning-related social skills during middle childhood at level-2 with trajectories of reading, vocabulary, and math at level-1 stayed the same. Teacher report of attention problems continued to predict average reading, vocabulary, and math scores. Similarly, mother reports of early childhood attention problems, self-regulation, and behavior problems continued to predict average reading, vocabulary, and math scores.

4.3.5 Model V

Model 5 adds average demographic factors, maternal verbal ability, children's cognitive ability at level-2, and time-varying demographic covariates at level-1. Middle childhood attention problems, as reported by teachers, continued to significantly predict the intercept for reading, vocabulary, and math during elementary school. Children scoring 1 SD higher on average attention problems during middle childhood scored 2.95 points lower on average reading scores, 2.32 points lower on average vocabulary scores, and 0.71 points lower on average math scores. As before, teacher-reports of self-regulation and behavior problems in middle childhood were not associated with the intercept for any of the outcomes.

Early childhood attention problems, based on maternal reports, also continued to predict the intercept for vocabulary and math achievement, but not for reading. Children who scored one unit higher on early childhood attention problems 0.67 points lower on vocabulary and 1.11 points lower on math achievement scores. These coefficients represent a 74% reduction in magnitude since Model 1, but the associations remained significant. In contrast, when demographic factors, maternal verbal ability, and cognitive ability were taken into account,

maternal-reports of self-regulation and behavior problems in early childhood were no longer significantly associated with the average intercepts for any of the academic outcomes. Thus, with demographic factors and time-varying covariates taken into account, learning-related social skills in early or middle childhood did not predict any of the slopes, only the intercepts.

A number of significant associations were observed between demographic factors, maternal verbal ability, children's early mental development, and achievement outcomes. Maternal education, maternal verbal ability, child age at first grade, and children's average Bayley scores were all positively associated with average intercept for reading, vocabulary, and math, such that higher maternal education, higher maternal verbal ability, higher child age at first grade, and higher mental development indicated higher average achievement on all three academic outcomes. Better health rating of the child was positively associated with the intercept for reading and vocabulary indicating that children with better health rating had higher average reading and vocabulary scores. On the other hand, child birthweight was positively associated with the intercept for vocabulary, however, indicating that children with low birthweight had higher average vocabulary scores. Higher marital transitions were positively associated with the intercept for reading. Child gender was positively associated with the intercept for vocabulary and math, such that boys displayed higher average vocabulary and math scores. Black children scored significantly lower in vocabulary and math than White/other children, but Hispanic and White/other children did not significantly differ. Greater numbers of children at home during early childhood was negatively associated with the intercept for reading and vocabulary. Poverty during middle childhood was negatively associated with average reading and math scores.

Only two between-child factors predicted growth over time: child age and Bayley scores. Child age in first grade was negatively associated with the slope of reading, vocabulary, and

math during elementary school. This indicates that older children displayed slower growth in all outcomes from first through fifth grade. Children's Bayley Mental Development Index during early childhood was also negatively associated with the slopes of reading and math indicating that children with higher cognitive ability as measured by the Bayley scale displayed slower rates of growth in reading and math during elementary school. Within-child changes in mother-rated health during middle childhood were associated with changes in reading scores during elementary school such that improvements in health signaled greater reading score.

4.3.6 Conclusions for Between-Children Differences in LRSS and Links with Trajectories of Achievement during Middle Childhood

Among the three middle childhood LRSS measures examined in the current study, only teacher-rated attention problems showed associations with achievement, and only for average performance (intercepts) and not growth. In summary, between-children differences on teacher-reported attention problems in middle childhood were associated with average intercepts for reading, vocabulary, and math. Despite, 74% reduction in magnitude, the results remained across model specifications that added early childhood LRSS skills and child and family demographic and cognitive actors. Between-children differences on maternal reports of attention problems during early childhood were also associated with the average intercept of vocabulary and math across models. Both teacher-reported and mother-reported attention problems were not associated with growth in achievement trajectories. Inter-individual differences (*between-children*) in teacher-reported self-regulation or behavior problems were not associated with either the average intercept or growth in academic achievement.

4.3.7 Conclusions for Within-Child changes in LRSS and Achievement during Middle Childhood

Intra-individual changes (*within-child*) in teacher-reported attention problems, self-regulation, and behavior problems were unrelated to changes in reading, vocabulary, or math achievement from first through fifth grade. This lack of association among changes in LRSS and changes in achievement was evident even before controlling for relevant child and family factors. These nonsignificant associations indicate that improvements in teacher's perceptions of children's self-regulation and declines in teacher's perceptions of attention and behavior problems were not associated with improvements in reading, vocabulary, or math scores during elementary school.

Table 7: Coefficients for WJ Letter-Word Identification based on 2-Level HLM

Average Intercept across Middle Childhood	Imputed Data *(N = 1123)*				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	485.22***	485.08***	485.47***	485.08***	485.13***
	(0.53)	(0.54)	(0.55)	(0.54)	(0.49)
Early Childhood LRSS					
Attention Problems		-2.92**		-2.92***	-0.79
		(0.90)		(0.90)	(0.81)
Self-Regulation		2.29**		2.29*	0.07
		(0.82)		(0.83)	(0.77)
Behavior Problems		1.18		1.18**	-0.02
		(0.77)		(0.77)	(0.70)
Middle Childhood LRSS					
Attention Problems	-1.25***	-1.10***		-1.10**	-0.71***
	(0.17)	(0.17)		(0.17)	(0.15)
Self-Regulation	0.47	0.36		0.36	0.07
	(0.38)	(0.36)		(0.36)	(0.29)
Behavior Problems	-0.07	-0.02		-0.02	0.11
	(0.14)	(0.14)		(0.14)	(0.11)
Early Demographics					

Table 7: (Continued)

Maternal Age at 1 month					-0.15
					(0.12)
Maternal Education at 1m					0.70**
					(0.26)
Child Male					-0.08
					(0.99)
Child - Hispanic					1.39
					(2.14)
Child - Black					-2.06
					(1.96)
Child – Low Birthweight					3.6
					(2.84)
Child – Age in grade 1					0.42**
					(0.13)
Child -Bayley					0.23***
					(0.05)
Maternal PPVT 36 m					0.17***
					(0.04)
Residential Mobility during EC					-0.21
					(0.42)
Marital Transitions during EC					1.02*
					(0.46)
Maternal Employment Hours during EC					-0.01
					(0.04)
Number of Children during EC					-2.07***
					(0.56)
Health of Child during EC					5.20***
					(1.26)
Early Childhood Family Income					-2.69
					(1.51)
Middle Childhood Family Income					-3.76*
					(1.60)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.21***	1.21***	1.21***	1.21***	1.21***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS					
Attention Problems		-0.01		-0.01	-0.01
		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.01		-0.01	-0.00
		(0.02)		(0.02)	(0.02)
Behavior Problems		0.02		0.02	0.02
		(0.02)		(0.02)	(0.02)
Middle Childhood LRSS					
Attention Problems	0.00	0.00		0.00	0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Self-Regulation	-0.01	-0.01		-0.01	-0.00
	(0.01)	(0.01)		(0.01)	(0.01)
Behavior Problems	-0.00	-0.00		-0.00	0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Early Demographics					
Maternal Age at 1 month					0.01
					(0.00)
Maternal Education at 1m					-0.01
					(0.01)

Table 7: (Continued)

Child Male					0.04
					(0.02)
Child - Hispanic					0.03
					(0.06)
Child - Black					-0.04
					(0.04)
Child - Low Birthweight					0.03
					(0.07)
Child – Age in grade 1					-0.01***
					(0.00)
Child -Bayley 15 + 24m					-0.00*
					(0.00)
Maternal PPVT 36 m					0.00
					(0.00)
Residential Mobility during EC					-0.01
					(0.01)
Marital Transitions during EC					-0.00
					(0.01)
Maternal Employment Hours during EC					0.00
					(0.00)
Number of Children during EC					0.01
					(0.01)
Health of Child during EC					-0.03
					(0.03)
Early Childhood Family Income					0.05
					(0.04)
Middle Childhood Family Income					0.02
					(0.04)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS					
Attention Problems			0.07	0.07	0.06
			(0.06)	(0.06)	(0.06)
Self-Regulation			0.13	0.13	0.10
			(0.14)	(0.14)	(0.13)
Behavior Problems			0.04	0.04	0.04
			(0.06)	(0.04)	(0.05)
Time-varying Covariates					
Poverty					0.04
					(0.20)
Marital Status					0.43
					(0.49)
Child Health					1.97**
					(0.56)
Number of Children					-0.88
					(0.81)

Table 8: Coefficients for WJ Picture Vocabulary Based on 2-Level HLM

Average Intercept across Middle Childhood	Imputed Data *(N = 1123)*				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	495.43*** (0.32)	495.31*** (0.33)	495.58*** (0.33)	495.31*** (0.32)	495.11*** (0.25)
Early Childhood LRSS					
Attention Problems		-2.59** (0.68)		-2.58** (0.68)	-0.84* (0.42)
Self-Regulation		1.61** (0.49)		1.61** (0.49)	0.02 (0.35)
Behavior Problems		1.53** (0.46)		1.53** (0.46)	0.38 (0.36)
Middle Childhood LRSS					
Attention Problems	-0.61*** (0.11)	-0.50*** (0.11)		-0.50*** (0.11)	-0.17* (0.08)
Self-Regulation	0.23 (0.22)	0.16 (0.21)		0.16 (0.21)	0.05 (0.15)
Behavior Problems	-0.13 (0.10)	-0.10 (0.09)		-0.10 (0.09)	0.06 (0.06)
Early Demographics					
Maternal Age at 1 month					0.07 (0.06)
Maternal Education at 1m					0.33* (0.15)
Child Male					3.03*** (0.51)
Child - Hispanic					0.49 (1.01)
Child - Black					-2.23* (0.98)
Child – Low Birthweight					2.83* (1.41)
Child – Age in grade 1					0.30*** (0.07)
Child -Bayley 15 + 24m					0.20*** (0.02)
Maternal PPVT 36 m					0.20*** (0.02)
Residential Mobility during EC					0.04 (0.20)
Marital Transitions during EC					0.23 (0.21)
Maternal Employment Hours during EC					0.00 (0.02)
Number of Children during EC					-1.83*** (0.32)
Health of Child during EC					1.85** (0.64)
Early Childhood Family Income					-1.25 (0.70)
Middle Childhood Family Income					-0.65 (0.74)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5

Table 8: (Continued)

(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.46***	0.46***	0.46***	0.46***	0.46***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS					
Attention Problems		0.01		0.01	0.01
		(0.01)		(0.01)	(0.01)
Self-Regulation		-0.02		-0.02	-0.02
		(0.01)		(0.01)	(0.01)
Behavior Problems		-0.01		-0.01	-0.02
		(0.01)		(0.01)	(0.01)
Middle Childhood LRSS					
Avg Attention Problems	0.00	-0.00		-0.00	-0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Self-Regulation	-0.00	-0.00		-0.00	-0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Behavior Problems	0.00	-0.00		-0.00	-0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Early Demographics					
Maternal Age at 1 month					-0.00
					(0.00)
Maternal Education at 1m					0.01
					(0.00)
Child Male					-0.04
					(0.01)
Child - Hispanic					-0.00
					(0.02)
Child - Black					-0.04
					(0.02)
Child - Birthweight					-0.04
					(0.04)
Child – Age in grade 1					-0.01***
					(0.00)
Child -Bayley 15 + 24m					-0.00
					(0.00)
Maternal PPVT 36 m					0.00
					(0.00)
Residential Mobility during EC					-0.00
					(0.00)
Marital Transitions during EC					-0.01
					(0.01)
Maternal Employment Hours during EC					0.00
					(0.00)
Number of Children during EC					-0.01
					(0.01)
Health of Child during EC					0.01
					(0.02)
Early Childhood Family Income					0.01
					(0.02)
Middle Childhood Family Income					0.00
					(0.02)

Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at	Between with	Within MC LRSS at	Between - within	Full model w Poverty

Table 8: (Continued)

	level 2	EC LRSS	level 1		
Middle Childhood LRSS					
Attention Problems			0.06	0.06	0.06
			(0.03)	(0.03)	(0.03)
Self-Regulation			0.05	0.05	0.05
			(0.05)	(0.05)	(0.05)
Behavior Problems			0.01	0.02	0.02
			(0.03)	(0.03)	(0.03)
Time-varying Covariates					
Poverty200					0.06
					(0.11)
Marital Status					-0.15
					(0.24)
Child Health					-0.31
					(0.25)
Number of Children					0.70
					(0.40)

Table 9: Coefficients for WJ Applied Problems Based on 2-Level HLM

Average Intercept across Middle Childhood	Imputed Data *(N = 1123)*				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	492.18***	492.05***	492.36***	492.05***	492.04***
	(0.36)	(0.36)	(0.37)	(0.36)	(0.31)
Early Childhood LRSS					
Attention Problems		-2.91**		-2.91**	-1.39*
		(0.83)		(0.83)	(0.54)
Self-Regulation		1.51*		1.51*	0.19
		(0.61)		(0.61)	(0.48)
Behavior Problems		1.57**		1.57**	0.65
		(0.50)		(0.50)	(0.43)
Middle Childhood LRSS					
Avg Attention Problems	-1.00***	-0.86***		-0.86***	-0.56***
	(0.12)	(0.12)		(0.12)	(0.10)
Self-Regulation	0.17	0.09		0.09	-0.06
	(0.24)	(0.22)		(0.22)	(0.18)
Behavior Problems	-0.05	-0.02		-0.02	0.12
	(0.10)	(0.10)		(0.10)	(0.07)
Early Demographics					
Maternal Age at 1 month					0.04
					(0.07)
Maternal Education at 1m					0.49**
					(0.17)
Child Male					2.72***
					(0.62)
Child - Hispanic					-1.70
					(1.28)
Child - Black					-3.80**
					(1.24)
Child – Low Birthweight					0.60
					(1.52)
Child – Age in grade 1					0.44***
					(0.08)
Child -Bayley 15 + 24m					0.28***
					(0.03)
Maternal PPVT 36 m					0.08**
					(0.02)
Residential Mobility during EC					-0.21
					(0.28)
Marital Transitions during EC					0.56
					(0.31)
Maternal Employment Hours during EC					0.02
					(0.02)
Number of Children during EC					-0.48
					(0.34)
Health of Child during EC					1.19
					(0.79)
Early Childhood Family Income					-0.77
					(0.96)

Table 9: (Continued)

Middle Childhood Family Income					-2.75** (1.00)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.84***	0.84***	0.84***	0.84***	0.84*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01
Early Childhood LRSS					
Attention Problems		0.02		0.02	0.02
		(0.01)		(0.01)	(0.01)
Self-Regulation		-0.01		-0.02	-0.01
		(0.01)		(0.01)	(0.01)
Behavior Problems		-0.02		-0.01	-0.01
		(0.01)		(0.01)	(0.01)
Middle Childhood LRSS					
Avg Attention Problems	0.01*	0.01		0.01	0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Self-Regulation	0.00	0.00		0.00	-0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Behavior Problems	-0.00	-0.00		-0.00	-0.00
	(0.00)	(0.00)		(0.00)	(0.00)
Early Demographics					
Maternal Age at 1 month					-0.00
					(0.00)
Maternal Education at 1m					-0.00
					(0.00)
Child Male					-0.05
					(0.02)
Child - Hispanic					0.03
					(0.03)
Child - Black					-0.02
					(0.03)
Child – Low Birthweight					-0.02
					(0.05)
Child – Age in grade 1					-0.01***
					(0.00)
Child -Bayley 15 + 24m					-0.00***
					(0.00)
Maternal PPVT 36 m					0.00
					(0.00)
Residential Mobility during EC					-0.01
					(0.01)
Marital Transitions during EC					-0.00
					(0.01)
Maternal Employment					-0.00
					(0.00)
Number of Children during EC					-0.00
					(0.01)
Health of Child during EC					0.00
					(0.02)
Early Childhood Family Income					-0.00
					(0.03)
Middle Childhood Family Income					-0.01
					(0.03)

Table 9: (Continued)

Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS					
Attention Problems			0.04	0.04	0.04
			(0.04)	(0.04)	(0.04)
Self-Regulation			0.12	0.12	0.12
			(0.09)	(0.09)	(0.09)
Behavior Problems			0.02	0.02	0.03
			(0.03)	(0.03)	(0.03)
Time-varying Covariates					
Poverty					0.11
					(0.13)
Marital Status					0.09
					(0.34)
Child Health					0.33
					(0.37)
Number of Children					-0.07
					(0.52)

4.4 EXAMINATION OF RESEARCH QUESTION 2

(LRSS AS A MODERATOR)

4.4.1 Family Income

A second goal of this study was to examine whether learning-related social skills moderated the risk of poorer academic achievement associated with lower family income in childhood. To examine this hypothesis, interactions between middle childhood indices of learning-related social skills (teacher reports of attention problems, self-regulation, and behavior problems) and family income in middle childhood and early childhood were tested in two separate analyses. It was expected that the interaction coefficients linking learning-related social skills and family income would be negative for the links between reports of attention problems and achievement and for

the links between behavior problems and achievement. The coefficients linking reports of self-regulation and achievement were expected to be positive.

As shown in table 10, interactions between teacher reports of learning-related social skills and family income in middle childhood were not significantly associated with the intercepts or slopes of reading, vocabulary, and math. A similar pattern emerged for LRSS interactions with early childhood income. The interactions between middle childhood learning-related social skills and family income in early childhood were also not significantly associated with any of the intercepts or slopes of reading, math, and vocabulary. It appears that, having lower levels of attention and behavior problems or higher levels of self-regulation as reported by teachers were not particularly associated with a lower risk of poorer achievement during middle childhood for children who faced economic hardships in middle childhood.

Table 10: Coefficients for the Interactions between Middle Childhood LRSS and Family Income

Average Intercept across Middle Childhood	WJ Letter-Word Identification		WJ Picture Vocabulary		WJ Applied Problems	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	MC LRSS X MC Inc	MC LRSS X EC Inc	MC LRSS X MC Inc	MCLRSS X EC Inc	MC LRSS X MC Inc	MC LRSS X EC Inc
Intercept	485.13***	485.15***	495.13***	495.13***	492.04***	492.04***
	(0.49)	(0.49)	(0.25)	(0.25)	(0.31)	(0.31)
Early Childhood LRSS						
Attention Problems	-0.75	-0.78	-0.84*	-0.82	-1.38*	-1.39*
	(0.82)	(0.81)	(0.42)	(0.42)	(0.55)	(0.54)
Self-Regulation	0.09	0.09	0.04	0.05	0.19	0.21
	(0.77)	(0.77)	(0.36)	(0.36)	(0.48)	(0.48)
Behavior Problems	-0.04	-0.02	0.39	0.38	0.65	0.66
	(0.70)	(0.70)	(0.36)	(0.37)	(0.43)	(0.43)
Middle Childhood LRSS						
Avg Attention Problems	-0.67	-0.70	-0.06	-0.07	-0.56***	-0.58***
	(0.18	(0.19)	(0.10)	(0.12)	(0.11)	(0.12)
Self-Regulation	-0.06	-0.15	0.03	-0.01	-0.11	-0.14
	(0.33)	(0.36)	(0.16)	(0.18)	(0.19)	(0.21)
Behavior Problems	0.06	0.05	0.06	0.05	0.10	0.12
	(0.14)	(0.14)	(0.07)	(0.07)	(0.08)	(0.08)
Early Demographics						
Maternal Age at 1 month	-0.15	-0.16	0.07	0.06	0.04	0.04
	(0.12)	(0.12)	(0.06)	(0.06)	(0.07)	(0.07)
Maternal Education at 1m	0.71**	0.72**	0.35*	0.35*	0.49**	0.49**
	(0.27)	(0.27)	(0.15)	(0.15)	(0.17)	(0.17)
Child Male	-0.08	-0.07	3.06***	3.01***	2.72***	2.73***
	(1.00)	(1.00)	(0.51)	(0.51)	(0.62)	(0.62)
Child - Hispanic	1.27	1.27	0.31	0.41	-1.71	-1.76
	(2.16)	(2.13)	(1.02)	(1.01)	(1.28)	(1.28)
Child - Black	-2.09	-1.97	-2.02*	-2.04*	-3.83**	-3.71**
	(2.00)	(2.00)	(1.00)	(1.00)	(1.28)	(1.27)
Child - Low Birthweight	3.45	3.53	2.67	2.74	0.59	0.64
	(2.84)	(2.83)	(1.39)	(1.41)	(1.52)	(1.51)
Child – Age in grade 1	0.42**	0.43**	0.27***	0.28***	0.44***	0.44***
	(0.13)	(0.13)	(0.07)	(0.07)	(0.08)	(0.08)
Child -Bayley 15 + 24m	0.23***	0.23***	0.20***	0.20***	0.27***	0.28***
	(0.05)	(0.05)	(0.02)	(0.02)	(0.03)	(0.03)
Maternal PPVT 36 m	0.17***	0.17***	0.20***	0.20***	0.08**	0.08**
	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Residential Mobility during EC	-0.20	-0.22	0.06	0.03	-0.20	-0.20
	(0.43)	(0.43)	(0.20)	(0.21)	(0.28)	(0.28)
Marital Transitions during EC	1.06	1.06	0.25	0.27	0.57	0.57
	(0.47)	(0.46)	(0.22)	(0.22)	(0.31)	(0.31)
Maternal Employment Hours during EC	-0.01	-0.01	-0.00	-0.00	0.02	0.02
	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Number of Children during EC	-2.07***	-2.08***	-1.82***	-1.83***	-0.47	-0.47
	(0.57)	(0.57)	(0.32)	(0.32)	(0.34)	(0.34)
Health of Child during EC	5.21***	5.14***	1.88**	1.79**	1.18	1.17
	(1.26)	(1.26)	(0.64)	(0.64)	(0.79)	(0.79)
Early Childhood Family Income	-2.70	-21.89	-1.29	6.52	-0.76	-0.70
	(1.51)	(21.57)	(0.69)	(14.99)	(0.96)	(18.85)
Middle Childhood	-18.25	-3.77*	13.82	-0.58	-8.14	-2.75**

Family Income	(32.78)	(1.59)	(15.20)	(0.74)	(20.61)	(1.01)
MC Attn X MC Income	-0.11		-0.28		-0.02	
	(0.38)		(0.20)		(0.22)	
MC SReg X MC Income	0.60		0.12		0.18	
	(0.80)		(0.36)		(0.52)	
MC BP X Mc Income	0.22		-0.013		0.07	
	(0.40)		(0.15)		(0.22)	
MC Attn X EC Income		-0.02		-0.22		0.05
		(0.33)		(0.18)		(0.22)
MC SReg X EC Income		0.72		0.20		0.25
		(0.66)		(0.34)		(0.47)
MC BP X EC Income		0.19		0.03		-0.01
		(0.34)		(0.16)		(0.18)
Level 2 Linear Slope						
(Between-children differences)						
Intercept	1.21***	1.21***	0.46***	0.46***	0.84***	0.84***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS						
Attention Problems	-0.01	-0.01	0.01	0.01	0.02	0.02
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Self-Regulation	-0.00	-0.00	-0.02*	-0.02*	-0.01	-0.01
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.02	0.02	-0.02*	-0.02*	-0.01	-0.01
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Middle Childhood LRSS						
Avg Attention Problems	0.00	0.01	-0.00	0.00	0.02	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Behavior Problems	0.00	0.00	0.00	0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics						
Maternal Age at 1 month	0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal Education at 1m	-0.01	-0.01	0.00	0.00	0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Child Male	0.04	0.04	-0.04**	-0.04**	-0.05**	-0.05**
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)
Child - Hispanic	0.03	0.03	-0.00	-0.01	0.03	0.03
	(0.06)	(0.06)	(0.02)	(0.02)	(0.03)	(0.03)
Child - Black	-0.04	-0.04	-0.04	-0.04	-0.02	-0.02
	(0.04)	(0.04)	(0.02)	(0.02)	(0.03)	(0.03)
Child - Low Birthweight	0.03	0.03	-0.04	-0.04	-0.02	-0.02
	(0.07)	(0.07)	(0.04)	(0.04)	(0.05)	(0.05)
Child – Age in grade 1	-0.01**	-0.01**	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Child -Bayley 15 + 24m	-0.00*	-0.00*	-0.00	-0.00	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal PPVT 36 m	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Residential Mobility during EC	-0.01	-0.01	-0.00	-0.00	-0.01	-0.01
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Marital Transitions during EC	-0.00	0.00	-0.01	-0.01	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maternal Employment	0.00	0.00	0.00	0.00	-0.00	-0.00

Hours during EC	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of Children	0.01	0.01	-0.01	-0.01	-0.00	-0.00
during EC	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Health of Child during	-0.03	-0.03	0.01	0.01	0.00	0.00
EC	(0.03)	(0.03)	(0.02)	(0.02)	(0.01)	(0.02)
Early Childhood	0.05	0.71	0.01	0.18	-0.00	-0.33
Family Income	(0.04)	(0.70)	(0.02)	(0.32)	(0.03)	(0.41)
Middle Childhood	0.61	0.02	0.22	0.00	-0.29	-0.01
Family Income	(0.78)	(0.04)	(0.40)	(0.02)	(0.44)	(0.03)
MC Attn X MC Income	-0.00		0.00		0.00	
	(0.01)		(0.04)		(0.01)	
MC SReg X MC	-0.01		-0.01		0.01	
Income	(0.02)		(0.01)		(0.01)	
MC BP X Mc Income	-0.00		-0.00		0.00	
	(0.01)		(0.00)		(0.01)	
MC Attn X EC Income		-0.01		-0.00		-0.00
		(0.01)		(0.00)		(0.01)
MC SReg X EC Income		-0.00		-0.01		0.01
		(0.02)		(0.01)		(0.01)
MC BP X EC Income		-0.00		-0.01		0.00
		(0.01)		(0.00)		(0.00)
Level 1 Slope						
(Time-varying variables and within-child change)						
Middle Childhood LRSS						
Attention Problems	0.06	0.06	0.06	0.06	0.04	0.04
	(0.06)	(0.06)	(0.03)	(0.03)	(0.04)	(0.04)
Self-Regulation	0.10	0.10	0.05	0.05	0.12	0.12
	(0.13)	(0.13)	(0.05)	(0.05)	(0.09)	(0.09)
Behavior Problems	0.04	0.04	0.02	0.02	0.03	0.03
	(0.05)	(0.05)	(0.03)	(0.03)	(0.03)	(0.03)
Time-varying Covariates						
Poverty	0.04	0.04	0.05	0.05	0.11	0.12
	(0.19)	(0.19)	(0.11)	(0.11)	(0.13)	(0.13)
Marital Status	0.43	0.43	-0.16	-0.15	0.11	0.11
	(0.49)	(0.50)	(0.23)	(0.24)	(0.34)	(0.35)
Child Health	1.98**	1.99**	-0.31	-0.31	0.34	0.34
	(0.56)	(0.56)	(0.25)	(0.25)	(0.38)	(0.37)
Number of Children	-0.90	-0.90	0.70	0.70	-0.07	-0.08
	(0.81)	(0.81)	(0.40)	(0.40)	(0.52)	(0.52)

4.4.2 Gender

4.4.2.1 Descriptive Information about LRSS and Achievement by Gender

Table 11 presents descriptive information about learning-related social skills in early and middle childhood and W scores for reading, math, and vocabulary skills in elementary school. All values are presented separately for males and females.

With respect to learning-related social skills in middle childhood, it appears that girls scored higher than boys on self-regulation, whereas boys scored higher than girls on attention and behavior problems. However, it may be noted that the scores on all skills differed by less than a point. On measures of early childhood learning-related social skills also girls scored somewhat higher on self-regulation but lower on attention and behavior problems compared to boys. Since the early childhood learning-related social skills were presented as z-scores, gender differences in early childhood learning-related social skills are somewhat greater than the gender differences in these skills during middle childhood.

With respect to academic achievement outcomes, it can be observed that the patterns observed were identical for both boys and girls. For boys and girls, the scores for all three outcomes increase from first to fifth grade. A closer look at mean scores reveals that, compared to math and vocabulary, greater gains were observed in reading scores from first to third grade. At third and fifth grades the performance in all three domains appears similar, with scores in reading, vocabulary and math falling within 5 points of each other. At first grade, however, boys and girls scored highest in vocabulary, followed by math and reading.

Although the patterns of scores between first and fifth grades are similar for both boys and girls actual scores are somewhat different from each other. Descriptively, it appears that girls

scored much higher than boys in reading in first grade, whereas boys scores much higher than girls in math and vocabulary. However, by fifth grade gender differences on achievement scores disappear.

Table 11: Descriptive Statistics for LRSS and Academic Achievement by Gender

LRSS	Males (n = 570)		Females (n = 553)	
	M	SD	M	SD
Early Childhood Attention Problems	0.07	0.83	-0.14	0.75
Early Childhood Self-Regulation	-0.07	0.86	0.16	0.81
Early Childhood Behavior Problems	0.02	0.88	-0.05	0.87
Middle Childhood Attention Problems	54.33	4.15	54.05	4.14
Middle Childhood Self-Regulation	14.62	2.44	15.42	2.38
Middle Childhood Behavior Problems	51.31	5.83	51.01	5.90
Academic Achievement				
Reading scores in1st grade	451.08	24.86	454.16	22.73
Reading scores in 3rd grade	493.45	19.04	494.43	17.57
Reading scores in 5th grade	510.09	17.76	510.40	16.32
Math scores in 1st grade	471.22	16.21	468.89	14.67
Math scores in 3rd grade	497.92	13.39	496.88	12.12
Math scores in 5th grade	510.44	12.03	509.43	11.78
Vocabulary scores in 1st grade	483.22	11.96	482.68	12.40
Vocabulary scores in 3rd grade	497.71	11.15	496.21	11.66
Vocabulary scores in 5th grade	506.46	11.29	505.39	12.34

4.4.2.2 Unconditional Growth Trajectories by Gender

Table 12 presents the coefficients for the unconditional growth trajectories from first through fifth grade for males and females. As mentioned earlier, the coefficient for the intercept represents average reading, vocabulary, and math scores during middle childhood. The coefficient for linear slope represents the rate of growth in each achievement outcome from first through fifth grade.

The coefficients for the intercepts indicate that the average reading, math, and vocabulary scores for the average boy in this sample were 484.70, 493.52, and 496.86, respectively. The average reading, math, and vocabulary scores for the average girl in this sample were 486.84, 492.30, and 495.17, respectively. The positive and significant coefficients on the linear slope terms suggest positive growth in both boys' and girls' academic trajectories over time.

The intercepts and slope terms for boys and girls were compared using t-tests. Since several comparisons were conducted, the alpha level was set to 0.01 for the two-tailed tests. The t-tests indicated that although on average girls scored 2.14 points higher than boys on reading achievement this difference is not statistically significant ($t_{(547+540)} = 2.03$, $p > 0.01$). Boys scored 1.22 points higher on math and 1.69 points higher than girls on vocabulary. The average intercepts for math ($t_{(547+540)} = 1.49$, $p > 0.01$) and vocabulary ($t_{(547+540)} = 2.35$, $p > 0.01$) were also not significantly different for boys and girls. At the less stringent alpha level of 0.05 the differences between boys and girls on reading and vocabulary are statistically significant with girls scoring higher than boys on reading and the boys scoring higher than girls on vocabulary.

The differences between these slopes were also compared using two-tailed t-tests. The t-tests indicated that the growth in boys' and girls' reading ($t_{(547+540)} = 1$, $p > 0.01$) and math

trajectories ($t_{(547+540)} = 2.14$, $p > 0.01$) did not significantly differ from each other. However, girls grew at a faster rate in vocabulary than boys ($t_{(547+540)} = 2.85$, $p < 0.01$).

Table 12: Unconditional Growth Models of Academic Trajectories from 1st through 5th Grade: By Gender.

	Males ($n = 570$)			Females ($n = 553$)		
Imputed Data $n = 1123$	WJ Letter-Word Identification Coefficient (SE)	WJ Picture Vocabulary Coefficient (SE)	WJ Applied Problems Coefficient (SE)	WJ Letter-Word Identification Coefficient (SE)	WJ Picture Vocabulary Coefficient (SE)	WJ Applied Problems Coefficient (SE)
Average Intercept						
Coefficient	484.70***	493.52***	496.86***	486.84***	492.30***	495.17***
(SE)	(0.90)	(0.62)	(0.51)	(0.82)	(0.54)	(0.51)
Slope						
Coefficient	1.23***	0.82***	0.44***	1.20***	0.85***	0.48***
(SE)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)

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

4.4.2.3 Conditional Growth Trajectories by Gender

Tables 13, 14, and 15 present the HLM results from the multi-group analyses. Multi-group analyses were conducted to examine whether the coefficients linking attention problems, self-regulation, and behavior problems with trajectories of reading, vocabulary, and math were stronger for boys than girls. In order to examine this hypothesis, five models were tested successively. Each model and its results are presented in order next. The coefficients in text below are presented in standard deviation terms, hence, the original coefficient provided in the

tables were multiplied by associated standard deviations displayed in table 11. Comparisons between boys' and girls' coefficients were conducted using the t-test formula provided in equation 3.13.

Model I

Model I examines *between-children* differences on teacher-reported social skills in middle childhood and their associations with trajectories of reading, vocabulary, and math skills. Teacher-reports of attention problems, self-regulation, and behavior problems were added as level 2 predictors of intercept and slope. Coefficients linking middle childhood learning-related social skills with achievement outcomes are presented in tables 13-15. As can be seen in the tables, when early childhood learning-related social skills and demographic factors were not taken into account, middle childhood attention problems based on teacher-reports were negatively associated with the intercepts for reading, vocabulary, and math achievement for both boys and girls. For boys or girls, teacher-reports of self-regulation and behavior problems in middle childhood were not associated with the intercept of any of the achievement outcomes.

Boys who were rated 1 SD higher by teachers on average attention problems scored 5.67 points lower on reading, 2.44 points lower on vocabulary, and 3.97 points lower on math. Girls who were rated 1 SD higher by teachers on average attention problems scored 4.65 points lower on reading, 2.66 points lower on vocabulary, and 4.27 points lower on math. These differences in coefficients between boys and girls were statistically significant for reading ($t_{(547+540)} = 3.00$, $p < 0.01$), but not for vocabulary ($t_{(547+540)} = 1.00$, $p > 0.01$), or math ($t_{(547+540)} = 0.13$, $p > 0.01$).

For boys or girls, teacher reports of learning-related social skills in middle childhood did not predict average rates of change in outcomes from first to fifth grade. The only association that was found to be significant was the link between teacher-rated attention problems in middle

childhood and rate of change in boys' math trajectories. Boys' math scores increased by 0.04 points with a 1 SD increase in teacher-reported attention problems during middle childhood.

Model II

Model II examines *between-children* differences on teacher-reported social skills in middle childhood and their association with trajectories of reading, vocabulary, and math skills when early childhood learning-related social skills were taken into account. In the second model, maternal-reports of attention problems, self-regulation, and behavior problems were entered as predictors of intercept and slope at level-2 .Model II presents the coefficients linking middle childhood learning-related social skills with trajectories of achievement as well as the coefficients linking early childhood learning-related social skills with achievement trajectories. When early learning-related social skills were taken into account, the patterns of association between middle childhood learning-related social skills and outcomes were generally similar. Teacher-reports of attention problems in middle childhood continued to predict the intercept for all three outcomes, for both boys and girls. Middle childhood self-regulation and behavior problems, as reported by the teachers, did not predict the average intercept for any outcome for either boys or girls.

Boys who were rated 1 SD higher by teachers on average attention problems during middle childhood scored 5.01 points lower on reading, 1.90 points lower on vocabulary, and 3.44 points lower on math. Girls who were rated 1 SD higher by teachers on attention problems during middle childhood scored 4.27 points lower on reading, 2.32 points lower on vocabulary, and 3.90 points lower on math. These differences in coefficients between boys and girl were not statistically significant for reading ($t_{(547+540)} = 2.24$, $p > 0.01$), vocabulary ($t_{(547+540)} = 2.10$, $p > 0.01$), or math ($t_{(547+540)} = 2.09$, $p > 0.01$).

The links between middle childhood learning-related social skills and the slopes of achievement outcomes were also similar. Middle childhood attention problems predicted the rate of growth in boys' math trajectories. With each SD increase in teacher-reports of average attention problems during middle childhood, there was a 0.04 point increase in their math scores from first to fifth grade. Teacher-reports of attention problems in middle childhood did not predict the rate of change in girls' math trajectories. For boys and girls, teacher-rated self-regulation and behavior problems did not predict the rate of change of any of the achievement outcomes.

Early childhood learning-related social skills, as reported by the mothers, were better predictors of the intercept of reading, vocabulary, and math achievement. Maternal reports of attention predicted all achievement outcomes for boys as well as vocabulary and math for girls. Mother-reported early child self-regulation, predicted the intercepts of vocabulary and math for boys but all three achievement outcomes for girls. Maternal reports of behavior problems were least predictive of achievement, with significant associations of vocabulary and math intercepts for boys but only vocabulary intercepts for girls.

Since vocabulary scores for both boys and girls were associated with all three indices of early childhood learning-related social skills, comparisons between the strength of associations for the coefficients for boys and girls were conducted. A 1 SD increase in attention problems during early childhood was associated with 1.89 points decrease in boys' vocabulary scores, whereas, 1 SD increase in attention problems during early childhood was associated with 2.31 points decrease in girls' vocabulary score and this difference was not statistically significant ($t_{(547+540)} = 0.32$, $p > 0.01$). 1 SD increase in self-regulation during early childhood was associated with 1.47 points increase in boys' vocabulary scores and with 1.59 points increase in girls'

scores, and this difference was not statistically significant ($t_{(547+540)} = 0.11$, $p > 0.01$). 1 SD increase in behavior problems during early childhood was associated with 1.43 points increase in boys' vocabulary scores and with 1.31 points increase in girls' scores, and this difference was not statistically significant ($t_{(547+540)} = 0.12$, $p > 0.01$).

With respect to math scores, 1 SD increase in attention problems during early childhood was associated with 2.23 points decrease in boys' math scores and with 2.34 points decrease in girls' math scores, and this difference was not statistically significant ($t_{(547+540)} = 0.09$, $p > 0.01$).1 SD increase in self-regulation during early childhood was associated with 1.49 points increase in boys' math scores and with 1.65 points increase in girls' math scores, and this difference was not statistically significant ($t_{(547+540)} = 0.14$, $p > 0.01$).

Model III

Model III examines *within-child* changes in teacher-reported learning-related social skills in middle childhood and corresponding changes in achievement. In this model**,** teacher-reports of attention problems, self-regulation, and behavior problems at grades 1, 3, and 5 were included at level 1 without any predictors of intercepts and slopes at level 2. Time-varying scores of attention, self-regulation, and behavior problems entered at level 1 of the HLM model indicated whether changes in these indices of learning-related social skills between first and fifth grades were associated with corresponding changes in achievement scores.

The coefficients reflecting links between time-varying measures of attention problems, self-regulation, and behavior problems and academic achievement outcomes are not statistically significant for boys or girls. Therefore, changes in learning-related social skills are not associated with changes in reading, vocabulary, or math for either boys or girls.

Model IV

The fourth model combines Models 2 and 3, including early and middle childhood LRSS at level-2 and time-varying LRSS at level-1. In this model, time-varying indicators of teacher-reported attention problems, self-regulation, and behavior problems available at grades 1, 3, and 5 were entered at level 1 and average scores of attention problems, self-regulation, and behavior problems during middle and early childhood were entered at level 2 of the HLM model.

This model tested whether inter-individual differences (*between-children*) in teacher-reported attention problems, self-regulation, and behavior problems were associated with trajectories of achievement when time-varying covariates were taken into account. Time-varying covariates of learning-related social skills indicate whether changes in attention problems, self-regulation, and behavior problems from first through fifth grades were associated with corresponding changes in reading, vocabulary, and math scores.

Teacher reports of attention problems in middle childhood were associated with reading, vocabulary, and math scores for both girls and boys. Boys who were rated 1 SD higher in attention problems scored 5.02 points lower in reading, 1.91 points lower in vocabulary, and 3.44 points lower in math. Girls who were rated 1 SD higher in attention problems scored 4.26 points lower in reading, 2.32 points lower in vocabulary, and 3.89 points lower in math. These differences between boys and girls were not statistically significant for reading ($t_{(547+540)} = 2.38$, $p > 0.01$), vocabulary ($t_{(547+540)} = 2.05$, $p < 0.01$), or math ($t_{(547+540)} = 2.05$, $p < 0.01$). Teacher reports of self-regulation and behavior problems in middle childhood were not associated with any outcome. Rate of growth in achievement were not predicted by any of the teacher-reports.

Early childhood attention problems were significantly associated with vocabulary and math scores for boys and girls. Boys who were rated 1 SD higher in attention problems scored

2.52 points lower in vocabulary and 2.47 points lower in math. Girls who were rated 1 SD higher in attention problems during middle childhood scored 2.09 points lower in vocabulary and 2.12 points lower in math. Neither of these differences between boys' and girls' scores was statistically significant.

Early childhood self-regulation, as reported by mothers, was also significantly associated with vocabulary and math scores for boys and girls. Boys' who were rated 1 SD higher on self-regulation scored 1.56 points higher in vocabulary and 1.58 points higher in math. Girls who were rated 1 SD higher in self-regulation scored 1.50 points higher in vocabulary and 1.56 points higher in math. These differences in boys and girls vocabulary and math scores were not statistically significant.

Mother-reported behavior problems in early childhood were significantly associated with boys' and girls' vocabulary scores. 1 SD increase in behavior problems was associated with 1.44 points decrease in boys' vocabulary scores and with 1.30 points decrease in girls' vocabulary scores. This difference was not statistically significant.

Time-varying covariates of learning-related social skills were not linked with achievement such that changes in teacher reports of attention problems, self-regulation, and behavior problems were not observed to be associated with corresponding changes in achievement for boys or girls.

Model V

Model 5 adds average demographic factors, maternal verbal ability, children's cognitive ability at level-2, and time-varying demographic covariates at level-1. When demographic factors, time-varying assessments of middle childhood learning-related social skills, and time-varying demographic covariates are taken into account in addition to the early and middle

childhood indices of learning-related social skills, middle childhood attention problems, as reported by the teachers continue to predict the intercepts for reading and math for both boys and girls. With 1 SD increase in teacher reports of attention problems during middle childhood, reading scores decreased by 3.23 points for boys and 2.49 points for girls and this difference is not statistically significant ($t_{(547+540)} = 2.38$, $p > 0.01$). With 1 SD increase in teacher-reported attention problems during middle childhood, math scores decreased by 1.95 points for boys and 2.65 points for girls and this difference is statistically significant ($t_{(547+540)} = 3.69$, $p < 0.01$). It may be noted that gender difference on reading is statistically significant at the more traditional alpha level of 0.05 for the two-tailed test.

When demographic and family factors are taken into account, early childhood social skills were not significantly associated with reading, vocabulary, or math skills anymore. The slopes for any of the outcomes are not associated with early or middle childhood indices of learning-related social skills.

Conclusions for between-children differences in learning-related social skills and trajectories of achievement during middle childhood

Higher levels of learning-related social skills were indeed found to be associated with girls and boys achievement scores. However, the magnitude of associations between learning-related social skills did not differ significantly by gender. As can be observed in the results presented in tables 12-14, main effects of learning-related social skills were evident but there were hardly statistically significant moderations by gender. One significant pattern that emerged was that decreases in teacher reports of attention problems in middle childhood were associated with higher average math scores for girls, even after early learning-related social skills,

demographic factors, child cognitive and maternal verbal ability, and time-varying covariates of learning-related social skills were taken into account.

Conclusions for within-child differences in learning-related social skills and trajectories of achievement during middle childhood

Changes in teacher-reported self-regulation, attention problems, or behavior problems during middle childhood were not associated with corresponding changes in reading, vocabulary, or math for either boys or girls. This indicates that improvements in teacher perceived child self-regulation and declines in teacher perceived attention and behavior problems were not associated with improvements in academic skills.

Table 13: Coefficients for WJ Letter-Word Identification by Gender

Average Intercept across Middle Childhood	Males (n = 570)					Females (n = 553)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	484.27***	484.26***	484.49***	484.26***	484.41***	486.15***	486.06***	486.30***	486.06***	485.85***
	(0.76)	(0.76)	(0.81)	(0.76)	(0.74)	(0.72)	(0.72)	(0.75)	(0.71)	(0.67)
Early Childhood LRSS										
Attention Problems		-2.97*		-2.97*	-1.33		-2.22		-2.22	-0.06
		(1.22)		(1.22)	(1.11)		(1.27)		(1.27)	(1.16)
Self-Regulation		2.19		2.19	-0.56		3.04*		3.04*	0.50
		(1.18)		(1.18)	(1.15)		(1.19)		(1.19)	(1.01)
Behavior Problems		1.65		1.64	0.27		0.65		0.65	-0.81
		(1.14)		(1.14)	(1.03)		(1.17)		(0.17)	(1.03)
Middle Childhood LRSS										
Avg Attention Problems	-1.37***	-1.21***		-1.21***	-0.78***	-1.12***	-1.03***		-1.03***	-0.60**
	(0.24)	(0.25)		(0.25)	(0.25)	(0.24)	(0.23)		(0.23)	(0.19)
Self-Regulation	0.56	0.50		0.50	-0.01	0.19	0.11		0.11	-0.02
	(0.55)	(0.55)		(0.55)	(0.47)	(0.55)	(0.51)		(0.51)	(0.47)
Behavior Problems	-0.05	0.02		0.02	-0.05	-0.13	-0.06		-0.06	0.19
	(0.20)	(0.20)		(0.20)	(0.19)	(0.21)	(0.19)		(0.19)	(0.19)
Early Demographics										
Maternal Age at 1 month					-0.30					0.01
					(0.17)					(0.15)
Maternal Education at 1m					-0.01					1.42***
					(0.37)					(0.35)
Child Male										
Child - Hispanic					2.49					0.08
					(2.88)					(2.97)
Child - Black					-1.35					-3.08
					(2.94)					(2.49)
Child – Low Birthweight					1.80					5.16
					(3.95)					(3.62)

Child – Age in grade 1					0.50**					0.33
					(0.19					(0.18)
Child -Bayley 15 + 24m					0.17*					0.29***
					(0.07)					(0.06)
Maternal PPVT 36 m					0.27***					0.07
					(0.05)					(0.05)
Residential Mobility					-1.12					1.05
during EC					(0.58)					(0.59)
Marital Transitions					1.18					0.86
during EC					(0.64)					(0.65)
Maternal Employment					0.01					-0.04
Hours during EC					(0.05)					(0.05)
Number of Children					-1.72*					-2.37**
during EC					(0.79)					(0.75)
Health of Child during					6.87***					3.56*
EC					(1.83)					(1.69)
Early Childhood					-1.31					-4.61*
Family Income					(1.99)					(2.18)
Middle Childhood					-36.00					-2.79
Family Income					(47.62)					(2.18)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.24***	1.24***	1.24***	1.24***	1.22***	1.19***	1.19***	1.19***	1.19***	1.19***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Early Childhood LRSS										
Attention Problems		-0.00		-0.00	0.01		-0.02		-0.02	-0.02
		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Self-Regulation		-0.01		-0.01	-0.00		-0.01		-0.01	0.00
		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Behavior Problems		0.00		0.00	0.01		0.03		0.03	0.04
		(0.03)		(0.03)	(0.03)		(0.02)		(0.02)	(0.02)
Middle Childhood LRSS										
Attention Problems	0.06	0.01		0.01	0.01	0.00	0.00		0.00	-0.00

	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Self-Regulation	-0.00	-0.00	-0.00	-0.01	-0.00	-0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.01	0.01	0.00	0.01	-0.00	-0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				0.00				0.01
				(0.00)				(0.00)
Maternal Education at				0.00				-0.02*
1m				(0.01)				(0.01)
Child Male								
Child - Hispanic				0.10				-0.06
				(0.08)				(0.09)
Child - Black				-0.12*				0.03
				(0.06)				(0.06)
Child – Low Birthweight				0.11				-0.06
				(0.14)				(0.09)
Child – Age in grade 1				-0.01**				-0.01
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00**
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.04*
during EC				(0.01)				(0.02)
Marital Transitions				-0.02				0.03
during EC				(0.02)				(0.02)
Maternal Employment				0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.03				-0.02
during EC				(0.02)				(0.02)
Health of Child during				-0.04				-0.02
EC				(0.04)				(0.04)
Early Childhood				0.01				0.10
Family Income				(0.06)				(0.06)
Middle Childhood				1.18				0.01

Family Income					(1.04)					(0.06)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.06	0.06	0.07			0.05	0.04	0.04
			(0.11)	(0.11)	(0.11)			(0.07)	(0.07)	(0.07)
Self-Regulation			0.21	0.20	0.24			-0.01	-0.02	-0.02
			(0.20)	(0.20)	(0.17)			(0.19)	(0.19)	(0.18)
Behavior Problems			0.09	0.09	0.10			-0.00	0.00	0.00
			(0.10)	(0.10)	(0.09)			(0.07)	(0.07)	(0.06)
Time-varying Covariates										
Poverty					0.37					-0.14
					(0.30)					(0.24)
Marital Status					0.69					0.07
					(0.60)					(0.66)
Child Health					2.95**					1.06
					(0.92)					(0.68)
Number of Children					0.09					-1.45
					(1.25)					(1.08)

Table 14: Coefficients for WJ Picture Vocabulary by Gender

Average Intercept across Middle Childhood	Males (n = 570)					Females (n = 553)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	496.42***	496.39***	496.53***	496.39***	495.97***	494.73***	494.68***	494.83***	494.68***	494.15***
	(0.43)	(0.42)	(0.45)	(0.42)	(0.34)	(0.46)	(0.46)	(0.48)	(0.45)	(0.36)
Early Childhood LRSS										
Attention Problems		-2.52*		-2.52*	-0.73		-2.78**		-2.78**	-1.05
		(0.84)		(0.86)	(0.58)		(0.77)		(0.76)	(0.67)
Self-Regulation		1.81**		1.81*	0.02		1.85*		1.85**	0.08
		(0.65)		(0.67)	(0.48)		(0.73)		(0.71)	(0.53)
Behavior Problems		1.64*		1.64**	0.20		1.49*		1.49***	0.57
		(0.63)		(0.67)	(0.54)		(0.69)		(0.68)	(0.55)
Middle Childhood LRSS										
Avg Attention Problems	-0.59***	-0.46**		-0.46**	-0.14	-0.64***	-0.56***		-0.56***	-0.20
	(0.14)	(0.14)		(0.13)	(0.12)	(0.17)	(0.15)		(0.14)	(0.12)
Self-Regulation	0.51	0.46		0.46	0.12	0.12	0.07		0.07	-0.04
	(0.27)	(0.26)		(0.24)	(0.19)	(0.38)	(0.34)		(0.32)	(0.24)
Behavior Problems	-0.03	0.02		0.02	0.08	-0.16	-0.13		-0.13	0.03
	(0.11)	(0.11)		(0.11)	(0.08)	(0.15)	(0.13)		(0.13)	(0.09)
Early Demographics										
Maternal Age at 1 month					0.06					0.07
					(0.07)					(0.09)
Maternal Education at 1m					0.13					0.52
					(0.20)					(0.22)
Child Male										
Child - Hispanic					1.10					-0.18
					(1.32)					(1.64)
Child - Black					-1.17					-3.00*
					(1.32)					(1.47)
Child – Low Birthweight					4.28					1.64
					(2.62)					(1.58)

Child – Age in grade 1					0.28**					0.24*
					(0.09)					(0.11)
Child -Bayley 15 + 24m					0.18					0.22***
					(0.03)					(0.04)
Maternal PPVT 36 m					0.22***					0.17***
					(0.03)					(0.03)
Residential Mobility					-0.09					0.13
during EC					(0.26)					(0.34)
Marital Transitions					0.39					0.03
during EC					(0.29)					(0.32)
Maternal Employment					-0.01					0.01
Hours during EC					(0.03)					(0.03)
Number of Children					-1.32**					-2.47***
during EC					(0.41)					(0.44)
Health of Child during					1.56					2.27*
EC					(0.88)					(0.94)
Early Childhood					-1.37					-0.77
Family Income					(0.89)					(1.12)
Middle Childhood					-1.11					-0.09
Family Income					(1.06)					(1.20)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.44***	0.44***	0.44***	0.44***	0.44***	0.48***	0.48***	0.48***	0.48***	0.47***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		-0.00		0.00	0.00		0.02		0.02	0.03
		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.02)
Self-Regulation		-0.02		-0.02	-0.02		-0.02		-0.02	-0.03
		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Behavior Problems		-0.02		-0.02	-0.02		-0.02		-0.02	-0.02
		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Middle Childhood LRSS										
Attention Problems	0.00	0.00		0.00	-0.00	0.00	-0.00		-0.00	0.00

	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				-0.00				0.01
1m				(0.01)				(0.00)
Child Male								
Child - Hispanic				0.00				-0.03
				(0.04)				(0.03)
Child - Black				-0.06				-0.01
				(0.04)				(0.03)
Child – Low Birthweight				0.02				-0.07
				(0.07)				(0.06)
Child – Age in grade 1				-0.01**				-0.01**
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.01
during EC				(0.01)				(0.01)
Marital Transitions				-0.00				-0.01
during EC				(0.01)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				-0.00				-0.02
during EC				(0.01)				(0.01)
Health of Child during				0.01				0.01
EC				(0.03)				(0.02)
Early Childhood				-0.01				0.02
Family Income				(0.03)				(0.03)
Middle Childhood				0.04				-0.02

Family Income					(0.03)					(0.03)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.04	0.04	0.05			0.06	0.07	0.07
			(0.05)	(0.05)	(0.05)			(0.04)	(0.04)	(0.04)
Self-Regulation			0.07	0.07	0.08			0.03	0.03	0.04
			(0.07)	(0.07)	(0.07)			(0.09)	(0.09)	(0.09)
Behavior Problems			0.03	0.03	0.03			0.00	0.01	0.01
			(0.03)	(0.03)	(0.03)			(0.04)	(0.04)	(0.03)
Time-varying Covariates										
Poverty200					0.33					-0.16
					(0.17)					(0.14)
Marital Status					0.12					-0.35
					(0.35)					(0.35)
Child Health					-0.15					-0.43
					(0.37)					(0.35)
Number of Children					0.40					0.81
					(0.62)					(0.54)

Table 15: Coefficients for WJ Applied Problems by Gender

Average Intercept across Middle Childhood	Males (n = 570)					Females (n = 553)				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	493.93***	492.90***	493.06***	492.90***	492.69***	491.63***	491.57***	491.75***	491.57***	491.34***
	(0.53)	(0.51)	(0.56)	(0.51)	(0.47)	(0.46)	(0.45)	(0.49)	(0.45)	(0.40)
Early Childhood LRSS										
Attention Problems		-2.97*		-2.97**	-1.61		-2.82**		-2.82***	-1.19
(CBQ + CBCL)		(1.18)		(1.18)	(0.83)		(0.78)		(0.78)	(0.72)
Self-Regulation		1.84*		1.84*	0.24		1.92*		1.92*	0.15
(CBQ + SSRS)		(0.87)		(0.87)	(0.75)		(0.75)		(0.75)	(0.60)
Behavior Problems		2.26**		2.26**	1.36		1.06		1.06	-0.22
(CBCL + SSRS)		(0.80)		(0.80)	(0.70)		(0.76)		(0.76)	(0.70)
Middle Childhood LRSS										
Avg Attention Problems	-0.96***	-0.83***		-0.83***	-0.47**	-1.03***	-0.94***		-0.94***	-0.64***
(TRF Attn Problems)	(0.16)	(0.17)		(0.17)	(0.14)	(0.17)	(0.15)		(0.15)	(0.12)
Self-Regulation	0.43	0.39		0.39	0.03	0.08	0.01		-0.01	-0.15
(TRF Self-Control)	(0.32)	(0.33)		(0.33)	(0.26)	(0.34)	(0.30)		(0.30)	(0.24)
Behavior Problems	-0.01	0.05		0.05	0.08	-0.02	0.02		0.02	0.17
(TRF Externalizing Beh)	(0.14)	(0.14)		(0.14)	(0.11)	(0.12)	(0.11)		(0.11)	(0.10)
Early Demographics										
Maternal Age at 1 month					0.04					0.06
					(0.10)					(0.09)
Maternal Education at 1m					0.26					0.75**
					(0.23)					(0.22)
Child Sex										
Child - Hispanic					-2.22					-0.97
					(1.79)					(1.80)
Child - Black					-4.17*					-3.77*
					(1.94)					(1.50)

Child - Birthweight					1.59					0.02
					(1.96)					(2.22)
Child – Age in grade 1					0.53***					0.37**
					(0.12)					(0.11)
Child -Bayley 15 + 24m					0.23***					0.31***
					(0.05)					(0.04)
Maternal PPVT 36 m					0.11**					0.05
					(0.03)					(0.03)
Residential Mobility during EC					-0.59					0.46
					(0.37)					(0.37)
Marital Transitions during EC					0.82					0.32
					(0.43)					(0.41)
Maternal Employment Hours during EC					0.04					-0.01
					(0.03)					(0.03)
Number of Children during EC					-0.47					-0.55
					(0.51)					(0.45)
Health of Child during EC					2.25					-0.06
					(1.22)					(1.03)
Early Childhood Poverty 200%					0.20					-2.13
					(1.31)					(1.32)
Middle Childhood Poverty 200%					-4.86**					-0.55
					(1.55)					(1.25)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.82***	0.82***	0.82***	0.82***	0.82***	0.86***	0.86***	0.86***	0.86***	0.85***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		0.03		0.03	0.02		0.02		0.02	0.01
(CBQ + CBCL)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.01		-0.01	-0.00		-0.03*		-0.04*	-0.02
(CBQ + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Behavior Problems		-0.03		-0.03	-0.03		-0.01		-0.01	0.00
(CBCL + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Middle Childhood										

LRSS								
Avg Attention Problems	0.01*	0.01*	0.01*	0.01	0.00	0.00	0.00	-0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				0.00				-0.01
1m				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.09*				-0.04
				(0.04)				(0.05)
Child - Black				-0.03				-0.02
				(0.04)				(0.05)
Child - Birthweight				0.06				-0.04
				(0.07)				(0.06)
Child – Age in grade 1				-0.01***				-0.01*
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00**				-0.01***
				(0.00)				(0.00)
Maternal PPVT 36 m				-0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.00				-0.02
during EC				(0.01)				(0.01)
Marital Transitions				-0.00				-0.00
during EC				(0.01)				(0.01)
Maternal Employment				-0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.01				-0.01
during EC				(0.01)				(0.01)
Health of Child during				-0.01				0.01
EC				(0.03)				(0.03)
Early Childhood				-0.01				0.02

Poverty200%					(0.04)					(0.04)
Middle Childhood					0.01					-0.02
Poverty200%					(0.04)					(0.04)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			-0.00	-0.00	0.00			0.07	0.07	0.07
			(0.06)	(0.06)	(0.05)			(0.06)	(0.06)	(0.06)
Self-Regulation			0.18	0.18	0.21*			0.05	0.05	0.05
			(0.11)	(0.10)	(0.10)			(0.13)	(0.13)	(0.12)
Behavior Problems			0.05	0.05	0.05			0.00	0.01	0.01
			(0.05)	(0.05)	(0.04)			(0.05)	(0.05)	(0.05)
Time-varying Covariates										
Poverty200					-0.08					0.21
					(0.21)					(0.17)
Marital Status (yes/no)					0.40					-0.36
					(0.46)					(0.49)
Child Health					0.37					0.34
					(0.56)					(0.53)
Number of Children					0.53					-0.67
					(0.72)					(0.81)

5.0 DISCUSSION

This study examined links between learning-related social skills in middle childhood, as measured by teacher reports of self-regulation, attention problems, and behavior problems, and trajectories of academic achievement during elementary school. Specifically, *between-children* differences as well as *within-child* changes in learning-related social skills during middle childhood and their associations with trajectories of reading, vocabulary, and math from first through fifth grade were modeled using Hierarchical Linear Modeling. These links were examined after controlling for early learning-related social skills, demographic variables, maternal verbal ability, and children's cognitive ability. Additionally, the possible role of learning-related social skills as a moderator was examined in two different contexts. First, whether having higher levels of learning-related social skills moderate the risk of poor academic achievement for children from low-income families; and second, whether links between learning-related social skills and academic achievement are stronger for boys.

Between-children differences in learning-related social skills were found to be associated with average intercepts for achievement but not with rates of growth. *Within-child* changes in learning-related social skills were not associated with changes in achievement. With respect to interindividual differences (*between-children*), teacher-reported attention problems in middle childhood were associated with average reading, vocabulary, and math during elementary school. These associations held up over and above demographic variables, maternal verbal ability, and

children's cognitive ability. In contrast, teacher reports of self-regulation and behavior problems were not associated with average achievement. Individual differences in early childhood attention skills, self-regulation, and behavior problems, as reported by mothers, were associated with average achievement scores; however, after controlling for child and family factors, they were no longer significant.

Learning-related social skills were not found to moderate the links between family incomes during early or middle childhood and trajectories of achievement. However, learning-related social skills appeared to moderate some links between gender and achievement. Based on the more stringent alpha level of 0.01, lower teacher-reported attention problems in middle childhood were associated with higher average levels of reading scores for girls even after early childhood learning-related social skills, children's cognitive ability in early childhood, and maternal verbal skills were taken into account. At a more liberal alpha level of 0.05, higher average levels in reading for boys were also associated with teacher-reported attention problems.

5.1 RESEARCH QUESTION 1

5.1.1 *Between-Children* Differences in LRSS and Trajectories of Achievement

In the present study, *between-children* differences as well as *within-child* changes in learning related social skills were modeled to predict levels and growth in trajectories of academic achievement. As noted above, only *between-children* differences in learning-related social skills and achievement were observed. Findings for *within-child* changes in learning-related social skills and achievement were nonsignificant. Further, with respect to the finding for between-

children differences, effects were found for average levels of achievement only. Learning-related social skills in middle or early childhood did not predict rates of growth in academic trajectories. The following section presents a discussion of the associations among achievement and early versus middle childhood learning-related social skills in the context of this study.

5.1.1.1 LRSS in Middle Childhood

Teacher reports of attention problems, but not self-regulation and behavior problems, were associated with average reading, vocabulary, and math scores. These results are consistent with those of Duncan and colleagues (Duncan et al., 2007) and Alexander, Entwisle, and Dauber (1993). Duncan and colleagues found attention in kindergarten a reliable predictor of math and reading achievement at first, third, and fifth grades besides early cognitive skills. Similarly, Alexander and colleagues found attention span to be concurrently associated with report cards and standardized tests of reading and math. Attention span was associated with report card and standardized test score of reading at first and second grades, with math reports cards at first, second, and fourth grades, and with standardized math test score at first grade only (Alexander, Entwisle, & Dauber, 1993). They also found attention span at first grade to be associated with math performance at fourth grade. In both studies, other aspects of learning-related social skills were not as strongly associated with achievement. For example, measure of self-regulation in the Duncan study (Duncan et al., 2007) and cooperation-compliance in the Alexander, Entwisle, and Dauber (1993) study were not as strongly associated with academic achievement as was attention. Consistent with previous findings, attention skills in middle childhood appeared to be a better predictor of average levels of academic achievement than other components of learning-related social skills. In the present study self-regulation or behavior problems, as reported by

teachers, did not predict either the levels or the rates of growth in any of the achievement outcomes.

Unexpected were the null findings for the links between teacher reports of self-regulation and academic achievement. Teacher reports of self-regulation in middle childhood were not associated with academic achievement outcomes even when early learning-related social skills, family demographics, and individual factors were not taken into account. One possibility is that the ability to complete standardized assessments of academic skills in the laboratory along with several other tasks may have been influenced by individual differences in children's attention skills only. Several elements of attention regulation such as engagement, disengagement in tasks, and shifting and orienting attention were required to finish the two to three-hour long laboratory measures including the Woodcock Johnson Tests of Achievement and Cognitive Ability. On the other hand, self-regulatory abilities that were assessed by teacher reports may not have played out in completing the tests of achievement administered in the laboratory. Some key components of teacher reports of self-control were about handling conflict with peers, responding appropriately to peers and cooperating with agemates, accepting peers' ideas for group activities, and the ability to handle criticism. Perhaps, if academic outcomes had been measured using report cards as well differential links between self-regulation and academic skills would have emerged. Reports cards provide a glimpse into children's performance at school and their ability to work in groups with classmates, as well as their ability to learn from feedback from teachers and peers. However, shared method variance could also inflate associations between teacher-reported learning-related social skills and teacher-assigned

Teacher reports of behavior problems were also not indicative of either the levels of achievement or growth in trajectories of achievement. Alexander, Entwisle, and Dauber (1993)

argue that social skills such as helpful behavior or even anger and defiance should not necessarily be associated with achievement since they matter less for learning. On the other hand, they demonstrate qualities such as active interest in the subject matter, active participation, and attention span, to be related to achievement.

The results linking teacher reports of middle childhood attention but not self-regulation and behavior problems with academic skills reiterate the importance of disaggregating components of learning-related social skills to assess their unique links with academic achievement. A distinction between different aspects of learning-related social skills was made in this study and differential links with achievement were found. But, it should be noted that each of these scales have some overlap, both statistically and conceptually. As reported earlier, the three averaged measures of learning-related social skills in middle childhood are moderately intercorrelated (-0.64 to 0.52). Also, a small number of items in the attention measures appear to be tapping into self-regulatory abilities (can't sit still, restless, fidgets, poorly coordinated or clumsy). The fact that teacher reports of attention encompassed several aspects of self-regulation and not merely "pure" attention skills demonstrates the complexity in measuring facets of children's social skills that are not mutually exclusive.

5.1.1.2 LRSS in Early Childhood

Similar to the results for teacher-reported attention in middle childhood, attention in early childhood was also associated with average achievement scores and not with rates of growth during elementary school. Maternal reports of attention problems in early childhood remained predictive of vocabulary and math over and above child and family factors but their links with average reading scores attenuated once the child and family factors were controlled. Thus, teachers' and mothers' reports may have captured aspects of children's attention skills that are

predictive of later academic performance. However, these results are somewhat inconsistent with previous work has found early learning-related social skills to be predictive of both level and change in reading and math (Li-Grining, Votruba-Drzal, & Maldonado, revise-resubmit 2009). In the work by Li-Grining and colleagues, however, a composite measure of self-regulation, attentiveness, and persistence was employed, whereas social skills were disaggregated in this study. A composite measure of skills that included persistence is likely to capture a variety of positive behaviors associated with learning.

Characteristics such as attention and self-regulation have some common underpinnings (Ruff & Rothbart, 1996), however only attention, as predicted by teachers in middle childhood and by mothers in early childhood, was consistently and uniquely associated with measures of achievement in this study. Although contemporaneous teacher reports of self-regulation did not predict academic skills, maternal reports of self-regulation measured in early childhood were uniquely associated with academic outcomes until demographic and family factors were taken into account. One reason for these different patterns of findings may be that mother and teacher reports are tapping into different aspects of regulation. Mother reports may have captured effortful control in the home environment specifically related to achievement, whereas teacher reports appear to assess self-control with classmates. Moreover, with respect to early regulation, it is clear that numerous family characteristics were playing a role in explaining mother-reported regulation and its association with achievement.

However, it is somewhat intriguing that learning-related social skills assessed in early childhood were better predictors of achievement than the learning-related social skills measured contemporaneously while children are in school. This may not necessarily be at odds with developmental progression of skills in childhood. In general, relatively greater variability in

skills in early childhood as compared to middle childhood is reported (Huston & Ripke, 2006). Therefore, one possible explanation for the difference in the two results is the differential stability of behaviors in early versus middle childhood. Skills are more likely to be malleable among toddlers and preschoolers than elementary school children (Kochanska, Tjebkes, & Forman, 1998; Kopp, 1989). Since skills gradually become more stabilized in middle childhood one would expect to observe a stronger relationship between learning-related social skills in early childhood and later achievement than the concurrent associations between the two in middle childhood.

This suggests that early learning-related social skills continue to have relevance for achievement throughout middle childhood. Nonetheless, this does not explain why learning-related social skills in middle childhood, especially self-regulation and behavior problems, did not predict achievement in middle childhood. It would be rather inaccurate to conclude based on these results that contemporaneous learning-related social skills have no relevance for achievement without ruling out data or measurement related issues, if any, specific to this dataset. None of the learning-related social skills in third grade are correlated with the first and fifth grade assessments whereas the latter two show modest correlations. It is surprising that assessments of self-regulation, attention, and behavior problems in third grade are all not associated with their first and fifth grade counterparts. This pattern appears unique to the NICHD SECCYD data since there is little reason to expect developmental aberrations during third grade in these learning-related social skills. Thus, the middle childhood findings should be interpreted with caution.

One aspect in particular that requires further consideration is the associations among self-regulation skills, academic achievement, and health. Ratings of children's health appeared to be

one potential mediator of self-regulation and achievement associations. Raver and Zigler (1997) aptly emphasize the importance of children's health in children's social, emotional and cognitive development by stating that fatigue or illness can compromise children's social competence. Moreover, poor health is also associated with more days missed from school and low energy level even when the child may attend school. For example, Li-Grining (2007) found that children's health predicted the development of self-regulation skills during preschool and elementary school for low-income children. Thus, poorer health could be associated with children's socio-emotional skills as well as directly with academic performance. In either case, paying more attention to children's health may be useful in understanding development in multiple domains including achievement.

5.1.2 *Within-Child* Changes in LRSS and Changes in Achievement

A second aim of the study was to examine *within-child* changes in learning-related social skills and corresponding changes in achievement during elementary school. Although not implying causality, *within-child* analysis informs us how well improvements/declines in learning-related social skills predict improvements/declines in achievement. However, contrary to expectations, changes in teacher reported self-regulation, attention problems, and behavior problems were not associated with corresponding changes in reading, vocabulary, or math skills.

The results for within-child associations are inconsistent with some past research. McClelland and colleagues (2007) reported growth in emergent literacy, vocabulary, and math over the prekindergarten year as a function of growth in behavioral regulation during prekindergarten. The participants in the McClelland study were from middle to upper-middle class families and thus can be considered quite comparable to the participants followed-up in this

study who were more economically advantaged. It may be noted that a great majority of this sample of children did not score in the clinical ranges of problem behaviors. On the contrary, children displayed higher than average levels of self-regulation and lower levels of behavior problems. Given that the skills were already high and problems were in the low range, there was less room for improvement. This may have contributed to the lack of evidence for within-child changes in learning-related social skills and accompanying changes in achievement. Thus, from a practical perspective, these non-significant associations would suggest caution to invention efforts related to the various learning-related social skills assessed in this study.

This study only demonstrated support for individual differences in children's learning-related social skills predicting average levels of achievement. No support was observed for learning-related social skills predicting growth in achievement or changes in learning-related social skills predicting change in achievement. As noted earlier, this sample of children already displayed higher levels of self-regulation and lower levels of attention or behavior problems. Since the skills are already at relatively higher levels in this sample there may not have been significant improvements in their learning-related social skills overtime, which would contribute to an apparent lack of association between changes in achievement as a function of changes in learning-related social skills. In future work, children's social and behavioral trajectories will be examined to distinguish cases with stable patterns from children with improvements or declines in skills over time. Further analysis of subgroups of children with higher levels of problems and lower levels of self-regulation may be more likely to reveal whether improvements in learning-related social skills predict improvements in achievement.

Within-child analyses provide a more rigorous test of associations because the influences of time-invariant child characteristics are controlled. In contrast, between-child analyses are

susceptible to endogeneity and selection biases (Duncan, Magnuson, & Ludwig, 2004). Thus, within-child relations between LRSS and achievement may not have been detected because the LRSS skills did not develop in a linear fashion during middle childhood, but it may also be the case the selection factors are operating as well that drive the between-child findings. Experimental designs to link improvements in LRSS to gains in achievement may be the most successful way to resolve these developmental and methodological issues.

5.2 RESEARCH QUESTION 2

5.2.1 Family Income, Achievement, and LRSS

The current study also examined whether learning-related social skills served as a moderator of the links between family income and academic achievement. It was expected that having higher levels of self-regulation and lower levels of attention and behavior problems would be associated with higher academic achievement scores and with higher rate of growth in achievement for children from lower income families compared to lower-income children with lower levels of learning-related social skills. Interactions between learning-related social skills and family income in middle as well as early childhood were examined. In the present study, interactions between learning-related social skills and family income during early and middle childhood in predicting achievement were not observed. This result is contrary to recent findings from nationally representative samples. Li-Grining, Votrba-Drzal, and Maldonado (revise-resubmit, 2009) found learning-related social skills to be especially beneficial to the academic trajectories of children living in poverty. The nationally representative sample from the Early Childhood

Longitudinal Study employed in the work by Li-Grining and colleagues is nationally is 10 times larger than the present study, hence was better able to detect very small differences among groups. It is not clear whether using income-to-needs ratios in this study as opposed to family income in the other study made a difference.

It is noteworthy that the analytic sample in this study is biased towards better family and economic resources. Approximately 98% of the children lived in two-parent homes, and 80% of the families were above 200% of the poverty level. Only 13% of the families in early childhood and 7% of the families during middle childhood were below 100% of the poverty level. Thus, national samples including a greater numbers of families in deep poverty as well as a broader range of low-income families would help in detecting interactions between learning-related social skills and family income.

5.2.2 Gender, Achievement, and LRSS

One of the goals of this study was also to investigate whether higher levels of learning-related social skills predicted higher achievement scores for boys more than girls. Higher levels of learning-related social skills were indeed found to be associated with girls' and boys' achievement scores. However, the magnitude of associations between learning-related social skills did not differ significantly by gender. As can be observed in the results presented in tables 12-14, main effects of learning-related social skills were evident but there were no statistically significant moderations by gender.

One interaction between teacher-reported attention problems and levels of math achievement was observed, such that higher levels of teacher-reported attention problems were associated with lower average math scores for girls. This was based on alpha level of 0.01 for the

two-tailed tests. A more stringent alpha level was set since several t-tests were conducted to compare coefficients linking attention, self-regulation, and behavior problems with reading, vocabulary, and math scores. It may be noted that at the traditional alpha level of 0.05, higher levels of teacher-reported attention problems were associated with lower average reading scores for boys compared to girls.

Since several comparisons were conducted and most results were non-significant one could assume that the few significant finding are spurious. However, in this study, teacher-reported attention problems consistently predicted average levels of achievement scores suggesting otherwise. With respect to math, girls have traditionally scored more poorly than boys. Recent studies, however, show that girls' performance in the math domain is catching up with that of boys' (US Department of Education, 2007b). The present finding may further mean that having higher levels of learning-related social skills, especially attention, helps when there is more room to improve to begin with.

With respect to the moderating role of learning-related social skills, Li-Grining, Votruba-Drzal, and Maldonado (revise-resubmit, 2009) found higher levels of teacher-reported learning-related social skills to be associated with greater gains in girls' math trajectories compared to boys' math trajectories modeled throughout elementary school. In the present study, teacher-reported skills predicted higher intercepts of girls' math scores, whereas the Li-Grining study found higher rates of growth in girls' math trajectories. Having higher levels of learning-related social skills may directly or indirectly help girls perform better in math domain. However, since most moderations tested in the present study were found to be non-significant, any conclusions about teacher's perceptions of children's skills being linked with differential performance for boys and girls cannot be drawn.

5.3 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

5.3.1 Limitations

This study had several noteworthy features, including within-child examination of trajectories, consideration of unique aspects of LRSS, and the multiple imputation of missing data by subgroups of race/ethnicity. To some degree this study also adds to our understanding of how learning-related social skills moderate relations between gender and academic achievement. However, several limitations should be noted as well. The sample, although ethnically and geographically diverse, is biased toward better family, economic, and emotional resources. Most children were from two-parent, middle class families in which mothers were well educated. An unusual proportion of families did not experience marital or residential transitions, and less than 20% of the families were below 200% of poverty level. Children born preterm or with low birth weight were excluded from the NICHD SECCYD; similarly teen mothers were not included in this sample. Hence, a range of problems associated with low child birth-weight or having a very young mother were not captured in this dataset. Learning-related social skills were mostly in the normative range. Most children in this sample did not display attention and behavior problems in the clinical range. This sample of children exhibited higher levels of self-regulation as well. With such a sample it is inappropriate to make generalizations to predominantly low-income or ethnic minority populations in which higher levels of socioemotional problems are observed.

Some methodological constraints also exist. Measures of early learning-related social skills were obtained at 54 months only and information from a single source was used. The intent was to composite early learning-related social skills spanning birth through 54 months. However, low correlations among various reports and observational measures of children's skills in early

childhood precluded the possibility of forming comprehensive composites. Since data were not experimentally manipulated in this study causal conclusions regarding links between learning-related social skills and academic achievement cannot be drawn based on results. In addition, teacher ID at first grade was used to model nesting within classrooms, however, this approach assumed that there was no change in classrooms between first and fifth grades and that the factor was essentially constant across the three time points. A better approach to modeling data dependence due to nesting within classrooms would have been to perform cross-classification procedures (Raudenbush, 1993) that take into account changes in nesting structures at each assessment. However due to missing information about teacher ID, the current approach was limited to utilizing only first grade teacher ID as an indicator of nesting within classrooms, thus, lacking in variability in nesting that existed in this data from one assessment to another. Assuming invariant nesting structure did not completely rule out whether and to what degree data dependence at each assessment was associated with achievement outcomes.

5.3.2 Directions for Future Research

Some shortcomings of this study point to several features that can be added in future studies for developing a better understanding of links between learning-related social skills and trajectories. In this study, associations between learning-related social skills and achievement were examined with indices of learning-related social skills as predictors and achievement indicators as outcomes. Following the work by Dearing, Kreider, Simpkins, and Weiss (2006) further analyses with achievement as predictors and learning-related social skills as outcomes may help clarify the extent to which causal factors work in one direction over another. Dearing and colleagues examined how between-children and within-child differences in family involvement in school

were associated with children's literacy. In that study, two latent growth curve models were estimated: one with family involvement as a predictor and literacy skills as the outcome, the other with literacy skills as the predictor and family involvement as the outcome. Since the data were non-experimental, causality may not be established with such analyses; however, such longitudinal analyses may help us understand the directions in which causal factors/confounds work.

In the current study maternal reports were used to index early childhood learning-related social skills, whereas teacher reports were used during middle childhood. In future work, additional analyses with maternal reports of leaning-related social skills in middle childhood could be used. Similar to Li-Grining, Votruba-Drzal, and Maldonado (revise-resubmit, 2009), teacher reports of learning-related social skills in kindergarten could be included as early indicators. Likewise, more comprehensive predictors and outcomes may provide a more complete picture of the associations that may exist but were not detected due to methodological limitations. Assessment of learning-related social skills using information from multiple sources such as mothers, teachers, peers, and including observations would be more valuable. Moreover, information from multiple sources may also be more likely to capture real differences in children's skills. Sets of children may exhibit similar tendencies in one domain but we may observe greater variability in some other domain. Therefore, even if information obtained from one source is accurate we may not adequately capture key differences within- or between-children.

Learning-related social skills were not observed to be differentially linked with gender or family income in predicting academic achievement. This dataset is biased toward better economic and socio-emotional resources. Thus, fewer children were observed to display

significant levels of attention, behavioral, or regulatory problems and fewer families experienced deep poverty. A more diverse sample will tend to generate more patterns of covariance. Moreover, using semi-parametric trajectories may provide another tool to model achievement trajectories as a function of trajectories of learning-related social skills (Nagin, 2007).

5.4 IMPLICATIONS FOR POLICY AND INTERVENTION

Based on this non-experimental, longitudinal study, causal links cannot be claimed. Despite this obvious limitation, our understanding of the presence and absence of associations among children's socio-emotional characteristics, their environment, and academic achievement is enhanced. However, arriving at quick conclusions with regard to public policy decisions would be akin to reading beyond what the data and results suggest.

Although changes in children's learning-related social skills were not associated with changes in achievement in this study, intervention research such as training young children's to improve their symptoms of inattention and working memory (Klineberg et al, 2005) provides a different lens for testing whether improvements in attention skills are associated with improvements in school performance. Similarly, other intervention research focusing on in service training to enhance teacher's knowledge of ADHD and behavior modification techniques (Jones & Chronis-Tuscano, 2008) would be beneficial. Such work can determine whether teacher's enhanced knowledge of the symptoms of inattention and their ability to handle them are associated with less negative perceptions of children's attention skills. Additionally, studying primarily low income families or identifying children with lower levels of learning-related social

skills will help figure out whether these skills are associated with resilience in the academic domain.

5.5 SUMMARY AND CONCLUSIONS

Using longitudinal data from the NICHD SECCYD links between learning-related social skills in middle childhood and trajectories of reading, vocabulary, and math from first through fifth grade were examined. The role of learning-related social skills as a moderator of the links between family income and academic achievement and between gender and achievement was investigated. This study is among the few that tested whether links exist between trajectories of achievement in middle childhood and concurrent learning-related social skills. Attention problems, based on teachers' perceptions, emerged as predictors of average performance but not of change in performance, of key academic competencies. Children's preschool age attention, self-regulation, and behavior were also predictors of academic competencies at school age but several key demographic factors of their environment explain these links better. Children's health is one factor that requires further attention as it may be better able to explain the links between learning-related social skills and academic achievement. This study points to further investigation of the moderating role of learning-related social skills with subgroups of children living in greater levels of poverty and exhibiting higher levels of socio-emotional problems. In conclusion, this study mostly suggests that teacher-reported attention problems have relevance for achievement test scores but rules out any causal connections since change in learning-related social skills did not predict change in achievement scores.

APPENDIX A

Table 16: Proportion of Cases by Subgroups of Race/Ethnicity that are missing data on Achievement Outcomes, Learning-related Social Skills, and Demographics Variables

Variables	Non-Hispanic White ($n = 866$)			Hispanic ($n = 68$)			Non-Hispanic Black ($n = 132$)			Non-Hispanic Others ($n = 57$)		
N	Avail	Miss	% miss	Avail	Miss	% miss	Avail	Miss	% miss	Avail	Miss	% miss
Marital transitions	851	15	1.7	66	2	2.9	125	7	5.3	56	1	1.8
Health of Child	849	17	2.0	65	3	4.4	127	5	3.8	57	0	0
Hours of Employment	849	17	2.0	65	3	4.4	127	5	3.8	57	0	0
Number of Children at Home	849	17	2.0	65	3	4.4	132	0	0	57	0	0
Maternal Age	866	0	0	68	0	0	132	0	0	57	0	0
Maternal Education	866	0	0	68	0	0	132	0	0	57	0	0
Child Gender	866	0	0	68	0	0	132	0	0	57	0	0
Child Hispanic	866	0	0	68	0	0	132	0	0	57	0	0
Child Black	866	0	0	68	0	0	132	0	0	57	0	0
Birth weight	866	0	0	68	0	0	132	0	0	57	0	0
Average Bayley Score	847	17	2.0	65	3	4.4	125	7	5.3	52	5	8.8
Maternal PPVT	828	38	4.4	62	6	8.8	118	14	10.6	51	6	10.5
Residential Mobility	852	14	1.6	67	1	1.5	130	1	0.8	57	0	0
Age in grade 1	866	866	0	68	0	0	132	0	0	57	0	0
EC Attention Problems	810	56	6.5	59	9	13.2	119	13	9.8	45	12	21.0

EC Self Regulation	810	56	6.5	59	9	13.2	118	14	10.6	45	12	21.0
EC Behavior Problems	810	56	6.5	59	9	13.2	117	15	11.4	45	12	21.0
MC Attention Problems	792	74	8.5	62	6	8.8	122	10	7.6	50	7	12.3
MC Self-Regulation	788	78	9.0	62	6	8.8	121	11	8.3	49	8	14.0
MC Behavior Problems	792	74	8.5	62	6	8.8	122	10	7.6	50	7	12.3
Attention Problems G1	789	77	8.9	59	9	13.2	107	25	18.9	47	10	17.5
Attention Problems G3	610	256	29.6	54	14	20.6	113	19	14.4	37	20	35.1
Attention Problems G5	720	146	16.9	60	8	11.8	97	35	26.5	45	12	21.0
Self Regulation G1	784	82	9.5	59	9	13.2	107	25	18.9	45	12	21.0
Self Regulation G3	606	260	30.0	53	15	22.1	113	19	14.4	37	20	35.1
Self Regulation G5	715	151	17.4	60	8	11.8	96	36	27.3	45	12	21.0
Behavior Problems G1	789	77	8.9	59	9	0	107	25	18.9	47	10	17.5
Behavior Problems G3	610	246	28.4	54	14	19.0	113	19	14.4	37	20	35.1
Behavior Problems G5	720	146	16.9	60	8	11.8	97	35	26.5	45	12	21.0
WJ Letter-Word Identification G1	802	64	7.3	60	8	11.8	116	16	12.1	47	10	17.5
WJ Letter-Word Identification G3	785	81	9.4	62	6	8.8	119	13	9.8	48	9	15.8
WJ Letter-Word Identification G5	764	102	11.8	59	9	13.2	121	11	8.3	48	9	15.8
WJ Applied Problems G1	802	64	7.3	59	9	13.2	116	16	12.1	46	11	19.3
WJ Applied Problems G3	784	82	9.5	62	6	8.8	119	13	9.8	48	9	15.8
WJ Applied Problems G5	764	102	11.8	59	9	13.2	121	11	8.3	48	9	15.8
WJ Picture Vocabulary G1	801	65	7.5	60	8	11.8	113	19	14.4	46	11	19.3
WJ Picture Vocabulary G3	785	81	9.4	62	6	8.8	119	13	12.1	48	9	15.8
WJ Picture Vocabulary G5	763	113	13.0	59	9	13.2	121	11	8.3	48	9	15.8

APPENDIX B

STATA COMMANDS FOR MULTIPLE IMPUTATION OF MISSING DATA

* This set of commands with individual equations predicting each variable was used to impute missing data *

** The same set of command were used to individually impute missing data for the three subgroups of race/ethnicity in this sample: 'White' & 'Others' combined, 'Hispanic', and 'Black'**

```
set logtype text
log using feb10wo, replace

#delimit;

ice id childsex ctrann pbiodadn birthwgt etherace mracem01 mage_m01 meducm01 mdi15o15
mdi24o24 mppvt36 reside1 att1 att2 att3 sreg1 sreg2 sreg3 bp1 bp2 bp3 slfrsm54 cbqicm54
bex_sm54 prbrsm54 cbqafm54 bap_sm54
incndm01 incndm06 incndm15 incndm24 incndm36 incntm54 incntm1s incntmg3 incntmg5
incntmg6
mhrw_m01 mhrw_m06 mhrw_m15 mhrw_m24 mhrw_m36 mhrw_m54 mhrw_m1s mahrwmg3
mahrwmg5 mahrwmg6
child06m child15m chldnm24 chldnm36 chldnm54 chldnm1s chldnmg3 chldnmg5 chldnmg6
hlthbm01 hlthbm03 hlthbm06 hlthbm09 hlthbm15 hlthbm24 hlthbm36 hlthbm54 hlthbm1s
hlthbmg3 hlthbmg5 hlthbmg6
mstatm01 mstatm03 mstatm06 mstatm09 mstatm12 mstatm15 mstatm24 mstatm36 mstatm54
mstatm1s mstatmg3 mstatmg5 mstatmg6
using feb10wo,m(5)
eq(id: id,
meducm01: mracem01 mage_m01 mppvt36,
mdi15o15: childsex etherace birthwgt mage_m01 meducm01 mdi24o24 mppvt36 incndm15,
mdi24o24: childsex etherace birthwgt mage_m01 meducm01 mdi15o15 mppvt36 incndm24,
mppvt36: mracem01 mage_m01 meducm01,
```

reside1: mracem01 mage_m01 meducm01 ctrann,
ctrann: mracem01 mage_m01 meducm01,
pbiodadn: mracem01 mage_m01 meducm01 ctrann,
att1: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm1s,
att2: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntmg3,
att3: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntmg5,
sreg1: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm1s,
sreg2: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntmg3,
sreg3: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntmg5,
bp1: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm1s,
bp2: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntmg3,
bp3: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntmg5,
slfrsm54: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm54,
cbqicm54: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm54,
bex_sm54: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm54,
prbrsm54: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm54,
cbqafm54: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm54,
bap_sm54: childsex etherace mage_m01 meducm01 mdi15o15 mdi24o24 mppvt36 incntm54,
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incndm06: mracem01 mage_m01 meducm01 incndm15,
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mhrw_m54: mracem01 mage_m01 meducm01 mhrw_m1s,
mhrw_m1s: mracem01 mage_m01 meducm01 mahrwmg3,
mahrwmg3: mracem01 mage_m01 meducm01 mahrwmg5,
mahrwmg5: mracem01 mage_m01 meducm01 mahrwmg6,
mahrwmg6: mahrwmg5,
child06m: mracem01 mage_m01 meducm01 child15m,
child15m: mracem01 mage_m01 meducm01 chldnm24,
chldnm24: mracem01 mage_m01 meducm01 chldnm36,
chldnm36: mracem01 mage_m01 meducm01 chldnm54,
chldnm54: mracem01 mage_m01 meducm01 chldnm1s,
chldnm1s: mracem01 mage_m01 meducm01 chldnmg3,
chldnmg3: mracem01 mage_m01 meducm01 chldnmg5,
chldnmg5: mracem01 mage_m01 meducm01 chldnmg6,

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hlthbm03: hlthbm01,
hlthbm06: childsex birthwgt etherace hlthbm09,
hlthbm09: hlthbm06,
hlthbm15: childsex birthwgt etherace hlthbm24,
hlthbm24: childsex birthwgt etherace hlthbm36,
hlthbm36: childsex birthwgt etherace hlthbm54,
hlthbm54: childsex birthwgt etherace hlthbm1s,
hlthbm1s: childsex birthwgt etherace hlthbmg3,
hlthbmg3: childsex birthwgt etherace hlthbmg5,
hlthbmg5: childsex birthwgt etherace hlthbmg6,
hlthbmg6: hlthbmg5,
mstatm01: mracem01 mage_m01 meducm01 mstatm03,
mstatm03: mracem01 mage_m01 meducm01 mstatm06,
mstatm06: mracem01 mage_m01 meducm01 mstatm09,
mstatm09: mracem01 mage_m01 meducm01 mstatm12,
mstatm12: mracem01 mage_m01 meducm01 mstatm15,
mstatm15: mracem01 mage_m01 meducm01 mstatm24,
mstatm24: mracem01 mage_m01 meducm01 mstatm36,
mstatm36: mracem01 mage_m01 meducm01 mstatm54,
mstatm54: mracem01 mage_m01 meducm01 mstatm1s,
mstatm1s: mracem01 mage_m01 meducm01 mstatmg3,
mstatmg3: mracem01 mage_m01 meducm01 mstatmg5,
mstatmg5: mracem01 mage_m01 meducm01 mstatmg6,
mstatmg6: mstatmg5);
misplit, clear m(5);

log close;
```

APPENDIX C

CONDITIONAL GROWTH MODELS

Table 17: Coefficients for WJ Letter-Word Identification for the Un-imputed (N = 886) and the Imputed (N = 1123) Analysis Samples Based on 2-level HLM

Average Intercept across Middle Childhood	Un-Imputed Data					Imputed Data				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	485.77***	485.78***	484.92***	484.95***	484.78***	485.22***	485.08***	485.47***	485.08***	485.13***
	(0.58)	(0.57)	(0.62)	(0.58)	(0.53)	(0.53)	(0.54)	(0.55)	(0.54)	(0.49)
Early Childhood LRSS										
Attention Problems		-1.20*		-1.78*	0.20		-2.92**		-2.92***	-0.79
(CBQ + CBCL)		(0.90)		(0.91)	(0.86)		(0.90)		(0.90)	(0.81)
Self-Regulation		3.03**		3.17**	1.02		2.29**		2.29*	0.07
(CBQ + SSRS)		(0.86)		(0.88)	(0.81)		(0.82)		(0.83)	(0.77)
Behavior Problems		0.94		0.99	-0.34		1.18		1.18**	-0.02
(CBCL + SSRS)		(0.85)		(0.86)	(0.80)		(0.77)		(0.77)	(0.70)
Middle Childhood LRSS										
Avg Attention Problems	-1.16***	-1.02***		-1.05***	-0.70***	-1.25***	-1.10***		-1.10**	-0.71***
(TRF Attn Problems)	(0.17)	(0.17)		(0.17)	(0.16)	(0.17)	(0.17)		(0.17)	(0.15)
Self-Regulation	0.48	0.45		0.31	0.04	0.47	0.36		0.36	0.07
(TRF Self-Control)	(0.35)	(0.35)		(0.36)	(0.32)	(0.38)	(0.36)		(0.36)	(0.29)

Table 17: (Continued)

Behavior Problems	0.04	0.12	0.08	0.16	-0.07	-0.02	-0.02	0.11
(TRF Externalizing Beh)	(0.14)	(0.14)	(0.14)	(0.13)	(0.14)	(0.14)	(0.14)	(0.11)
Early Demographics								
Maternal Age at 1 month				-0.14				-0.15
				(0.14)				(0.12)
Maternal Education at				0.68*				0.70**
1m				(0.31)				(0.26)
Child Sex				0.28				-0.08
				(1.13)				(0.99)
Child - Hispanic				1.14				1.39
				(2.57)				(2.14)
Child - Black				-0.36				-2.06
				(2.46)				(1.96)
Child - Birthweight				3.88				3.6
				(3.51)				(2.84)
Child – Age in grade 1				0.32*				0.42**
				(0.16)				(0.13)
Child -Bayley 15 + 24m				0.16**				0.23***
				(0.05)				(0.05)
Maternal PPVT 36 m				0.18***				0.17***
				(0.04)				(0.04)
Residential Mobility				0.39				-0.21
during EC				(0.49)				(0.42)
Marital Transitions				-0.04				1.02*
during EC				(0.93)				(0.46)
Maternal Employment				-0.04				-0.01
Hours during EC				(0.04)				(0.04)
Number of Children				-2.08**				-2.07***
during EC				(0.67)				(0.56)
Health of Child during				4.52***				5.20***
EC				(1.46)				(1.26)
Early Childhood Poverty				-3.04				-2.69
200%				(1.71)				(1.51)
Middle Childhood				-4.85**				-3.76*
Poverty 200%				(1.83)				(1.60)

Table 17: (Continued)

Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.21***	1.21***	1.22***	1.22***	1.22***	1.21***	1.21***	1.21***	1.21***	1.21***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		-0.00		-0.03	0.00		-0.01		-0.01	-0.01
(CBQ + CBCL)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.02		-0.02	-0.02		-0.01		-0.01	-0.00
(CBQ + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Behavior Problems		0.01		0.01	0.01		0.02		0.02	0.02
(CBCL + SSRS)		(0.02)		(.02)	(0.02)		(0.02)		(0.02)	(0.02)
Middle Childhood LRSS										
Avg Attention Problems	0.01	0.01		0.01	0.01	0.00	0.00		0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)
Self-Regulation	-0.00	-0.00		0.00	-0.00	-0.01	-0.01		-0.01	-0.00
(TRF Self-Control)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)	(0.01)		(0.01)	(0.01)
Behavior Problems	-0.00	-0.00		0.00	0.00	-0.00	-0.00		-0.00	0.00
(TRF Externalizing Beh)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)
Early Demographics										
Maternal Age at 1 month					0.00					0.01
					(0.00)					(0.00)
Maternal Education at 1m					-0.01					-0.01
					(0.01)					(0.01)
Child Sex					0.02					0.04
					(0.03)					(0.02)
Child - Hispanic					0.04					0.03
					(0.07)					(0.06)
Child - Black					-0.02					-0.04
					(0.05)					(0.04)
Child - Birthweight					-0.01					0.03
					(0.09)					(0.07)

Table 17: (Continued)

Child – Age in grade 1					-0.01*					-0.01***
					(0.00)					(0.00)
Child -Bayley 15 + 24m					-0.00					-0.00*
					(0.00)					(0.00)
Maternal PPVT 36 m					0.00					0.00
					(0.00)					(0.00)
Residential Mobility during EC					-0.01					-0.01
					(0.01)					(0.01)
Marital Transitions during EC					0.03					-0.00
					(0.02)					(0.01)
Maternal Employment Hours during EC					0.00					0.00
					(0.00)					(0.00)
Number of Children during EC					0.01					0.01
					(0.02)					(0.01)
Health of Child during EC					-0.04					-0.03
					(0.03)					(0.03)
Early Childhood Poverty200%					-0.01					0.05
					(0.04)					(0.04)
Middle Childhood Poverty200%					0.05					0.02
					(0.05)					(0.04)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.13	0.13	0.10			0.07	0.07	0.06
			(0.07)	(0.07)	(0.07)			(0.06)	(0.06)	(0.06)
Self-Regulation			0.21	0.22	0.20			0.13	0.13	0.10
			(0.13)	(0.13)	(0.14)			(0.14)	(0.14)	(0.13)
Behavior Problems			0.09	0.09	0.13*			0.04	0.04	0.04
			(0.06)	(0.06)	(0.06)			(0.06)	(0.04)	(0.05)
Time-varying Covariates										

Table 17: (Continued)

Poverty200	-0.02	0.04
	(0.22)	(0.20)
Marital Status (yes/no)	-0.17	0.43
	(0.64)	(0.49)
Child Health	1.15	1.97**
	(0.68)	(0.56)
Number of Children	-1.31	-0.88
	(0.95)	(0.81)

Table 18: Coefficients for WJ Letter-Word Identification for the Un-imputed (N=867) and the Imputed (N=1123) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Un-Imputed Data					Imputed Data				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	485.88***	485.91***	485.01***	485.04***	484.84***	485.45***	485.45***	485.45***	485.45***	485.46***
	(0.59)	(0.58)	(0.63)	(0.59)	(0.54)	(0.55)	(0.54)	(0.58)	(0.54)	(0.48)
Early Childhood LRSS										
Attention Problems		-1.75*		-1.74*	0.22		-2.71**		-2.71**	-0.61
(CBQ + CBCL)		(0.88)		(0.90)	(0.85)		(0.96)		(0.96)	(0.87)
Self-Regulation		3.01**		3.21***	1.11		2.80**		2.80**	0.81
(CBQ + SSRS)		(0.87)		(0.88)	(0.80)		(0.90)		(0.90)	(0.78)
Behavior Problems		0.80		0.88	-0.22		1.19		1.19	0.09
(CBCL + SSRS)		(0.85)		(0.86)	(0.80)		(0.82)		(0.82)	(0.74)
Middle Childhood LRSS										
Avg Attention Problems	-1.18***	-1.04***		-1.06***	-0.72***	-1.28***	-1.13***		-1.13***	-0.76***
(TRF Attn Problems)	(0.17)	(0.17)		(0.17)	(0.16)	(0.18)	(1.18)		(0.18)	(0.15)
Self-Regulation	0.49	0.45		0.34	0.14	0.47	0.36		0.36	0.04
(TRF Self-Control)	(0.37)	(0.37)		(0.37)	(0.33)	(0.39)	(0.38)		(0.38)	(0.29)
Behavior Problems	0.10	0.18		0.15	0.22	-0.02	0.04		0.04	0.14
(TRF Externalizing Beh)	(0.15)	(0.14)		(0.14)	(0.13)	(0.15)	(0.14)		(0.14)	(0.12)
Early Demographics										
Maternal Age at 1 month					-0.14					-0.15
					(0.14)					(0.13)
Maternal Education at 1m					0.74*					0.61*
					(0.31)					(0.29)
Child Sex					0.49					0.17
					(1.12)					(1.01)
Child - Hispanic					1.25					0.83
					(2.58)					(2.27)

Table 18: (Continued)

Child - Black					-0.87					-2.02
					(2.51)					(2.13)
Child - Birthweight					3.42					3.00
					(3.16)					(2.63)
Child – Age in grade 1					0.32*					0.40**
					(0.16)					(0.14)
Child -Bayley 15 + 24m					0.17***					0.23***
					(0.05)					(0.05)
Maternal PPVT 36 m					0.18***					0.18
					(0.04)					(0.04)
Residential Mobility					0.35					-0.08
during EC					(0.50)					(0.45)
Marital Transitions					-0.01					0.74
during EC					(0.94)					(0.60)
Maternal Employment					-0.04					-0.01
Hours during EC					(0.04)					(0.04)
Number of Children					-1.91**					-1.85**
during EC					(0.67)					(0.60)
Health of Child during					4.29					4.21**
EC					(1.47)					(1.34)
Early Childhood Poverty					-3.28					-3.09
200%					(1.77)					(1.73)
Middle Childhood					-4.81*					-3.53*
Poverty 200%					(1.90)					(1.65)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.22***	1.22***	1.22***	1.22***	1.22***	1.22***	1.22***	1.22***	1.22***	1.22***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		-0.01		-0.00	-0.00		-0.01		-0.01	-0.00
(CBQ + CBCL)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.02		-0.02	-0.02		-0.01		-0.01	0.00
(CBQ + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Behavior Problems		0.01		0.01	0.01		0.02		0.02	0.02

Table 18: (Continued)

(CBCL + SSRS)		(0.02)	(0.02)	(0.02)		(0.02)	(0.02)	(0.02)
Middle Childhood								
LRSS								
Avg Attention Problems	0.00*	0.01	0.01	0.01	0.01	0.01	0.01	0.00
(TRF Attn Problems)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.03)
Early Demographics								
Maternal Age at 1 month				0.00				0.00
				(0.00)				(0.03)
Maternal Education at				-0.01				-0.00
1m				(0.01)				(0.01)
Child Sex				0.02				0.04
				(0.03)				(0.02)
Child - Hispanic				0.03				0.05
				(0.07)				(0.06)
Child - Black				-0.02				-0.03
				(0.05)				(0.05)
Child - Birthweight				0.01				0.03
				(0.01)				(0.08)
Child – Age in grade 1				-0.01*				-0.01
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00*
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				-0.01				-0.01
during EC				(0.01)				(0.01)
Marital Transitions				0.02				0.02
during EC				(0.02)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.01				0.01
during EC				(0.02)				(0.01)

Table 18: (Continued)

Health of Child during EC					-0.04 (0.03)					-0.04 (0.03)
Early Childhood Poverty200%					-0.01 (0.04)					0.03 (0.04)
Middle Childhood Poverty200%					0.05 (0.05)					0.02 (0.04)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.14 (0.07)	0.14 (0.07)	0.10 (0.07)			0.07 (0.06)	0.07 (0.06)	0.05 (0.06)
Self-Regulation			0.22 (0.13)	0.23 (0.13)	0.20 (0.14)			0.10 (0.14)	0.10 (0.14)	0.09 (0.16)
Behavior Problems			0.10 (0.06)	0.10 (0.06)	0.13* (0.06)			0.05 (0.06)	0.05 (0.06)	0.06 (0.06)
Time-varying Covariates										
Poverty200					-0.07 (0.22)					0.03 (0.24)
Marital Status (yes/no)					-0.19 (0.64)					0.81 (0.52)
Child Health					1.15 (0.68)					2.04*** (0.54)
Number of Children					-1.31 (0.96)					-0.55 (0.84)

Table 19: Coefficients for WJ Picture Vocabulary for the Un-imputed (N=886) and the Imputed (N=1123) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Un-Imputed Data					Imputed Data				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	496.01***	496.02***	495.95***	495.96***	495.96***	495.43***	495.31***	495.58***	495.31***	495.11***
	(0.35)	(0.34)	(0.37)	(0.35)	(0.27)	(0.32)	(0.33)	(0.33)	(0.32)	(0.25)
Early Childhood LRSS										
Attention Problems		-2.31***		-2.22***	-0.70		-2.59**		-2.58**	-0.84*
(CBQ + CBCL)		(0.52)		(0.53)	(0.46)		(0.68)		(0.68)	(0.42)
Self-Regulation		1.64**		1.72**	0.21		1.61**		1.61**	0.02
(CBQ + SSRS)		(0.49)		(0.50)	(0.40)		(0.49)		(0.49)	(0.35)
Behavior Problems		1.48**		1.61**	0.53		1.53**		1.53**	0.38
(CBCL + SSRS)		(0.50)		(0.51)	(0.38)		(0.46)		(0.46)	(0.36)
Middle Childhood LRSS										
Avg Attention Problems	-0.57***	-0.46***		-0.48***	-0.19*	-0.61***	-0.50***		-0.50***	-0.17*
(TRF Attn Problems)	(0.11)	(0.11)		(0.11)	(0.09)	(0.11)	(0.11)		(0.11)	(0.08)
Self-Regulation	0.13	0.13		0.11	0.02	0.23	0.16		0.16	0.05
(TRF Self-Control)	(0.21)	(0.21)		(0.21)	(0.16)	(0.22)	(0.21)		(0.21)	(0.15)
Behavior Problems	-0.04	0.01		0.01	0.11	-0.13	-0.10		-0.10	0.06
(TRF Externalizing Beh)	(0.09)	(0.09)		(0.09)	(0.07)	(0.10)	(0.09)		(0.09)	(0.06)
Early Demographics										
Maternal Age at 1 month					0.07					0.07
					(0.07)					(0.06)
Maternal Education at 1m					0.06					0.33*
					(0.17)					(0.15)
Child Sex					3.73***					3.03***
					(0.58)					(0.51)
Child - Hispanic					0.79					0.49
					(1.12)					(1.01)

Table 19: (Continued)

Child - Black				-0.29						-2.23*
				(1.14)						(0.98)
Child - Birthweight				3.60*						2.83*
				(1.69)						(1.41)
Child – Age in grade 1				0.24**						0.30***
				(0.08)						(0.07)
Child -Bayley 15 + 24m				0.22***						0.20***
				(0.02)						(0.02)
Maternal PPVT 36 m				0.22***						0.20***
				(0.02)						(0.02)
Residential Mobility during EC				0.17						0.04
				(0.22)						(0.20)
Marital Transitions during EC				-0.49						0.23
				(0.39)						(0.21)
Maternal Employment Hours during EC				-0.00						0.00
				(0.02)						(0.02)
Number of Children during EC				-1.72***						-1.83***
				(0.36)						(0.32)
Health of Child during EC				2.16**						1.85**
				(0.74)						(0.64)
Early Childhood Poverty 200%				-1.69*						-1.25
				(0.85)						(0.70)
Middle Childhood Poverty 200%				-0.44						-0.65
				(0.87)						(0.74)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems (CBQ + CBCL)		0.00		0.01	0.02		0.01		0.01	0.01
		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Self-Regulation (CBQ + SSRS)		-0.01		-0.01	-0.02		-0.02		-0.02	-0.02
		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)

Table 19: (Continued)

Behavior Problems		-0.01	-0.02	-0.02*		-0.01	-0.01	-0.02
(CBCL + SSRS)		(0.01)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
Middle Childhood								
LRSS								
Avg Attention Problems	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.01	-0.00	-0.01	-0.00	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Behavior Problems	-0.00	-0.00	0.00	-0.00	0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				-0.00				0.01
1m				(0.00)				(0.00)
Child Sex				-0.05				-0.04
				(0.01)				(0.01)
Child - Hispanic				-0.02				-0.00
				(0.03)				(0.02)
Child - Black				0.00				-0.04
				(0.03)				(0.02)
Child - Birthweight				-0.02				-0.04
				(0.05)				(0.04)
Child – Age in grade 1				-0.01**				-0.01***
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.00				-0.00
during EC				(0.01)				(0.00)
Marital Transitions				-0.01				-0.01
during EC				(0.01)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				-0.00				-0.01

Table 19: (Continued)

during EC					(0.01)					(0.01)
Health of Child during					0.00					0.01
EC					(0.02)					(0.02)
Early Childhood					-0.01					0.01
Poverty200%					(0.02)					(0.02)
Middle Childhood					0.01					0.00
Poverty200%					(0.02)					(0.02)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.04	0.04	0.02			0.06	0.06	0.06
			(0.03)	(0.03)	(0.04)			(0.03)	(0.03)	(0.03)
Self-Regulation			0.06	0.06	0.06			0.05	0.05	0.05
			(0.06)	(0.06)	(0.06)			(0.05)	(0.05)	(0.05)
Behavior Problems			0.03	0.04	0.04			0.01	0.02	0.02
			(0.03)	(0.03)	(0.03)			(0.03)	(0.03)	(0.03)
Time-varying Covariates										
Poverty200					0.12					0.06
					(0.16)					(0.11)
Marital Status (yes/no)					-0.15					-0.15
					(0.35)					(0.24)
Child Health					-0.57					-0.31
					(0.31)					(0.25)
Number of Children					0.61					0.70
					(0.51)					(0.40)

Table 20: Coefficients for WJ Picture Vocabulary for the Un-imputed (N=867) and the Imputed (N=1123) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Un-Imputed Data					Imputed Data				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	496.11***	496.11***	496.03***	496.04***	496.02***	495.78***	495.79***	495.78***	495.79***	495.78***
	(0.36)	(0.35)	(0.37)	(0.35)	(0.27)	(0.33)	(0.32)	(0.35)	(0.32)	(0.24)
Early Childhood LRSS										
Attention Problems		-2.27***		-2.19***	-0.70		-2.56***		-2.56***	-0.73
(CBQ + CBCL)		(0.51)		(0.52)	(0.45)		(0.61)		(0.61)	(0.45)
Self-Regulation		1.65**		1.71**	0.26		1.66**		1.66**	0.26
(CBQ + SSRS)		(0.48)		(0.49)	(0.39)		(0.56)		(0.56)	(0.38)
Behavior Problems		1.50**		1.58**	0.60		1.56**		1.56**	0.50
(CBCL + SSRS)		(0.50)		(0.51)	(0.39)		(0.47)		(0.47)	(0.36)
Middle Childhood LRSS										
Avg Attention Problems	-0.58***	-0..47***		-0.48***	-0.19*	-0.65***	-0.54***		-0.54***	-0.20*
(TRF Attn Problems)	(0.11)	(0.11)		(0.11)	(0.09)	(0.11)	(0.11)		(0.11)	(0.08)
Self-Regulation	0.08	0.08		0.07	0.05	0.20	0.14		0.14	0.04
(TRF Self-Control)	(0.22)	(0.21)		(0.22)	(0.17)	(0.22)	(0.21)		(0.21)	(0.15)
Behavior Problems	-0.03	0.02		0.03	0.12	-0.08	-0.04		-0.04	0.10
(TRF Externalizing Beh)	(0.09)	(0.09)		(0.09)	(0.07)	(0.10)	(0.09)		(0.09)	(0.06)
Early Demographics										
Maternal Age at 1 month					0.06					0.05
					(0.07)					(0.06)
Maternal Education at 1m					0.05					0.19
					(0.17)					(0.16)
Child Sex					3.91***					3.30***
					(0.58)					(0.52)
Child - Hispanic					0.72					0.18
					(1.12)					(1.05)

Table 20: (Continued)

Child - Black					-0.85					-2.00*
					(1.13)					(0.97)
Child - Birthweight					3.41*					2.85*
					(1.61)					(1.42)
Child – Age in grade 1					0.21**					0.26**
					(0.08)					(0.07)
Child -Bayley 15 + 24m					0.21*					0.20*
					(0.03)					(0.02)
Maternal PPVT 36 m					0.23***					0.22***
					(0.02)					(0.02)
Residential Mobility					0.16					0.06
during EC					(0.21)					(0.19)
Marital Transitions					-0.48					0.07
during EC					(0.39)					(0.26)
Maternal Employment					0.01					0.00
Hours during EC					(0.02)					(0.02)
Number of Children					-1.54***					-1.70***
during EC					(0.34)					(0.31)
Health of Child during					1.93**					1.66*
EC					(0.73)					(0.67)
Early Childhood Poverty					-1.82*					-1.59*
200%					(0.85)					(0.71)
Middle Childhood					-0.45					-0.33
Poverty 200%					(0.86)					(0.76)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		0.00		0.01	0.02		0.01		0.01	0.01
(CBQ + CBCL)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Self-Regulation		-0.02		-0.02	-0.02		-0.02*		-0.02*	-0.02*
(CBQ + SSRS)		(0.010		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Behavior Problems		-0.01		-0.02	-0.02*		-0.02*		-0.02*	-0.02*

(CBCL + SSRS)		(0.01)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
Middle Childhood								
LRSS								
Avg Attention Problems	0.01	0.00	0.00	-0.00	0.00	0.00	0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Behavior Problems	-0.00	-0.00	0.00	-0.00	0.00	0.00	0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.000	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				-0.00				0.00
1m				(0.00)				(0.00)
Child Sex				-0.05**				-0.04**
				(0.02)				(0.01)
Child - Hispanic				-0.02				-0.01
				(0.03)				(0.03)
Child - Black				-0.00				-0.04
				(0.03)				(0.02)
Child - Birthweight				-0.03				-0.04
				(0.05)				(0.05)
Child – Age in grade 1				-0.01**				-0.01**
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.00				-0.00
during EC				(0.01)				(0.01)
Marital Transitions				-0.01				-0.00
during EC				(0.01)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				-0.00				-0.01
during EC				(0.01)				(0.01)

Table 20: (Continued)

Health of Child during EC					0.00					0.00
					(0.02)					(0.02)
Early Childhood Poverty200%					-0.02					-0.00
					(0.02)					(0.02)
Middle Childhood Poverty200%					0.01					0.01
					(0.02)					(0.02)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.04	0.04	0.02			0.05	0.05	0.05
			(0.03)	(0.03)	(0.04)			(0.03)	(0.03)	(0.04)
Self-Regulation			0.07	0.08	0.07			0.05	0.05	0.05
			(0.06)	(0.06)	(0.06)			(0.05)	(0.05)	(0.05)
Behavior Problems			0.04	0.04	0.05			0.02	0.02	0.03
			(0.03)	(0.03)	(0.03)			(0.03)	(0.03)	(0.03)
Time-varying Covariates										
Poverty200					0.10					0.07
					(0.16)					(0.12)
Marital Status (yes/no)					-0.18					-0.12
					(0.34)					(0.25)
Child Health					-0.58					-0.38
					(0.32)					(0.26)
Number of Children					0.61					0.75
					(0.52)					(0.42)

Table 21: Coefficients for WJ Applied Problems for the Un-imputed (N=886) and the Imputed (N=1123) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Un-Imputed Data					Imputed Data				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	492.91***	492.92***	492.40***	492.42***	492.33***	492.18***	492.05***	492.36***	492.05***	492.04***
	(0.38)	(0.38)	(0.42)	(0.38)	(0.33)	(0.36)	(0.36)	(0.37)	(0.36)	(0.31)
Early Childhood LRSS										
Attention Problems		-2.44***		-2.30***	-1.20*		-2.91**		-2.91**	-1.39*
(CBQ + CBCL)		(0.63)		(0.65)	(0.57)		(0.83)		(0.83)	(0.54)
Self-Regulation		1.81**		2.06**	0.78		1.51*		1.51*	0.19
(CBQ + SSRS)		(0.56)		(0.57)	(0.51)		(0.61)		(0.61)	(0.48)
Behavior Problems		1.59**		1.58**	0.72		1.57**		1.57**	0.65
(CBCL + SSRS)		(0.57)		(0.59)	(0.52)		(0.50)		(0.50)	(0.43)
Middle Childhood LRSS										
Avg Attention Problems	-0.99***	-0.86***		-0.88***	-0.60***	-1.00***	-0.86***		-0.86***	-0.56***
(TRF Attn Problems)	(0.11)	(0.11)		(0.11)	(0.11)	(0.12)	(0.12)		(0.12)	(0.10)
Self-Regulation	0.08	0.07		0.02	-0.07	0.17	0.09		0.09	-0.06
(TRF Self-Control)	(0.24)	(0.23)		(0.24)	(0.21)	(0.24)	(0.22)		(0.22)	(0.18)
Behavior Problems	0.03	0.08		0.07	0.15	-0.05	-0.02		-0.02	0.12
(TRF Externalizing Beh)	(0.10)	(0.09)		(0.09)	(0.08)	(0.10)	(0.10)		(0.10)	(0.07)
Early Demographics										
Maternal Age at 1 month					0.03					0.04
					(0.08)					(0.07)
Maternal Education at 1m					0.44*					0.49**
					(0.20)					(0.17)
Child Sex					3.46***					2.72***
					(0.71)					(0.62)
Child - Hispanic					-2.21					-1.70
					(1.40)					(1.28)

Table 21: (Continued)

Child - Black					-3.48*					-3.80**
					(1.53)					(1.24)
Child - Birthweight					1.46					0.60
					(1.87)					(1.52)
Child – Age in grade 1					0.49***					0.44***
					(0.10)					(0.08)
Child -Bayley 15 + 24m					0.25***					0.28***
					(0.03)					(0.03)
Maternal PPVT 36 m					0.08**					0.08**
					(0.03)					(0.02)
Residential Mobility					0.03					-0.21
during EC					(0.30)					(0.28)
Marital Transitions					0.26					0.56
during EC					(0.53)					(0.31)
Maternal Employment					0.00					0.02
Hours during EC					(0.03)					(0.02)
Number of Children					-0.21					-0.48
during EC					(0.39)					(0.34)
Health of Child during					0.83					1.19
EC					(0.93)					(0.79)
Early Childhood Poverty					-1.05					-0.77
200%					(1.05)					(0.96)
Middle Childhood					-2.44*					-2.75**
Poverty 200%					(1.10)					(1.00)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01
Early Childhood LRSS										
Attention Problems		0.02		0.02	0.02		0.02		0.02	0.02
(CBQ + CBCL)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Self-Regulation		-0.01		-0.02	-0.01		-0.01		-0.02	-0.01
(CBQ + SSRS)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)

Table 21: (Continued)

Behavior Problems		-0.02	-0.02	-0.02		-0.02	-0.01	-0.01
(CBCL + SSRS)		(0.01)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
Middle Childhood								
LRSS								
Avg Attention Problems	0.01***	0.01**	0.01**	0.01**	0.01*	0.01	0.01	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	0.01	0.00	0.01	0.00	0.00	0.00	0.00	-0.00
(TRF Self-Control)	(0.24)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Behavior Problems	0.03	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.10)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				-0.00				-0.00
1m				(0.00)				(0.00)
Child Sex				-0.06**				-0.05
				(0.02)				(0.02)
Child - Hispanic				0.02				0.03
				(0.04)				(0.03)
Child - Black				-0.02				-0.02
				(0.04)				(0.03)
Child - Birthweight				-0.03				-0.02
				(0.05)				(0.05)
Child – Age in grade 1				-0.01***				-0.01***
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00***				-0.00***
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				-0.00				-0.01
during EC				(0.01)				(0.01)
Marital Transitions				-0.01				-0.00
during EC				(0.01)				(0.01)
Maternal Employment				-0.00				-0.00
				(0.00)				(0.00)
Number of Children				-0.00				-0.00

Table 21: (Continued)

during EC					(0.01)					(0.01)
Health of Child during					0.01					0.00
EC					(0.02)					(0.02)
Early Childhood					0.01					-0.00
Poverty200%					(0.03)					(0.03)
Middle Childhood					0.01					-0.01
Poverty200%					(0.03)					(0.03)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.07	0.07	0.03			0.04	0.04	0.04
			(0.05)	(0.05)	(0.05)			(0.04)	(0.04)	(0.04)
Self-Regulation			0.17	0.17	0.18*			0.12	0.12	0.12
			(0.09)	(0.09)	(0.09)			(0.09)	(0.09)	(0.09)
Behavior Problems			0.06	0.06	0.09*			0.02	0.02	0.03
			(0.04)	(0.04)	(0.04)			(0.03)	(0.03)	(0.03)
Time-varying Covariates										
Poverty200					0.17					0.11
					(0.15)					(0.13)
Marital Status					0.12					0.09
					(0.46)					(0.34)
Child Health					0.21					0.33
					(0.43)					(0.37)
Number of Children					-0.28					-0.07
					(0.66)					(0.52)

Table 22: Coefficients for WJ Applied Problems for the Un-imputed (N=867) and the Imputed (N=1123) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Un-Imputed Data					Imputed Data				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	492.96***	492.97***	492.42***	492.44***	492.37***	492.61***	492.62***	492.62***	492.62***	492.63***
	(0.39)	(0.38)	(0.43)	(0.40)	(0.33)	(0.36)	(0.35)	(0.39)	(0.35)	(0.30)
Early Childhood LRSS										
Attention Problems		-2.43***		-2.31**	-1.15*		-2.85***		-2.85***	-1.28*
(CBQ + CBCL)		(0.64)		(0.65)	(0.58)		(0.65)		(0.65)	(0.51)
Self-Regulation		1.81**		2.03**	0.81		1.55*		1.55*	0.38
(CBQ + SSRS)		(0.56)		(0.58)	(0.52)		(0.60)		(0.60)	(0.47)
Behavior Problems		1.53**		1.50*	0.76		1.59**		1.59**	0.67
(CBCL + SSRS)		(0.58)		(0.60)	(0.51)		(0.54)		(0.54)	(0.47)
Middle Childhood LRSS										
Avg Attention Problems	-0.99***	-0.87***		-0.88***	-0.61***	-1.06***	-0.94***		-0.94***	-0.62***
(TRF Attn Problems)	(0.11)	(0.11)		(0.12)	(0.11)	(0.13)	(0.13)		(0.13)	(0.10)
Self-Regulation	0.06	0.05		0.01	-0.06	0.11	0.04		0.04	-0.10
(TRF Self-Control)	(0.25)	(0.25)		(0.26)	(0.21)	(0.24)	(0.23)		(0.23)	(0.18)
Behavior Problems	0.04	0.10		0.09	0.16	-0.02	0.03		0.03	0.16
(TRF Externalizing Beh)	(0.10)	(0.10)		(0.10)	(0.08)	(0.11)	(0.11)		(0.11)	(0.08)
Early Demographics										
Maternal Age at 1 month					0.03					0.03
					(0.08)					(0.07)
Maternal Education at					0.46*					0.43*
1m					(0.20)					(0.18)
Child Sex					3.68***					3.32***
					(0.71)					(0.64)
Child - Hispanic					-2.26					-0.83
					(1.40)					(1.30)

Table 22: (Continued)

Child - Black				-4.01*						-4.21**
				(1.57)						(1.35)
Child - Birthweight				1.33						0.66
				(1.91)						(1.59)
Child – Age in grade 1				0.51***						0.45***
				(0.10)						(0.09)
Child -Bayley 15 + 24m				0.25***						0.29***
				(0.03)						(0.03)
Maternal PPVT 36 m				0.08***						0.10
				(0.03)						(0.03)
Residential Mobility during EC				0.05						-0.03
				(0.30)						(0.26)
Marital Transitions during EC				0.24						0.67
				(0.53)						(0.34)
Maternal Employment Hours during EC				0.01						0.03
				(0.03)						(0.02)
Number of Children during EC				-0.14						-0.20
				(0.39)						(0.34)
Health of Child during EC				0.75						1.10
				(0.92)						(0.83)
Early Childhood Poverty 200%				-1.18						-0.98
				(1.07)						(0.97)
Middle Childhood Poverty 200%				-2.34*						-2.56*
				(1.10)						(1.03)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 4
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.39)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		0.02		0.02	0.02		0.02		0.02	0.02
(CBQ + CBCL)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.02)
Self-Regulation		-0.02		-0.02	-0.01		-0.02		-0.02	-0.02
(CBQ + SSRS)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Behavior Problems		-0.02		-0.02	-0.02		-0.02*		-0.02	-0.02

Table 22: (Continued)

(CBCL + SSRS)		(0.01)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
Middle Childhood								
LRSS								
Avg Attention Problems	0.01***	0.01**	0.01**	0.01*	0.01**	0.01*	0.01	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00
(TRF Self-Control)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Behavior Problems	-0.00	-0.00	-0.02	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				-0.00				-0.00
1m				(0.01)				(0.00)
Child Sex				-0.06**				-0.05**
				(0.02)				(0.02)
Child - Hispanic				0.02				0.04
				(0.04)				(0.03)
Child - Black				-0.03				-0.02
				(0.04)				(0.03)
Child - Birthweight				-0.03				-0.04
				(0.05)				(0.05)
Child – Age in grade 1				-0.01***				-0.01***
				(0.00)				(0.02)
Child -Bayley 15 + 24m				-0.00***				-0.00***
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				-0.00				-0.01
during EC				(0.01)				(0.01)
Marital Transitions				-0.01				0.01
during EC				(0.01)				(0.01)
Maternal Employment				-0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.00				0.00
during EC				(0.01)				(0.01)

Table 22: (Continued)

Health of Child during EC					0.01					-0.00
					(0.02)					(0.02)
Early Childhood Poverty200%					0.01					-0.01
					(0.03)					(0.03)
Middle Childhood Poverty200%					0.01					-0.01
					(0.03)					(0.03)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.07	0.07	0.03			0.04	0.04	0.04
			(0.05)	(0.05)	(0.05)			(0.04)	(0.04)	(0.04)
Self-Regulation			0.16	0.16	0.18			0.11	0.11	0.12
			(0.09)	(0.09)	(0.09)			(0.09)	(0.09)	(0.11)
Behavior Problems			0.05	0.06	0.08*			0.02	0.03	0.03
			(0.04)	(0.04)	(0.04)			(0.03)	(0.03)	(0.04)
Time-varying Covariates										
Poverty200					0.16					0.14
					(0.15)					(0.15)
Marital Status (yes/no)					0.11					0.28
					(0.47)					(0.35)
Child Health					0.21					0.36
					(0.45)					(0.39)
Number of Children					-0.27					0.07
					(0.66)					(0.60)

APPENDIX D

INTERACTIONS BETWEEN LRSS AND FAMILY INCOME

Table 23: Coefficients for WJ Letter-Word Identification for the Interactions between Middle Childhood Learning-Related Social Skills and Poverty in Earyl and Middle Childhood for the Un-imputed and the Imputed Analysis Samples – Based on 2-Level and 3-Level HLM

Average Intercept across Middle Childhood	2-level HLM Modeling				3-level HLM Modeling			
	Un-Imputed Data		Imputed Data		Un-Imputed Data		Imputed Data	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	MC LRSS X MC Pov	MC LRSS X EC Pov	MC LRSS X MC Pov	MC LRSS X EC Pov	MC LRSS X MC Pov	MC LRSS X EC Pov	MC LRSS X MC Pov	MC LRSS X EC Pov
Intercept	484.76***	484.80***	485.13***	485.15***	484.84***	484.85***	485.45***	485.46***
	(0.53)	(0.53)	(0.49)	(0.49)	(0.53)	(0.53)	(0.48)	(0.48)
Early Childhood LRSS								
Attention Problems	0.29	0.20	-0.75	-0.78	0.33	0.23	-0.58	-0.60

Table 23: (Continued)

(CBQ + CBCL)	(0.89)	(0.86)	(0.82)	(0.81)	(0.85)	(0.85)	(0.88)	(0.87)
Self-Regulation	1.03	1.03	0.09	0.09	1.14	1.12	0.84	0.86
(CBQ + SSRS)	(0.81)	(0.81)	(0.77)	(0.77)	(0.80)	(0.80)	(0.77)	(0.77)
Behavior Problems	-0.47	-0.39	-0.04	-0.02	-0.35	-0.28	0.06	0.09
(CBCL + SSRS)	(0.80)	(0.80)	(0.70)	(0.70)	(0.80)	(0.80)	(0.74)	(0.73)
Middle Childhood LRSS								
Avg Attention Problems	-0.66	-0.68	-0.67	-0.70	-0.66**	-0.71***	-0.74***	-0.77***
(TRF Attn Problems)	(0.19)	(0.19)	(0.18	(0.19)	(0.20)	(0.19)	(0.18)	(0.20)
Self-Regulation	-0.28	-0.18	-0.06	-0.15	-0.18	-0.10	-0.15	-0.19
(TRF Self-Control)	(0.35)	(0.36)	(0.33)	(0.36)	(0.36)	(0.36)	(0.35)	(0.37)
Behavior Problems	0.03	0.11	0.06	0.05	0.09	0.17	0.07	0.11
(TRF Externalizing Beh)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.15)	(0.14)	(0.15)
Early Demographics								
Maternal Age at 1 month	-0.15	-0.15	-0.15	-0.16	-0.14	-0.15	-0.16	-0.16
	(0.14)	(0.14)	(0.12)	(0.12)	(0.14)	(0.14)	(0.13)	(0.12)
Maternal Education at 1m	0.72*	0.70*	0.71**	0.72**	0.78*	0.75*	0.63*	0.63*
	(0.32)	(0.31)	(0.27)	(0.27)	(0.32)	(0.31)	(0.29)	(0.29)
Child Sex	0.24	0.32	-0.08	-0.07	0.45	0.54	0.14	0.18
	(1.13)	(1.14)	(1.00)	(1.00)	(1.12)	(1.13)	(1.01)	(1.01)
Child - Hispanic	1.00	1.06	1.27	1.27	1.09	1.14	0.69	0.74
	(2.56)	(2.53)	(2.16)	(2.13)	(2.56)	(2.53)	(2.25)	(2.16)
Child - Black	-0.37	-0.30	-2.09	-1.97	-0.96	-0.84	-2.00	-1.80
	(2.46)	(2.47)	(2.00)	(2.00)	(2.51)	(2.53)	(2.19)	(1.88)
Child - Birthweight	3.33	3.70	3.45	3.53	2.81	3.23	2.80	2.96
	(3.58)	(3.51)	(2.84)	(2.83)	(3.22)	(3.16)	(2.63)	(3.08)
Child – Age in grade 1	0.32*	0.33*	0.42**	0.43**	0.32*	0.34*	0.40**	0.41**
	(0.16)	(0.16)	(0.13)	(0.13)	(0.16)	(0.16)	(0.140	(0.14)
Child -Bayley 15 + 24m	0.16**	0.16**	0.23***	0.23***	0.17**	0.17**	0.22***	0.23***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.04)
Maternal PPVT 36 m	0.19***	0.18***	0.17***	0.17***	0.18***	0.17***	0.18***	0.18***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Residential Mobility during EC	0.38	0.37	-0.20	-0.22	0.37	0.34	-0.06	-0.08
	(0.49	(0.49)	(0.43)	(0.43)	(0.50)	(0.50)	(0.45)	(0.42)
Marital Transitions during EC	0.17	0.03	1.06	1.06	0.19	0.08	0.82	0.82
	(0.96)	(0.94)	(0.47)	(0.46)	(0.97)	(0.95)	(0.63)	(0.60)
Maternal Employment Hours during EC	-0.05	-0.04	-0.01	-0.01	-0.04	-0.04	-0.01	-0.01
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)

Table 23: (Continued)

Number of Children during EC	-2.07**	-2.08**	-2.07***	-2.08***	-1.90**	-1.91**	-1.84**	-1.83**
	(0.67)	(0.69)	(0.57)	(0.57)	(0.66)	(0.67)	(0.60)	(0.57)
Health of Child during EC	4.46**	4.43**	5.21***	5.14***	4.19**	4.17**	4.16**	4.11**
	(1.45)	(1.46)	(1.26)	(1.26)	(1.46)	(1.47)	(1.33)	(1.31)
Early Childhood Poverty 200%	-2.95	-24.08	-2.70	-21.89	-3.20	-29.25	-3.07	-23.70
	(1.72)	(29.54)	(1.51)	(21.57)	(1.78)	(31.24)	(1.74)	(28.23)
Middle Childhood Poverty 200%	-53.62	-4.86**	-18.25	-3.77*	-50.68	-4.83*	-27.28	-3.54*
	(33.30)	(1.84)	(32.78)	(1.59)	(33.58)	(1.91)	(31.53)	(1.65)
MC Attn X MC Poverty200	-0.15		-0.11		-0.21		-0.05	
	(0.34)		(0.38)		(0.34)		(0.34)	
MC SReg X MC Poverty200	1.54		0.60		1.54		0.81	
	(0.82)		(0.80)		(0.82)		(0.83)	
MC BP X Mc Poverty200	0.65		0.22		0.67*		0.28	
	(0.34)		(0.40)		(0.34)		(0.37)	
MC Attn X EC Poverty200		-0.02		-0.02		0.00		0.04
		(0.33)		(0.33)		(0.34)		(0.33)
MC SReg X EC Poverty200		0.81		0.72		0.97		0.77
		(0.73)		(0.66)		(0.77)		(0.77)
MC BP X EC Poverty200		0.20		0.19		0.22		0.13
		(0.31)		(0.34)		(0.32)		(0.31)
Level 2 Linear Slope								
(Between-children differences)								
Intercept	1.22***	1.22***	1.21***	1.21***	1.22***	1.22***	1.22***	1.22***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS								
Attention Problems	0.00	0.00	-0.01	-0.01	-0.00	-0.00	-0.00	-0.00
(CBQ + CBCL)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Self-Regulation	-0.02	-0.02	-0.00	-0.00	-0.02	-0.02	0.00	0.00
(CBQ + SSRS)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Behavior Problems	0.01	0.01	0.02	0.02	0.01	0.00	0.02	0.02
(CBCL + SSRS)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Middle Childhood LRSS								
Avg Attention Problems	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00

Table 23: (Continued)

(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.00	-0.00	0.00	0.00	0.00	-0.00	0.00	0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Early Demographics								
Maternal Age at 1 month	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal Education at 1m	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Child Sex	0.02	0.02	0.04	0.04	0.02	0.02	0.04	0.04
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Child - Hispanic	0.03	0.04	0.03	0.03	0.03	0.03	0.05	0.06
	(0.07)	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)	(0.06)
Child - Black	-0.02	-0.02	-0.04	-0.04	-0.02	-0.02	-0.02	-0.03
	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)
Child - Birthweight	0.01	0.01	0.03	0.03	0.02	0.01	0.03	0.02
	(0.09)	(0.09)	(0.07)	(0.07)	(0.09)	(0.09)	(0.08)	(0.08)
Child – Age in grade 1	-0.01*	-0.01*	-0.01**	-0.01**	-0.01*	-0.01*	-0.01***	-0.01***
	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Child -Bayley 15 + 24m	-0.00	-0.00	-0.00*	-0.00*	-0.00	-0.00	-0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal PPVT 36 m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Residential Mobility during EC	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Marital Transitions during EC	0.03	0.03	-0.00	0.00	0.02	0.02	0.02	0.02
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)
Maternal Employment Hours during EC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of Children during EC	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)
Health of Child during EC	-0.04	-0.04	-0.03	-0.03	-0.03	-0.04	-0.04	-0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Early Childhood Poverty200%	-0.01	0.09	0.05	0.71	-0.01	0.17	0.03	0.49
	(0.04)	(0.73)	(0.04)	(0.70)	(0.04)	(0.74)	(0.04)	(0.73)
Middle Childhood Poverty200%	0.56	0.05	0.61	0.02	0.55	0.05	0.87	0.02
	(0.82)	(0.05)	(0.78)	(0.04)	(0.81)	(0.05)	(0.86)	(0.05)

Table 23: (Continued)

MC Attn X MC Poverty200	-0.01		-0.00		-0.01		-0.01	
	(0.01)		(0.01)		(0.01)		(0.01)	
MC SReg X MC Poverty200	-0.01		-0.01		-0.01		-0.01	
	(0.02)		(0.02)		(0.02)		(0.02)	
MC BP X Mc Poverty200	0.00		-0.00		0.00		-0.00	
	(0.01)		(0.01)		(0.01)		(0.01)	
MC Attn X EC Poverty200		-0.01		-0.01		-0.01		-0.01
		(0.01)		(0.01)		(0.01)		(0.01)
MC SReg X EC Poverty200		-0.00		-0.00		-0.00		-0.00
		(0.02)		(0.02)		(0.02)		(0.02)
MC BP X EC Poverty200		0.00		-0.00		0.00		0.00
		(0.01)		(0.01)		(0.01)		(0.01)
Level 1 Slope								
(Time-varying variables and within-child change)								
Middle Childhood LRSS								
Attention Problems	0.11	0.10	0.06	0.06	0.11	0.10	0.05	0.05
	(0.08)	(0.07)	(0.06)	(0.06)	(0.08)	(0.08)	(0.06)	(0.06)
Self-Regulation	0.20	0.20	0.10	0.10	0.20	0.20	0.09	0.08
	(0.14)	(0.14)	(0.13)	(0.13)	(0.14)	(0.14)	(0.16)	(0.16)
Behavior Problems	0.12*	0.12*	0.04	0.04	0.12 tr.	0.13*	0.06	0.06
	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
Time-varying Covariates								
Poverty200	-0.02	-0.02	0.04	0.04	-0.07	-0.06	0.03	0.03
	(0.22)	(0.22)	(0.19)	(0.19)	(0.22)	(0.22)	(0.23)	(0.24)
Marital Status (yes/no)	-0.15	-0.15	0.43	0.43	-0.17	-0.17	0.80	0.81
	(0.64)	(0.65)	(0.49)	(0.50)	(0.64)	(0.65)	(0.52)	(0.53)
Child Health	1.13	1.15	1.98**	1.99**	1.13	1.15	2.05***	2.06***
	(0.68)	(0.68)	(0.56)	(0.56)	(0.68)	(0.68)	(0.54)	(0.54)
Number of Children	-1.32	-1.32	-0.90	-0.90	-1.31	-1.32	-0.55	-0.58
	(0.95)	(0.95)	(0.81)	(0.81)	(0.97)	(0.97)	(0.86)	(0.85)

Table 24: Coefficients for Picture Vocabulary for the Interactions between Middle Childhood Learning-Related Social Skills and Poverty in Early and Middle Childhood for the Un-imputed and the Imputed Analysis Samples – Based on 2-Level and 3-Level HLM

Average Intercept across Middle Childhood	2-level HLM Modeling				3-level HLM Modeling			
	Un-Imputed Data		Imputed Data		Un-Imputed Data		Imputed Data	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	MC LRSS X MC Pov	MC LRSS X EC Pov	MC LRSS X MC Pov	MCLRSS X EC Pov	MC LRSS X MC Pov	MCLRSS X EC Pov	MC LRSS X MC Pov	MC LRSS X EC Pov
Intercept	495.96***	495.96***	495.13***	495.13***	496.02***	496.02***	495.77***	495.77***
	(0.26)	(0.27)	(0.25)	(0.25)	(0.27)	(0.27)	(0.24)	(0.24)
Early Childhood LRSS								
Attention Problems	-0.65	-0.68	-0.84*	-0.82	-0.62	-0.67	-0.72	-0.71
(CBQ + CBCL)	(0.46)	(0.46)	(0.42)	(0.42)	(0.45)	(0.45)	(0.45)	(0.45)
Self-Regulation	0.21	0.21	0.04	0.05	0.26	0.26	0.28	0.28
(CBQ + SSRS)	(0.39)	(0.39)	(0.36)	(0.36)	(0.39)	(0.39)	(0.38)	(0.37)
Behavior Problems	0.47	0.46	0.39	0.38	0.54	0.51	0.49	0.48
(CBCL + SSRS)	(0.37)	(0.38)	(0.36)	(0.37)	(0.38)	(0.37)	(0.37)	(0.36)
Middle Childhood LRSS								
Avg Attention Problems	-0.09	-0.13	-0.06	-0.07	-0.04	-0.11	-0.12	-0.14
(TRF Attn Problems)	(0.11)	(0.18)	(0.10)	(0.12)	(0.11)	(0.11)	(0.10)	(0.11)
Self-Regulation	-0.11	-0.15	0.03	-0.01	-0.10	-0.14	-0.03	-0.07
(TRF Self-Control)	(0.19)	(0.19)	(0.16)	(0.18)	(0.19)	(0.19)	(0.17)	(0.18)
Behavior Problems	0.03	0.04	0.06	0.05	0.03	0.05	0.09	0.08
(TRF Externalizing Beh)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Early Demographics								
Maternal Age at 1 month	0.07	0.06	0.07	0.06	0.06	0.05	0.05	0.04
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)	(0.06)	(0.06)
Maternal Education at 1m	0.08	0.08	0.35*	0.35*	0.09	0.08	0.21	0.21
	(0.17)	(0.17)	(0.15)	(0.15)	(0.18)	(0.18)	(0.16)	(0.16)
Child Sex	3.72***	3.75***	3.06***	3.01***	3.92***	3.94***	3.30***	3.29***
	(0.58)	(0.58)	(0.51)	(0.51)	(0.58)	(0.58)	(0.52)	(0.52)

Table 24: (Continued)

Child - Hispanic	0.62	0.70	0.31	0.41	0.49	0.60	0.02	0.17
	(1.13)	(1.12)	(1.02)	(1.01)	(1.13)	(1.12)	(0.05)	(1.05)
Child - Black	-0.33	-0.28	-2.02*	-2.04*	-1.00	-0.82	-1.89	-1.85
	(1.14)	(1.15)	(1.00)	(1.00)	(1.11)	(1.13)	(1.00)	(0.99)
Child - Birthweight	3.34*	3.36*	2.67	2.74	3.11	3.18	2.66	2.76
	(1.69)	(1.72)	(1.39)	(1.41)	(1.59)	(1.63)	(1.40)	(1.43)
Child – Age in grade 1	0.23**	0.25**	0.27***	0.28***	0.24**	0.26**	0.26**	0.27***
	(0.08)	(0.08)	(0.07)	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)
Child -Bayley 15 + 24m	0.21***	0.21***	0.20***	0.20***	0.21***	0.21***	0.20	0.20
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Maternal PPVT 36 m	0.22***	0.23***	0.20***	0.20***	0.23***	0.22***	0.22***	0.22***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Residential Mobility during EC	0.17	0.14	0.06	0.03	0.17	0.13	0.08	0.06
	(0.22)	(0.22)	(0.20)	(0.21)	(0.21)	(0.21)	(0.19)	(0.19)
Marital Transitions during EC	-0.39	-0.42	0.25	0.27	-0.38	-0.41	0.11	0.13
	(0.39)	(0.39)	(0.22)	(0.22)	(0.39)	(0.39)	(0.25)	(0.26)
Maternal Employment Hours during EC	-0.00	0.00	-0.00	-0.00	0.00	0.01	0.00	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Number of Children during EC	-1.72***	-1.75***	-1.82***	-1.83***	-1.52***	-1.57***	-1.70***	-1.70***
	(0.36)	(0.36)	(0.32)	(0.32)	(0.34)	(0.35)	(0.31)	(0.31)
Health of Child during EC	2.19***	2.08**	1.88**	1.79**	1.94**	1.83*	1.65*	1.57*
	(0.73)	(0.73)	(0.64)	(0.64)	(0.71)	(0.72)	(0.66)	(0.66)
Early Childhood Poverty 200%	-1.65	-15.34	-1.29	6.52	-1.74*	-17.52	-1.60	-4.33
	(0.85)	(13.63)	(0.69)	(14.99)	(0.84)	(14.09)	(0.71)	(12.40)
Middle Childhood Poverty 200%	-10.73	-0.45	13.82	-0.58	-10.24	-0.46	1.67	-0.30
	(15.18)	(0.88)	(15.20)	(0.74)	(15.31)	(0.88)	(13.92)	(0.75)
MC Attn X MC Poverty200	-0.34		-0.28		-0.44**		-0.20	
	(0.17)		(0.20)		(0.16)		(0.17)	
MC SReg X MC Poverty200	0.66		0.12		0.76*		0.34	
	(0.38)		(0.36)		(0.39)		(0.35)	
MC BP X Mc Poverty200	0.36		-0.013		0.43**		0.07	
	(0.17)		(0.15)		(0.16)		(0.21)	
MC Attn X EC Poverty200		-0.19		-0.22		-0.21		-0.13
		(0.18)		(0.18)		(0.17)		(0.17)
MC SReg X EC Poverty200		0.66		0.20		0.77		0.37
		(0.34)		(0.34)		(0.35)		(0.32)

Table 24: (Continued)

MC BP X EC Poverty200		0.28		0.03		0.30		0.08
		(0.16)		(0.16)		(0.16)		(0.18)
Level 2 Linear Slope								
(Between-children differences)								
Intercept	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***	0.46***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS								
Attention Problems	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01
(CBQ + CBCL)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Self-Regulation	-0.02	-0.02	-0.02*	-0.02*	-0.02	-0.02	-0.02*	-0.02*
(CBQ + SSRS)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	-0.02*	-0.02*	-0.02*	-0.02*	-0.02*	-0.02*	-0.02*	-0.02*
(CBCL + SSRS)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Middle Childhood LRSS								
Avg Attention Problems	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Behavior Problems	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal Education at 1m	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Child Sex	-0.05**	-0.05*	-0.04**	-0.04**	-0.05**	-0.05**	-0.04**	-0.04**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Child - Hispanic	-0.02	-0.02	-0.00	-0.01	-0.02	-0.02	-0.00	-0.01
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Child - Black	0.00	0.00	-0.04	-0.04	-0.00	-0.00	-0.04	-0.04
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)
Child - Birthweight	-0.02	-0.02	-0.04	-0.04	-0.02	-0.02	-0.04	-0.04
	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)

Table 24: (Continued)

Child – Age in grade 1	-0.01***	-0.01***	-0.01***	-0.01***	-0.01**	-0.01**	-0.01**	-0.01**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Child -Bayley 15 + 24m	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal PPVT 36 m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Residential Mobility during EC	0.00	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Marital Transitions during EC		-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maternal Employment Hours during EC		0.00	0.00	0.00	0.00	0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of Children during EC		-0.00	-0.01	-0.01	-0.00	-0.00	-0.01	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Health of Child during EC		0.00	0.01	0.01	0.00	0.00	0.00	0.00
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Early Childhood Poverty200%	-0.01	0.05	0.01	0.18	-0.02	-0.04	-0.00	0.04
	(0.02)	(0.34)	(0.02)	(0.32)	(0.02)	(0.34)	(0.02)	(0.34)
Middle Childhood Poverty200%	0.35	0.01	0.22	0.00	0.39	0.01	0.42	0.01
	(0.37)	(0.02)	(0.40)	(0.02)	(0.37)	(0.02)	(0.48)	(0.02)
MC Attn X MC Poverty200	-0.00		0.00		-0.00		-0.00	
	(0.00)		(0.04)		(0.00)		(0.00)	
MC SReg X MC Poverty200	-0.01		-0.01		-0.01		-0.01	
	(0.01)		(0.01)		(0.01)		(0.01)	
MC BP X Mc Poverty200	-0.00		-0.00		-0.00		-0.00	
	(0.00)		(0.00)		(0.00)		(0.00)	
MC Attn X EC Poverty200		0.00		-0.00		0.00		-0.00
		(0.00)		(0.00)		(0.00)		(0.00)
MC SReg X EC Poverty200		-0.00		-0.01		-0.00		-0.00
		(0.01)		(0.01)		(0.01)		(0.01)
MC BP X EC Poverty200		-0.00		-0.01		-0.00		0.00
		(0.00)		(0.00)		(0.00)		(0.00)
Level 1 Slope								
(Time-varying variables and within-child change)								
Middle Childhood LRSS								
Attention Problems	0.02	0.02	0.06	0.06	0.02	0.02	0.05	0.05

Table 24: (Continued)

	(0.04)	(0.00)	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.04)
Self-Regulation	0.06	0.06	0.05	0.05	0.07	0.07	0.06	0.05
	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)
Behavior Problems	0.04	0.04	0.02	0.02	0.05	0.05	0.03	0.03
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Time-varying Covariates								
Poverty200	0.11	0.12	0.05	0.05	0.09	0.10	0.06	0.07
	(0.16)	(0.16)	(0.11)	(0.11)	(0.16)	(0.16)	(0.12)	(0.12)
Marital Status (yes/no)	-0.14	-0.15	-0.16	-0.15	-0.18	-0.19	-0.13	-0.12
	(0.34)	(0.34)	(0.23)	(0.24)	(0.34)	(0.34)	(0.25)	(0.25)
Child Health	-0.58	-0.57	-0.31	-0.31	-0.60	-0.58	-0.38	-0.37
	(0.31)	(0.31)	(0.25)	(0.25)	(0.31)	(0.31)	(0.26)	(0.26)
Number of Children	0.61	0.62	0.70	0.70	0.61	0.62	0.76	0.75
	(0.51)	(0.51)	(0.40)	(0.40)	(0.51)	(0.51)	(0.42)	(0.42)

Table 25: Coefficients for the WJ Applied Problems for the Interactions between Middle Childhood Learning-Related Social Skills and Poverty in Early and Middle Childhood for the Un-imputed and the Imputed Analysis Samples – Based on 2-Level and 3-Level HLM

Average Intercept across Middle Childhood	2-level HLM Modeling				3-level HLM Modeling			
	Un-Imputed Data		Imputed Data		Un-Imputed Data		Imputed Data	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	MC LRSS X MC Pov	MC LRSS X EC Pov	MC LRSS X MC Pov	MC LRSS X EC Pov	MC LRSS X MC Pov	MC LRSS X EC Pov	MC LRSS X MC Pov	MC LRSS X EC Pov
Intercept	492.32***	492.33***	492.04***	492.04***	492.37***	492.38***	492.63***	492.63***
	(0.33)	(0.33)	(0.31)	(0.31)	(0.33)	(0.33)	(0.30)	(0.30)
Early Childhood LRSS								
Attention Problems	-1.18*	-1.21*	-1.38*	-1.39*	-1.12 tr	-1.15*	-1.27*	-1.28*
(CBQ + CBCL)	(0.58)	(0.57)	(0.55)	(0.54)	(0.58)	(0.57)	(0.51)	(0.50)
Self-Regulation	0.78	0.80	0.19	0.21	0.82	0.83	0.38	0.41
(CBQ + SSRS)	(0.51)	(0.51)	(0.48)	(0.48)	(0.51)	(0.51)	(0.47)	(0.47)
Behavior Problems	0.69	0.74	0.65	0.66	0.72	0.78	0.66	0.68
(CBCL + SSRS)	(0.52)	(0.51)	(0.43)	(0.43)	(0.51)	(0.51)	(0.47)	(0.47)
Middle Childhood LRSS								
Avg Attention Problems	-0.62***	-0.69***	-0.56***	-0.58***	-0.61***	-0.69***	-0.62***	-0.64***
(TRF Attn Problems)	(0.12)	(0.12)	(0.11)	(0.12)	(0.12)	(0.12)	(0.13)	(0.13)
Self-Regulation	-0.17	-0.17	-0.11	-0.14	-0.19	-0.15	-0.17	-0.18
(TRF Self-Control)	(0.22)	(0.22)	(0.19)	(0.21)	(0.22)	(0.22)	(0.21)	(0.22)
Behavior Problems	0.11	0.16	0.10	0.12	0.11	0.17	0.12	0.17
(TRF Externalizing Beh)	(0.09)	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.09)
Early Demographics								
Maternal Age at 1 month	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03
	(0.08)	(0.08)	(0.07)	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)
Maternal Education at 1m	0.44*	0.42*	0.49**	0.49**	0.47*	0.45*	0.44*	0.44*
	(0.20)	(0.20)	(0.17)	(0.17)	(0.20)	(0.20)	(0.18)	(0.18)
Child Sex	3.46***	3.51***	2.72***	2.73***	3.68***	3.72***	3.31***	3.34***
	(0.71)	(0.71)	(0.62)	(0.62)	(0.71)	(0.71)	(0.64)	(0.64)
Child - Hispanic	-2.23	-2.20	-1.71	-1.76	-2.30	-2.26	-0.89	-0.87
	(1.41	(1.38)	(1.28)	(1.28)	(1.41)	(1.38	(1.28)	(1.28)

Table 25: (Continued)

Child - Black	-3.53*	-3.43*	-3.83**	-3.71**	-4.08*	-3.98*	-4.25**	-4.08**
	(1.53)	(1.54)	(1.28)	(1.27)	(1.56)	(1.58)	(1.37)	(1.37)
Child - Birthweight	1.34	1.58	0.59	0.64	1.16	1.44	0.61	0.68
	(1.88)	(1.83)	(1.52)	(1.51)	(1.92)	(1.86)	(1.58)	(1.55)
Child – Age in grade 1	0.49***	0.50***	0.44***	0.44***	0.51***	0.52***	0.45***	0.45***
	(0.10)	(0.10)	(0.08)	(0.08)	(0.10)	(0.10)	(0.09)	(0.09)
Child -Bayley 15 + 24m	0.26***	0.26***	0.27***	0.28***	0.25***	0.26***	0.28***	0.29***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Maternal PPVT 36 m	0.09**	0.08**	0.08**	0.08**	0.08**	0.08**	0.10***	0.10***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)
Residential Mobility during EC	0.02	0.05	-0.20	-0.20	0.04	0.06	-0.04	-0.02
	(0.30)	(0.30)	(0.28)	(0.28)	(0.30)	(0.30)	(0.26)	(0.26)
Marital Transitions during EC	0.33	0.28	0.57	0.57	0.32	0.27	0.70	0.69
	(0.56)	(0.55)	(0.31)	(0.31)	(0.56)	(0.55)	(0.36)	(0.35)
Maternal Employment Hours during EC	0.00	0.00	0.02	0.02	0.01	0.01	0.03	0.03
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Number of Children during EC	-0.22	-0.20	-0.47	-0.47	-0.15	-0.12	-0.19	-0.17
	(0.39)	(0.39	(0.34)	(0.34)	(0.39)	(0.39)	(0.35)	(0.35)
Health of Child during EC	0.79	0.81	1.18	1.17	0.71	0.74	1.06	1.06
	(0.92)	(0.93)	(0.79)	(0.79)	(0.91)	(0.92)	(0.82)	(0.82)
Early Childhood Poverty 200%	-1.01	-17.80	-0.76	-0.70	-1.13	-15.83	-0.10	-7.26
	(1.06)	(20.38)	(0.96)	(18.85)	(1.07)	(21.70)	(0.96)	(20.04)
Middle Childhood Poverty 200%	-21.93	-2.43*	-8.14	-2.75**	-23.71	-2.32*	-12.36	-2.56*
	(24.27)	(1.10)	(20.61)	(1.01)	(24.33)	(1.10)	(21.23)	(1.04)
MC Attn X MC Poverty200	0.02		-0.02		-0.03		-0.04	
	(0.24)		(0.22)		(0.25)		(0.24)	
MC SReg X MC Poverty200	0.49		0.18		0.59		0.30	
	(0.62)		(0.52)		(0.62)		(0.55)	
MC BP X Mc Poverty200	0.21		0.07		0.27		0.14	
	(0.23)		(0.22)		(0.22)		(0.22)	
MC Attn X EC Poverty200		0.25		0.05		0.23		0.06
		(0.23)		(0.22)		(0.24)		(0.21)
MC SReg X EC Poverty200		0.32		0.25		0.30		0.27
		(0.51)		(0.47)		(0.55)		(0.54)
MC BP X EC Poverty200		-0.03		-0.01		-0.05		-0.02
		(0.20)		(0.18)		(0.21)		(0.21)

Table 25: (Continued)

Level 2 Linear Slope								
(Between-children differences)								
Intercept	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***	0.84***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS								
Attention Problems	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
(CBQ + CBCL)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Self-Regulation	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
(CBQ + SSRS)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.02	-0.02	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02
(CBCL + SSRS)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Middle Childhood LRSS								
Avg Attention Problems	0.01	0.01	0.02	0.00	0.01	0.01	0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal Education at 1m	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Child Sex	-0.06**	-0.06**	-0.05**	-0.05**	-0.06**	-0.06**	-0.05**	-0.05**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Child - Hispanic	0.02	0.02	0.03	0.03	0.02	0.02	0.04	0.04
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)
Child - Black	-0.03	-0.02	-0.02	-0.02	-0.03	-0.03	-0.03	-0.02
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)
Child - Birthweight	-0.04	-0.03	-0.02	-0.02	-0.04	-0.03	-0.04	-0.04
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)
Child – Age in grade 1	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Table 25: (Continued)

Child -Bayley 15 + 24m	-0.00***	-0.00**	-0.00***	-0.00***	-0.00**	-0.00**	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maternal PPVT 36 m	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Residential Mobility during	-0.00	-0.00	-0.01	-0.01	-0.00	-0.00	-0.01	-0.01
EC	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Marital Transitions during	-0.01	-0.01	-0.00	-0.00	-0.01	-0.01	0.01	0.01
EC	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Maternal Employment Hours	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
during EC	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of Children during	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	-0.00
EC	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Health of Child during EC	0.01	0.01	0.00	0.00	0.00	0.01	-0.00	-0.01
	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Early Childhood	0.01	-0.61	-0.00	-0.33	0.01	-0.54	-0.01	-0.41
Poverty200%	(0.03)	(0.52)	(0.03)	(0.41)	(0.03)	(0.03)	(0.03)	(0.43)
Middle Childhood	-0.46	0.01	-0.29	-0.01	-0.51	0.01	-0.33	-0.01
Poverty200%	(0.58)	(0.03)	(0.44)	(0.03)	(0.57)	(0.03)	(0.47)	(0.03)
MC Attn X MC Poverty200	0.00		0.00		0.00		0.00	
	(0.01)		(0.01)		(0.01)		(0.01)	
MC SReg X MC Poverty200	0.01		0.01		0.01		0.01	
	(0.01)		(0.01)		(0.01)		(0.01)	
MC BP X Mc Poverty200	0.00		0.00		0.00		0.00	
	(0.01)		(0.01)		(0.01)		(0.01)	
MC Attn X EC Poverty200		0.00		-0.00		0.00		-0.00
		(0.01)		(0.01)		(0.01)		(0.00)
MC SReg X EC Poverty200		0.02		0.01		0.01		0.01
		(0.01)		(0.01)		(0.01)		(0.01)
MC BP X EC Poverty200		0.00		0.00		0.00		0.01
		(0.01)		(0.00)		(0.01)		(0.00)
Level 1 Slope								
(Time-varying variables and within-child change) Middle Childhood LRSS								
Attention Problems	0.02	0.02	0.04	0.04	0.02	0.03	0.04	0.04
	(0.05)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)

Table 25: (Continued)

Self-Regulation	0.18*	0.19*	0.12	0.12	0.18*	0.19*	0.12	0.12
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.11)	(0.11)
Behavior Problems	0.09*	0.09*	0.03	0.03	0.09*	0.09*	0.03	0.03
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)
Time-varying Covariates								
Poverty200	0.17	0.18	0.11	0.12	0.16	0.17	0.15	0.15
	(0.15)	(0.15)	(0.13)	(0.13)	(0.15)	(0.15)	(0.14)	(0.14)
Marital Status (yes/no)	0.12	0.10	0.11	0.11	0.12	0.09	0.30	0.30
	(0.47)	(0.47)	(0.34)	(0.35)	(0.47)	(0.45)	(0.36)	(0.36)
Child Health	0.22	0.22	0.34	0.34	0.21	0.21	0.36	0.37
	(0.43)	(0.45)	(0.38)	(0.37)	(0.45)	(0.45)	(0.39)	(0.39)
Number of Children	-0.28	-0.30	-0.07	-0.08	-0.27	-0.29	0.06	0.05
	(0.66)	(0.66)	(0.52)	(0.52)	(0.66)	(0.66)	(0.56)	(0.56)

APPENDIX E

CONDITIONAL GROWTH MODELS EXAMINED BY GENDER

Table 26: Coefficients for the WJ Letter-Word Identification for the Imputed (N=1123) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	484.27***	484.26***	484.49***	484.26***	484.41***	486.15***	486.06***	486.30***	486.06***	485.85***
	(0.76)	(0.76)	(0.81)	(0.76)	(0.74)	(0.72)	(0.72)	(0.75)	(0.71)	(0.67)
Early Childhood LRSS										
Attention Problems		-2.97*		-2.97*	-1.33		-2.22		-2.22	-0.06
(CBQ + CBCL)		(1.22)		(1.22)	(1.11)		(1.27)		(1.27)	(1.16)
Self-Regulation		2.19		2.19	-0.56		3.04*		3.04*	0.50
(CBQ + SSRS)		(1.18)		(1.18)	(1.15)		(1.19)		(1.19)	(1.01)
Behavior Problems		1.65		1.64	0.27		0.65		0.65	-0.81
(CBCL + SSRS)		(1.14)		(1.14)	(1.03)		(1.17)		(0.17)	(1.03)

Table 26: (Continued)

Middle Childhood								
LRSS								
Avg Attention Problems	-1.37***	-1.21***	-1.21***	-0.78***	-1.12***	-1.03***	-1.03***	-0.60**
(TRF Attn Problems)	(0.24)	(0.25)	(0.25)	(0.25)	(0.24)	(0.23)	(0.23)	(0.19)
Self-Regulation	0.56	0.50	0.50	-0.01	0.19	0.11	0.11	-0.02
(TRF Self-Control)	(0.55)	(0.55)	(0.55)	(0.47)	(0.55)	(0.51)	(0.51)	(0.47)
Behavior Problems	-0.05	0.02	0.02	-0.05	-0.13	-0.06	-0.06	0.19
(TRF Externalizing Beh)	(0.20)	(0.20)	(0.20)	(0.19)	(0.21)	(0.19)	(0.19)	(0.19)
Early Demographics								
Maternal Age at 1 month				-0.30				0.01
				(0.17)				(0.15)
Maternal Education at				-0.01				1.42***
1m				(0.37)				(0.35)
Child Sex								
Child - Hispanic				2.49				0.08
				(2.88)				(2.97)
Child - Black				-1.35				-3.08
				(2.94)				(2.49)
Child - Birthweight				1.80				5.16
				(3.95)				(3.62)
Child – Age in grade 1				0.50**				0.33
				(0.19				(0.18)
Child -Bayley 15 + 24m				0.17*				0.29***
				(0.07)				(0.06)
Maternal PPVT 36 m				0.27***				0.07
				(0.05)				(0.05)
Residential Mobility				-1.12				1.05
during EC				(0.58)				(0.59)
Marital Transitions				1.18				0.86
during EC				(0.64)				(0.65)
Maternal Employment				0.01				-0.04
Hours during EC				(0.05)				(0.05)
Number of Children				-1.72*				-2.37**
during EC				(0.79)				(0.75)
Health of Child during				6.87***				3.56*
EC				(1.83)				(1.69)

Table 26: (Continued)

Early Childhood Poverty 200%					-1.31 (1.99)					-4.61* (2.18)
Middle Childhood Poverty 200%					-36.00 (47.62)					-2.79 (2.18)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.24***	1.24***	1.24***	1.24***	1.22***	1.19***	1.19***	1.19***	1.19***	1.19***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Early Childhood LRSS										
Attention Problems		-0.00		-0.00	0.01		-0.02		-0.02	-0.02
(CBQ + CBCL)		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Self-Regulation		-0.01		-0.01	-0.00		-0.01		-0.01	0.00
(CBQ + SSRS)		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Behavior Problems		0.00		0.00	0.01		0.03		0.03	0.04
(CBCL + SSRS)		(0.03)		(0.03)	(0.03)		(0.02)		(0.02)	(0.02)
Middle Childhood LRSS										
Avg Attention Problems	0.06	0.01		0.01	0.01	0.00	0.00		0.00	-0.00
(TRF Attn Problems)	(0.01)	(0.01)		(0.01)	(0.01)	(0.00)	(0.00)		(0.00)	(0.01)
Self-Regulation	-0.00	-0.00		-0.00	-0.01	-0.00	-0.00		-0.00	-0.00
(TRF Self-Control)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)	(0.01)		(0.01)	(0.01)
Behavior Problems	0.01	0.01		0.00	0.01	-0.00	-0.00		-0.00	-0.00
(TRF Externalizing Beh)	(0.01)	(0.01)		(0.01)	(0.01)	(0.00)	(0.00)		(0.00)	(0.00)
Early Demographics										
Maternal Age at 1 month					0.00 (0.00)					0.01 (0.00)
Maternal Education at 1m					0.00 (0.01)					-0.02* (0.01)
Child Sex										
Child - Hispanic					0.10 (0.08)					-0.06 (0.09)
Child - Black					-0.12* (0.06)					0.03 (0.06)

Table 26: (Continued)

Child - Birthweight					0.11					-0.06
					(0.14)					(0.09)
Child – Age in grade 1					-0.01**					-0.01
					(0.00)					(0.00)
Child -Bayley 15 + 24m					-0.00					-0.00**
					(0.00)					(0.00)
Maternal PPVT 36 m					0.00					0.00
					(0.00)					(0.00)
Residential Mobility during EC					0.01					-0.04*
					(0.01)					(0.02)
Marital Transitions during EC					-0.02					0.03
					(0.02)					(0.02)
Maternal Employment Hours during EC					0.00					-0.00
					(0.00)					(0.00)
Number of Children during EC					0.03					-0.02
					(0.02)					(0.02)
Health of Child during EC					-0.04					-0.02
					(0.04)					(0.04)
Early Childhood Poverty200%					0.01					0.10
					(0.06)					(0.06)
Middle Childhood Poverty200%					1.18					0.01
					(1.04)					(0.06)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.06	0.06	0.07			0.05	0.04	0.04
			(0.11)	(0.11)	(0.11)			(0.07)	(0.07)	(0.07)
Self-Regulation			0.21	0.20	0.24			-0.01	-0.02	-0.02
			(0.20)	(0.20)	(0.17)			(0.19)	(0.19)	(0.18)
Behavior Problems			0.09	0.09	0.10			-0.00	0.00	0.00
			(0.10)	(0.10)	(0.09)			(0.07)	(0.07)	(0.06)

Table 26: (Continued)

Time-varying Covariates		
Poverty200	0.37	-0.14
	(0.30)	(0.24)
Marital Status (yes/no)	0.69	0.07
	(0.60)	(0.66)
Child Health	2.95**	1.06
	(0.92)	(0.68)
Number of Children	0.09	-1.45
	(1.25)	(1.08)

Table 27: Coefficients for WJ Picture Vocabulary for the Imputed (N=1123) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	496.42*** (0.43)	496.39*** (0.42)	496.53*** (0.45)	496.39*** (0.42)	495.97*** (0.34)	494.73*** (0.46)	494.68*** (0.46)	494.83*** (0.48)	494.68*** (0.45)	
Early Childhood LRSS										
Attention Problems (CBQ + CBCL)		-2.52* (0.84)		-2.52*	-0.73 (0.58)		-2.78** (0.77)		-2.78** (0.76)	
Self-Regulation (CBQ + SSRS)		1.81** (0.65)		1.81*	0.02 (0.48)		1.85* (0.73)		1.85** (0.71)	
Behavior Problems (CBCL + SSRS)		1.64* (0.63)		1.64**	0.20 (0.54)		1.49* (0.69)		1.49*** (0.68)	
Middle Childhood LRSS										
Avg Attention Problems (TRF Attn Problems)	-0.59*** (0.14)	-0.46** (0.14)		-0.46**	-0.14 (0.12)	-0.64*** (0.17)	-0.56*** (0.15)		-0.56*** (0.14)	
Self-Regulation (TRF Self-Control)	0.51 (0.27)	0.46 (0.26)		0.46	0.12 (0.19)	0.12 (0.38)	0.07 (0.34)		0.07 (0.32)	
Behavior Problems (TRF Externalizing Beh)	-0.03 (0.11)	0.02 (0.11)		0.02	0.08 (0.08)	-0.16 (0.15)	-0.13 (0.13)		-0.13 (0.13)	
Early Demographics										
Maternal Age at 1 month					0.06 (0.07)					
Maternal Education at 1m					0.13 (0.20)					
Child Sex										
Child - Hispanic					1.10 (1.32)					
Child - Black					-1.17 (1.32)					
Child - Birthweight					4.28 (2.62)					

Table 27: (Continued)

Child – Age in grade 1					0.28**					
					(0.09)					
Child -Bayley 15 + 24m					0.18					
					(0.03)					
Maternal PPVT 36 m					0.22***					
					(0.03)					
Residential Mobility during EC					-0.09					
					(0.26)					
Marital Transitions during EC					0.39					
					(0.29)					
Maternal Employment Hours during EC					-0.01					
					(0.03)					
Number of Children during EC					-1.32**					
					(0.41)					
Health of Child during EC					1.56					
					(0.88)					
Early Childhood Poverty 200%					-1.37					
					(0.89)					
Middle Childhood Poverty 200%					-1.11					
					(1.06)					
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.44***	0.44***	0.44***	0.44***	0.44***	0.48***	0.48***	0.48***	0.48***	0.47***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		-0.00		0.00	0.00		0.02		0.02	0.03
(CBQ + CBCL)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.02)
Self-Regulation		-0.02		-0.02	-0.02		-0.02		-0.02	-0.03
(CBQ + SSRS)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Behavior Problems		-0.02		-0.02	-0.02		-0.02		-0.02	-0.02
(CBCL + SSRS)		(0.01)		(0.01)	(0.01)		(0.01)		(0.01)	(0.01)
Middle Childhood LRSS										

Table 27: (Continued)

Avg Attention Problems	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				-0.00				0.01
1m				(0.01)				(0.00)
Child Sex								
Child - Hispanic				0.00				-0.03
				(0.04)				(0.03)
Child - Black				-0.06				-0.01
				(0.04)				(0.03)
Child - Birthweight				0.02				-0.07
				(0.07)				(0.06)
Child – Age in grade 1				-0.01**				-0.01**
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.01
during EC				(0.01)				(0.01)
Marital Transitions				-0.00				-0.01
during EC				(0.01)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				-0.00				-0.02
during EC				(0.01)				(0.01)
Health of Child during				0.01				0.01
EC				(0.03)				(0.02)
Early Childhood				-0.01				0.02
Poverty200%				(0.03)				(0.03)

Table 27: (Continued)

Middle Childhood Poverty200%					0.04 (0.03)					-0.02 (0.03)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.04 (0.05)	0.04 (0.05)	0.05 (0.05)			0.06 (0.04)	0.07 (0.04)	0.07 (0.04)
Self-Regulation			0.07 (0.07)	0.07 (0.07)	0.08 (0.07)			0.03 (0.09)	0.03 (0.09)	0.04 (0.09)
Behavior Problems			0.03 (0.03)	0.03 (0.03)	0.03 (0.03)			0.00 (0.04)	0.01 (0.04)	0.01 (0.03)
Time-varying Covariates										
Poverty200					0.33 (0.17)					-0.16 (0.14)
Marital Status (yes/no)					0.12 (0.35)					-0.35 (0.35)
Child Health					-0.15 (0.37)					-0.43 (0.35)
Number of Children					0.40 (0.62)					0.81 (0.54)

Table 28: Coefficients for WJ Applied Problems for the Imputed (N=1123) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	493.93***	492.90***	493.06***	492.90***	492.69***	491.63***	491.57***	491.75***	491.57***	491.34***
	(0.53)	(0.51)	(0.56)	(0.51)	(0.47)	(0.46)	(0.45)	(0.49)	(0.45)	(0.40)
Early Childhood LRSS										
Attention Problems		-2.97*		-2.97**	-1.61		-2.82**		-2.82***	-1.19
(CBQ + CBCL)		(1.18)		(1.18)	(0.83)		(0.78)		(0.78)	(0.72)
Self-Regulation		1.84*		1.84*	0.24		1.92*		1.92*	0.15
(CBQ + SSRS)		(0.87)		(0.87)	(0.75)		(0.75)		(0.75)	(0.60)
Behavior Problems		2.26**		2.26**	1.36		1.06		1.06	-0.22
(CBCL + SSRS)		(0.80)		(0.80)	(0.70)		(0.76)		(0.76)	(0.70)
Middle Childhood LRSS										
Avg Attention Problems	-0.96***	-0.83***		-0.83***	-0.47**	-1.03***	-0.94***		-0.94***	-0.64***
(TRF Attn Problems)	(0.16)	(0.17)		(0.17)	(0.14)	(0.17)	(0.15)		(0.15)	(0.12)
Self-Regulation	0.43	0.39		0.39	0.03	0.08	0.01		-0.01	-0.15
(TRF Self-Control)	(0.32)	(0.33)		(0.33)	(0.26)	(0.34)	(0.30)		(0.30)	(0.24)
Behavior Problems	-0.01	0.05		0.05	0.08	-0.02	0.02		0.02	0.17
(TRF Externalizing Beh)	(0.14)	(0.14)		(0.14)	(0.11)	(0.12)	(0.11)		(0.11)	(0.10)
Early Demographics										
Maternal Age at 1 month					0.04					0.06
					(0.10)					(0.09)
Maternal Education at 1m					0.26					0.75**
					(0.23)					(0.22)
Child Sex										
Child - Hispanic					-2.22					-0.97
					(1.79)					(1.80)
Child - Black					-4.17*					-3.77*
					(1.94)					(1.50)
Child - Birthweight					1.59					0.02
					(1.96)					(2.22)

Table 28: (Continued)

Child – Age in grade 1					0.53***					0.37**
					(0.12)					(0.11)
Child -Bayley 15 + 24m					0.23***					0.31***
					(0.05)					(0.04)
Maternal PPVT 36 m					0.11**					0.05
					(0.03)					(0.03)
Residential Mobility					-0.59					0.46
during EC					(0.37)					(0.37)
Marital Transitions					0.82					0.32
during EC					(0.43)					(0.41)
Maternal Employment					0.04					-0.01
Hours during EC					(0.03)					(0.03)
Number of Children					-0.47					-0.55
during EC					(0.51)					(0.45)
Health of Child during					2.25					-0.06
EC					(1.22)					(1.03)
Early Childhood Poverty					0.20					-2.13
200%					(1.31)					(1.32)
Middle Childhood					-4.86**					-0.55
Poverty 200%					(1.55)					(1.25)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.82***	0.82***	0.82***	0.82***	0.82***	0.86***	0.86***	0.86***	0.86***	0.85***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		0.03		0.03	0.02		0.02		0.02	0.01
(CBQ + CBCL)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.01		-0.01	-0.00		-0.03*		-0.04*	-0.02
(CBQ + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Behavior Problems		-0.03		-0.03	-0.03		-0.01		-0.01	0.00
(CBCL + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Middle Childhood LRSS										

Table 28: (Continued)

Avg Attention Problems	0.01*	0.01*	0.01*	0.01	0.00	0.00	0.00	-0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				0.00				-0.01
1m				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.09*				-0.04
				(0.04)				(0.05)
Child - Black				-0.03				-0.02
				(0.04)				(0.05)
Child - Birthweight				0.06				-0.04
				(0.07)				(0.06)
Child – Age in grade 1				-0.01***				-0.01*
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00**				-0.01***
				(0.00)				(0.00)
Maternal PPVT 36 m				-0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.00				-0.02
during EC				(0.01)				(0.01)
Marital Transitions				-0.00				-0.00
during EC				(0.01)				(0.01)
Maternal Employment				-0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.01				-0.01
during EC				(0.01)				(0.01)
Health of Child during				-0.01				0.01
EC				(0.03)				(0.03)

Table 28: (Continued)

Early Childhood Poverty200%					-0.01 (0.04)					0.02 (0.04)
Middle Childhood Poverty200%					0.01 (0.04)					-0.02 (0.04)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			-0.00 (0.06)	-0.00 (0.06)	0.00 (0.05)			0.07 (0.06)	0.07 (0.06)	0.07 (0.06)
Self-Regulation			0.18 (0.11)	0.18 (0.10)	0.21* (0.10)			0.05 (0.13)	0.05 (0.13)	0.05 (0.12)
Behavior Problems			0.05 (0.05)	0.05 (0.05)	0.05 (0.04)			0.00 (0.05)	0.01 (0.05)	0.01 (0.05)
Time-varying Covariates										
Poverty200					-0.08 (0.21)					0.21 (0.17)
Marital Status (yes/no)					0.40 (0.46)					-0.36 (0.49)
Child Health					0.37 (0.56)					0.34 (0.53)
Number of Children					0.53 (0.72)					-0.67 (0.81)

Table 29: Coefficients for the WJ Letter-Word Identification for the Un-imputed (N=886) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	484.71***	484.74***	483.96***	484.02***	483.99***	486.83***	486.83***	485.87***	485.87***	485.59***
	(0.85)	(0.83)	(0.93)	(0.86)	(0.79)	(0.79)	(0.77)	(0.83)	(0.76)	(0.70)
Early Childhood LRSS										
Attention Problems		-2.96*		-3.00*	-0.37		-0.47		-0.21	0.94
(CBQ + CBCL)		(1.20)		(1.23)	(1.78)		(1.31)		(1.33)	(1.19)
Self-Regulation		1.89		2.00	0.24		4.03**		4.2**	1.62
(CBQ + SSRS)		(1.25)		(1.30)	(1.24)		(1.18)		(1.20)	(0.97)
Behavior Problems		1.48		1.65	0.02		1.21		0.14	-0.97
(CBCL + SSRS)		(1.16)		(1.17)	(1.11)		(1.30)		(1.32)	(1.09)
Middle Childhood LRSS										
Avg Attention Problems	-1.29***	-1.27***		-1.15***	-0.84**	-1.03***	-0.94***		-0.97***	-0.56**
(TRF Attn Problems)	(0.25)	(0.25)		(0.26)	(0.25)	(0.22)	(1.30)		(0.23)	(0.21)
Self-Regulation	0.76	0.77		0.62	0.16	-0.01	0.03		-0.06	0.15
(TRF Self-Control)	(0.51)	(0.50)		(0.52)	(0.46)	(0.47)	(0.48)		(0.49)	(0.43)
Behavior Problems	0.07	0.17		0.13	0.13	-0.05	0.04		0.01	0.28
(TRF Externalizing Beh)	(0.22)	(0.21)		(0.22)	(0.20)	(0.19)	(0.18)		(0.18)	(0.16)
Early Demographics										
Maternal Age at 1 month					-0.31					0.04
					(0.19)					(0.19)
Maternal Education at 1m					0.17					1.55***
					(0.46)					(0.41)
Child Sex										
Child - Hispanic					-0.21					3.18
					(3.30)					(3.33)
Child - Black					-1.45					2.20
					(3.41)					(3.32)

Table 29: (Continued)

Child - Birthweight					0.09					6.19
					(3.40)					(4.69)
Child – Age in grade 1					0.32					0.32
					(0.23)					(0.21)
Child -Bayley 15 + 24m					0.09					0.27***
					(0.07)					(0.06)
Maternal PPVT 36 m					0.28***					0.09
					(0.07)					(0.05)
Residential Mobility during EC					-0.24					1.09
					(0.66)					(0.76)
Marital Transitions during EC					-0.61					1.31
					(1.29)					(1.15)
Maternal Employment Hours during EC					-0.03					-0.07
					(0.06)					(0.05)
Number of Children during EC					-0.93					-3.39***
					(0.87)					(0.89)
Health of Child during EC					6.11**					2.67
					(2.12)					(1.92)
Early Childhood Poverty 200%					-1.94					-4.85
					(2.43)					(2.50)
Middle Childhood Poverty 200%					-5.77*					-3.37*
					(2.87)					(2.23)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.23***	1.23***	1.23***	1.23***	1.22***	1.20***	1.19***	1.20***	1.20***	1.20***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Early Childhood LRSS										
Attention Problems (CBQ + CBCL)		-0.00		-0.01	0.01		-0.01		-0.01	0.00
		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Self-Regulation (CBQ + SSRS)		-0.01		-0.02	-0.01		-0.02		-0.02	-0.01
		(0.03)		(0.03)	(0.03)		(0.02)		(0.02)	(0.03)
Behavior Problems (CBCL + SSRS)		-0.01		-0.00	-0.01		0.03		0.02	0.02
		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)

Table 29: (Continued)

Middle Childhood								
LRSS								
Avg Attention Problems	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00
(TRF Attn Problems)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Self-Regulation	0.00	0.00	0.00	-0.01	-0.01	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.01	0.01	0.01	0.01	-0.01	-0.01	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				0.00				0.01
				(0.00)				(0.00)
Maternal Education at				0.0				-0.02
1m				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.11				-0.09
				(0.10)				(0.08)
Child - Black				-0.10				0.09
				(0.07)				(0.07)
Child - Birthweight				0.14				-0.15
				(0.14)				(0.09)
Child – Age in grade 1				-0.01*				-0.00
				(0.01)				(0.00)
Child -Bayley 15 + 24m				0.00				-0.00
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.06
during EC				(0.02)				(0.02)
Marital Transitions				-0.01				0.08**
during EC				(0.03)				(0.03)
Maternal Employment				0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.03				-0.02
during EC				(0.02)				(0.02)

Table 29: (Continued)

Health of Child during EC					-0.03 (0.05)					-0.05 (0.05)
Early Childhood Poverty200%					-0.02 (0.06)					0.01 (0.05)
Middle Childhood Poverty200%					0.04 (0.07)					0.07 (0.05)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.17 (0.10)	0.17 (0.10)	0.20* (0.10)			0.06 (0.09)	0.05 (0.09)	-0.03 (0.10)
Self-Regulation			0.35 (0.21)	0.35 (0.21)	0.40 (0.21)			0.08 (0.16)	0.06 (0.16)	0.12 (0.17)
Behavior Problems			0.15 (0.10)	0.14 (0.10)	0.20* (0.09)			0.03 (0.08)	0.04 (0.08)	0.09 (0.08)
Time-varying Covariates										
Poverty200					0.28 (0.34)					-0.17 (0.27)
Marital Status (yes/no)					0.70 (0.70)					-0.98 (1.04)
Child Health					2.38* (1.61)					0.25 (0.82)
Number of Children					0.30 (1.61)					-2.12 (1.20)

Table 30: Coefficients for the WJ Picture Vocabulary for the Un-imputed (N=886) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	496.86***	496.87***	496.75***	496.77***	496.91***	495.17***	495.17***	495.15***	495.16***	485.13***
	(0.48)	(0.48)	(0.51)	(0.48)	(0.36)	(0.50)	(0.48)	(0.52)	(0.59)	(0.49)
Early Childhood LRSS										
Attention Problems		-2.70***		-2.70***	-0.23		-2.38**		-2.16*	-0.79
(CBQ + CBCL)		(0.64)		(0.66)	(0.60)		(0.83)		(0.85)	
Self-Regulation		1.51*		1.55*	0.15		2.15**		2.24**	0.07
(CBQ + SSRS)		0.67)		(0.68)	(0.52)		(0.72)		(0.73)	
Behavior Problems		1.76**		1.85**	0.14		1.59*		1.71*	-0.02
(CBCL + SSRS)		(0.63)		(0.65)	(0.50)		(0.78)		(0.79)	
Middle Childhood LRSS										
Avg Attention Problems	-0.58***	-0.45**		-0.47**	-0.21	-0.60**	-0.48**		-0.50**	-0.71***
(TRF Attn Problems)	(0.15)	(0.14)		(0.14)	(0.11)	(0.17)	(0.16)		(0.17)	
Self-Regulation	0.45	0.47		0.48	0.04	0.02	0.10		0.01	0.08
(TRF Self-Control)	(0.29)	(0.14)		(0.30)	(0.22)	(0.32)	(0.32)		(0.32)	
Behavior Problems	0.05	0.13		0.14	0.16	-0.06	-0.00		-0.02	0.10
(TRF Externalizing Beh)	(0.12)	(0.12)		(0.12)	(0.09)	(0.13)	(0.12)		(0.12)	
Early Demographics										
Maternal Age at 1 month					0.02					-0.15
					(0.09)					(0.12)
Maternal Education at 1m					-0.09					0.70**
					(0.24)					(0.26)
Child Sex										-0.08
										(0.99)
Child - Hispanic					0.48					1.39
					(1.28)					(2.14)
Child - Black					-0.42					-2.06
					(1.50)					(1.96)
Child - Birthweight					2.58					3.6

Table 30: (Continued)

					(2.73)					(2.84)
Child – Age in grade 1					0.20					0.42**
					(0.11)					(0.13)
Child -Bayley 15 + 24m					0.18***					0.23***
					(2.73)					(0.05)
Maternal PPVT 36 m					0.24***					0.17***
					(0.03)					(0.04)
Residential Mobility					0.22					-0.21
during EC					(0.27)					(0.42)
Marital Transitions					-0.58					1.02*
during EC					(0.52)					(0.46)
Maternal Employment					-0.03					-0.01
Hours during EC					(0.03)					(0.04)
Number of Children					-0.88					-2.07***
during EC					(0.47)					(0.56)
Health of Child during					1.33					5.20***
EC					(1.03)					(1.23)
Early Childhood Poverty					-2.82*					-2.69
200%					(1.17)					(1.51)
Middle Childhood					-1.20					-3.77*
Poverty 200%					(1.19)					(1.60)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.44***	0.44***	0.44***	0.44***	0.44***	0.48***	0.48***	0.48***	0.48***	1.20***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		-0.01		-0.00	-0.00		0.02		0.03*	-0.01
(CBQ + CBCL)		(0.01)		(0.01)	(0.01)		(0.02)		(0.02)	
Self-Regulation		-0.02		-0.02	-0.02		-0.01		-0.02	-0.01
(CBQ + SSRS)		(0.01)		(0.02)	(0.02)		(0.01)		(0.01)	
Behavior Problems		-0.01		-0.02	-0.02		-0.02		-0.03	0.02
(CBCL + SSRS)		(0.01)		(0.02)	(0.02)		(0.01)		(0.01)	
Middle Childhood										

Table 30: (Continued)

LRSS								
Avg Attention Problems	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	0.00
(TRF Attn Problems)	(0.00)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Self-Regulation	-0.00	-0.00	0.00	-0.00	-0.01	-0.01	-0.01	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	
Behavior Problems	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	
Early Demographics								
Maternal Age at 1 month				-0.00				0.01
				(0.00)				(0.00)
Maternal Education at				0.00				-0.01
1m				(0.01)				(0.01)
Child Sex								0.04
								(0.02)
Child - Hispanic				-0.03				0.03
				(0.04)				(0.06)
Child - Black				-0.02				-0.05
				(0.04)				(0.04)
Child - Birthweight				0.01				0.03
				(0.06)				(0.07)
Child – Age in grade 1				-0.01*				-0.01***
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.003
				(0.00)				(0.001)
Maternal PPVT 36 m				-0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.01
during EC				(0.01)				(0.01)
Marital Transitions				0.01				-0.00
during EC				(0.01)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				-0.00				0.01
during EC				(0.01)				(0.01)
Health of Child during				-0.01				-0.03
EC				(0.03)				(0.02)

Table 30: (Continued)

Early Childhood Poverty200%					-0.04 (0.03)					
Middle Childhood Poverty200%					0.05 (0.03)					
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.07	0.06	0.04			0.02	0.02	-0.00
			(0.05)	(0.05)	(0.05)			(0.05)	(0.05)	(0.05)
Self-Regulation			0.06	0.06	0.05			0.08	0.09	0.09
			(0.08)	(0.08)	(0.05)			(0.08)	(0.08)	(0.09)
Behavior Problems			0.04	0.04	0.05			0.03	0.03	0.04
			(0.04)	(0.04)	(0.04)			(0.04)	(0.04)	(0.04)
Time-varying Covariates										
Poverty200					0.51**					-0.26
					(0.17)					(0.19)
Marital Status (yes/no)					0.52					-0.54
					(0.43)					(0.53)
Child Health					-0.68					0.43
					(0.46)					(0.42)
Number of Children					0.22					0.53
					(0.85)					(0.64)

Table 31: Coefficients for WJ Applied Problems for the Un-imputed (N=886) Analysis Samples Based on 2-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty	Model 1 Between MC LRSS at level 2	Model 2 Between with EC LRSS	Model 3 Within MCLRSS at level 1	Model 4 Between - within	Model 5 Full model w Poverty
Intercept	493.53***	493.55***	493.00***	493.04***	493.04***	492.29***	492.29***	491.80***	491.80***	491.57***
	(0.58)	(0.56)	(0.63)	(0.57)	(0.50)	(0.50)	(0.48)	(0.56)	(0.50)	(0.43)
Early Childhood LRSS										
Attention Problems		-3.22**		-3.13***	-1.30		-1.96*		-1.73*	-1.04
(CBQ + CBCL)		(0.91)		(0.94)	(0.81)		(0.84)		(0.86)	(0.76)
Self-Regulation		1.29**		1.48	0.59		2.59***		2.93***	0.93
(CBQ + SSRS)		(0.88)		(0.90)	(0.81)		(0.70)		(0.71)	(0.62)
Behavior Problems		2.46**		2.50**	1.49*		0.99		0.95	-0.06
(CBCL + SSRS)		(0.81)		(0.83)	(0.73)		(0.83)		(0.86)	(0.72)
Middle Childhood LRSS										
Avg Attention Problems	-0.98***	-0.85***		-0.89***	-0.52***	-1.01***	-0.90***		-0.90***	-0.66***
(TRF Attn Problems)	(0.17)	(0.17)		(0.17)	(0.16)	(0.13)	(0.14)		(0.14)	(0.14)
Self-Regulation	0.27	0.29		0.22	-0.19	0.11	0.17		0.13	0.09
(TRF Self-Control)	(0.34)	(0.33)		(0.35)	(0.29)	(0.33)	(0.32)		(0.34)	(0.29)
Behavior Problems	0.01	0.08		0.09	0.05	0.11	0.19		0.16	0.29
(TRF Externalizing Beh)	(0.15)	(0.14)		(0.15)	(0.12)	(0.12)	(0.11)		(0.11)	(0.10)
Early Demographics										
Maternal Age at 1 month					0.01					0.07
					(0.11)					(0.11)
Maternal Education at 1m					0.13					0.83**
					(0.27)					(0.26)
Child Sex										
Child - Hispanic					-2.47					-1.35
					(1.80)					(2.13)
Child - Black					-5.39*					-1.60
					(2.23)					(2.02)

Table 31: (Continued)

Child - Birthweight					-1.46					3.11
					(1.77)					(2.79)
Child – Age in grade 1					0.53**					0.49**
					(0.15)					(0.14)
Child -Bayley 15 + 24m					0.18***					0.34***
					(0.04)					(0.04)
Maternal PPVT 36 m					0.11**					0.05
					(0.04)					(0.03)
Residential Mobility					-0.12					0.22
during EC					(0.39)					(0.50)
Marital Transitions					0.72					0.28
during EC					(0.75)					(0.73)
Maternal Employment					0.03					-0.03
Hours during EC					(0.04)					(0.03)
Number of Children					0.34					-0.74
during EC					(0.52)					(0.53)
Health of Child during					2.56					0.94
EC					(1.40)					(1.15)
Early Childhood Poverty					-0.14					-2.20
200%					(1.48)					(1.57)
Middle Childhood					-5.04**					0.03
Poverty 200%					(1.65)					(1.46)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.82***	0.82***	0.82***	0.82***	0.82***	0.85***	0.85***	0.86***	0.86***	0.85***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		0.02		0.01	0.01		0.03		0.03	0.03
(CBQ + CBCL)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.01		-0.02	-0.01		-0.02		-0.02	-0.02
(CBQ + SSRS)		(0.02)		(0.02)	(0.02)		(0.01)		(0.02)	(0.02)
Behavior Problems		-0.03*		-0.03	-0.03		-0.01		-0.01	-0.02
(CBCL + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)

Table 31: (Continued)

Middle Childhood								
LRSS								
Avg Attention Problems	0.01***	0.01**	0.01**	0.01**	0.00	0.00	0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	0.00	0.00	0.01	0.00	-0.00	-0.00	-0.00	-0.01
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.01*
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				0.00
				(0.00)				(0.00)
Maternal Education at				0.00				-0.01
1m				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.11*				-0.11*
				(0.05)				(0.05)
Child - Black				-0.00				-0.06
				(0.05)				(0.05)
Child - Birthweight				0.07				-0.10
				(0.08)				(0.06)
Child – Age in grade 1				-0.01***				-0.01
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00***
				(0.00)				(0.00)
Maternal PPVT 36 m				-0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.00				-0.02
during EC				(0.01)				(0.01)
Marital Transitions				-0.02				0.01
during EC				(0.02)				(0.02)
Maternal Employment				-0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.01				-0.02
during EC				(0.01)				(0.01)
Health of Child during				-0.00				0.02
EC				(0.03)				(0.03)

Table 31: (Continued)

Early Childhood Poverty200%					0.02 (0.04)					0.02 (0.04)
Middle Childhood Poverty200%					0.01 (0.05)					0.02 (0.04)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.06 (0.07)	0.06 (0.07)	0.04 (0.07)			0.09 (0.07)	0.08 (0.07)	0.02 (0.07)
Self-Regulation			0.27* (0.12)	0.26* (0.12)	0.28* (0.12)			0.07 (0.13)	0.07 (0.13)	0.13 (0.13)
Behavior Problems			0.07 (0.06)	0.07 (0.06)	0.11 (0.06)			0.05 (0.05)	0.05 (0.05)	0.07 (0.06)
Time-varying Covariates										
Poverty200					-0.18 (0.20)					0.38* (0.19)
Marital Status (yes/no)					0.86 (0.63)					-0.84 (0.62)
Child Health					0.32 (0.65)					0.22 (0.58)
Number of Children					1.07 (1.05)					-0.95 (0.83)

Table 32: Coefficients for WJ Letter-Word Identification for the Imputed (N=1123) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	484.65***	484.68***	484.66***	484.67***	484.62***	486.26***	486.25***	486.26***	486.25***	486.39***
	(0.79)	(0.78)	(0.84)	(0.78)	(0.71)	(0.74)	(0.73)	(0.79)	(0.73)	(0.64)
Early Childhood LRSS										
Attention Problems		-3.14*		-3.12*	-1.08		-2.28		-2.28	0.22
(CBQ + CBCL)		(1.29)		(1.30)	(1.20)		(1.39)		(1.39)	(1.28)
Self-Regulation		2.43*		2.40 tr	0.08		3.17*		3.17*	0.80
(CBQ + SSRS)		(1.24)		(1.23)	(1.15)		(1.26)		(1.26)	(1.03)
Behavior Problems		1.81		1.79	0.33		0.55		0.55	-0.88
(CBCL + SSRS)		(1.16)		(1.15)	(1.09)		(1.27)		(1.27)	(1.10)
Middle Childhood LRSS										
Avg Attention Problems	-1.37***	-1.20***		-1.21***	-0.87***	-1.19***	-1.08***		-1.08***	-0.60*
(TRF Attn Problems)	(0.25)	(0.25)		(0.26)	(0.23)	(0.26)	(0.26)		(0.26)	(0.24)
Self-Regulation	0.66	0.61		0.62	0.28	0.17	0.09		0.09	-0.03
(TRF Self-Control)	(0.50)	(0.51)		(0.50)	(0.45)	(0.56)	(0.51)		(0.51)	(0.52)
Behavior Problems	0.03	0.10		0.11	0.12	-0.10	-0.01		-0.01	0.20
(TRF Externalizing Beh)	(0.21)	(0.21)		(0.21)	(0.19)	(0.22)	(0.20)		(0.20)	(0.20)
Early Demographics										
Maternal Age at 1 month					-0.33					0.07
					(0.18)					(0.17)
Maternal Education at 1m					-0.14					1.46***
					(0.39)					(0.38)
Child Sex										
Child - Hispanic					0.43					0.21
					(2.98)					(3.20)
Child - Black					-1.01					-2.90
					(3.03)					(3.07)
Child - Birthweight					1.00					4.57
					(3.60)					(3.54)

Table 32: (Continued)

Child – Age in grade 1					0.43*					0.41*
					(0.20)					(0.18)
Child -Bayley 15 + 24m					0.17*					0.31***
					(0.06)					(0.06)
Maternal PPVT 36 m					0.28					0.07
					(0.06)					(0.05)
Residential Mobility during EC					-0.69					0.87
					(0.62)					(0.68)
Marital Transitions during EC					0.41					0.72
					(0.86)					(0.73)
Maternal Employment Hours during EC					-0.01					-0.00
					(0.06)					(0.05)
Number of Children during EC					-1.42					-2.24**
					(0.81)					(0.81)
Health of Child during EC					5.54**					2.95
					(1.92)					(1.78)
Early Childhood Poverty 200%					-2.24					-4.23
					(2.17)					(2.63)
Middle Childhood Poverty 200%					-4.23					-2.87
					(2.76)					(2.47)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.24***	1.25***	1.24***	1.24***	1.23***	1.19***	1.19***	1.19***	1.19***	1.19***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Early Childhood LRSS										
Attention Problems		-0.00		-0.00	0.01		-0.02		-0.02	-0.03
(CBQ + CBCL)		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Self-Regulation		0.00		0.00	0.01		-0.01		-0.01	0.01
(CBQ + SSRS)		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Behavior Problems		0.01		0.01	0.00		0.04		0.04	0.05*
(CBCL + SSRS)		(0.03)		(0.03)	(0.03)		(0.02)		(0.02)	(0.02)
Middle Childhood LRSS										

Table 32: (Continued)

Avg Attention Problems	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
(TRF Attn Problems)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.01	-0.00	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.01	0.01	0.00	0.01	-0.00	-0.00	-0.00	-0.01
(TRF Externalizing Beh)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				0.00				0.01
				(0.00)				(0.00)
Maternal Education at				0.00				-0.02
1m				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.13				-0.03
				(0.08)				(0.07)
Child - Black				-0.14*				0.06
				(0.06)				(0.07)
Child - Birthweight				0.11				-0.08
				(0.14)				(0.09)
Child – Age in grade 1				-0.01**				-0.01*
				(0.00				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00**
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.04*
during EC				(0.01)				(0.02)
Marital Transitions				-0.01				0.03
during EC				(0.02)				(0.02)
Maternal Employment				0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.03				-0.02
during EC				(0.02)				(0.02)
Health of Child during				-0.06				-0.02
EC				(0.05)				(0.04)
Early Childhood				-0.01				0.02
Poverty200%				(0.06)				(0.05)

Table 32: (Continued)

Middle Childhood Poverty200%					0.04 (0.07)					0.02 (0.05)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.08 (0.10)	0.08 (0.10)	0.08 (0.10)			0.04 (0.07)	0.04 (0.08)	0.04 (0.07)
Self-Regulation			0.24 (0.19)	0.23 (0.19)	0.24 (0.17)			-0.04 (0.18)	-0.04 (0.18)	-0.04 (0.18)
Behavior Problems			0.11 (0.10)	0.10 (0.10)	0.10 (0.09)			-0.00 (0.07)	0.00 (0.07)	0.02 (0.07)
Time-varying Covariates										
Poverty200					0.31 (0.32)					-0.11 (0.23)
Marital Status (yes/no)					1.15 (0.62)					0.22 (0.77)
Child Health					3.06 (0.90)					1.00 (0.68)
Number of Children					0.60 (1.31)					-1.37 (1.14)

Table 33: Coefficients for WJ Picture Vocabulary for the Imputed (N=1123) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	496.66***	496.67***	496.66***	496.39***	496.61***	494.87***	494.88***	494.87***	494.89***	494.86***
	(0.45)	(0.44)	(0.47)	(0.42)	(0.33)	(0.47)	(0.46)	(0.50)	(0.46)	(0.35)
Early Childhood LRSS										
Attention Problems		-2.63*		-2.52*	-0.44		-2.82**		-2.82**	-0.92
(CBQ + CBCL)		(0.91)			(0.70)		(0.82)		(0.82)	(0.73)
Self-Regulation		1.78*		1.81*	0.09		1.93*		1.93*	0.26
(CBQ + SSRS)		(0.72)			(0.52)		(0.78)		(0.76)	(0.56)
Behavior Problems		1.75**		1.64**	0.09		1.68*		1.68*	0.75
(CBCL + SSRS)		(0.63)			(0.51)		(0.76)		(0.76)	(0.60)
Middle Childhood LRSS										
Avg Attention Problems	-0.62***	-0.51***		-0.46**	-0.17	-0.69***	-0.60***		-0.59***	-0.21
(TRF Attn Problems)	(0.14)	(0.14)			(0.10)	(0.16)	(0.15)		(0.15)	(0.12)
Self-Regulation	0.57*	0.50		0.46	0.13	0.11	0.09		0.09	-0.01
(TRF Self-Control)	(0.26)	(0.26)			(0.19)	(0.38)	(0.35)		(0.35)	(0.25)
Behavior Problems	0.06	0.11		0.02	0.14	-0.14	-0.09		-0.09	0.03
(TRF Externalizing Beh)	(0.11)	(0.11)			(0.08)	(0.15)	(0.14)		(0.14)	(0.10)
Early Demographics										
Maternal Age at 1 month					0.01					0.09
					(0.08)					(0.08)
Maternal Education at 1m					-0.09					0.52*
					(0.21)					(0.22)
Child Sex										
Child - Hispanic					0.35					-0.46
					(1.23)					(1.80)
Child - Black					-1.52					-3.17*
					(1.33)					(1.46)
Child - Birthweight					3.06					1.48
					(2.21)					(1.68)

Table 33: (Continued)

Child – Age in grade 1					0.23*					0.30**
					(0.09)					(0.11)
Child -Bayley 15 + 24m					0.19***					0.21***
					(0.03)					(0.04)
Maternal PPVT 36 m					0.25***					0.17***
					(0.03)					(0.03)
Residential Mobility					0.12					-0.12
during EC					(0.25)					(0.34)
Marital Transitions					-0.08					0.01
during EC					(0.36)					(0.35)
Maternal Employment					-0.02					0.02
Hours during EC					(0.03)					(0.03)
Number of Children					-0.95*					-2.48***
during EC					(0.38)					(0.44)
Health of Child during					1.56					2.05*
EC					(0.93)					(1.00)
Early Childhood Poverty					-2.27*					-0.40
200%					(0.90)					(1.10)
Middle Childhood					-0.90					0.22
Poverty 200%					(1.03)					(1.26)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.44***	0.44***	0.44***	0.44***	0.44***	0.48***	0.47***	0.48***	0.48***	0.47***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		-0.00		0.00	-0.00		0.02		0.02	0.03
(CBQ + CBCL)		(0.02)			(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.02		-0.02	-0.02		-0.02		-0.02	-0.03
(CBQ + SSRS)		(0.01)			(0.01)		(0.01)		(0.01)	(0.01)
Behavior Problems		-0.02		-0.02	-0.03		-0.02		-0.02	-0.03
(CBCL + SSRS)		(0.01)			(0.01)		(0.01)		(0.01)	(0.01)
Middle Childhood LRSS										

Table 33: (Continued)

Avg Attention Problems	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01
(TRF Self-Control)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Behavior Problems	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				-0.00				0.01
1m				(0.01)				(0.00)
Child Sex								
Child - Hispanic				0.01				-0.04
				(0.04)				(0.04)
Child - Black				-0.06				-0.02
				(0.04)				(0.03)
Child - Birthweight				0.01				-0.06
				(0.06)				(0.06)
Child – Age in grade 1				-0.01*				-0.01**
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				0.00
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.02
during EC				(0.01)				(0.01)
Marital Transitions				0.00				-0.02
during EC				(0.01)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				-0.00				-0.02
during EC				(0.01)				(0.01)
Health of Child during				-0.00				0.01
EC				(0.03)				(0.02)
Early Childhood				-0.03				0.03
Poverty200%				(0.03)				(0.03)

Table 33: (Continued)

Middle Childhood Poverty200%					0.06 (0.03)					-0.03 (0.03)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.05 (0.05)	0.04	0.05 (0.05)			0.06 (0.04)	0.06 (0.04)	0.07 (0.04)
Self-Regulation			0.08 (0.07)	0.07	0.10 (0.07)			0.03 (0.09)	0.04 (0.09)	0.04 (0.09)
Behavior Problems			0.03 (0.04)	0.03	0.03 (0.04)			0.01 (0.04)	0.01 (0.04)	0.02 (0.04)
Time-varying Covariates										
Poverty200					0.37 (0.17)					-0.17 (0.15)
Marital Status (yes/no)					0.34 (0.37)					-0.37 (0.36)
Child Health					-0.27 (0.37)					-0.43 (0.35)
Number of Children					0.52 (0.68)					0.63 (0.54)

Table 34: Coefficients for WJ Applied Problems for the Imputed (N=1123) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	493.49***	493.49***	493.48***	493.49***	493.47***	491.70***	491.72***	491.70***	491.72***	491.78***
	(0.55)	(0.53)	(0.58)	(0.53)	(0.45)	(0.48)	(0.47)	(0.53)	(0.46)	(0.38)
Early Childhood LRSS										
Attention Problems		-3.22**		-3.21**	-1.51*		-2.81**		-2.81**	-1.05
(CBQ + CBCL)		(0.99)		(0.99)	(0.75)		(0.83)		(0.83)	(0.81)
Self-Regulation		1.62		1.61	0.02		1.83*		1.84*	0.35
(CBQ + SSRS)		(0.86)		(0.86)	(0.79)		(0.76)		(0.76)	(0.63)
Behavior Problems		2.50**		2.49**	1.34		0.94		0.94	-0.24
(CBCL + SSRS)		(0.81		(0.82)	(0.70)		(0.84)		(0.84)	(0.75)
Middle Childhood LRSS										
Avg Attention Problems	-1.05***	-0.92***		-0.92***	-0.56**	-1.07***	-0.97***		-0.97***	-0.66***
(TRF Attn Problems)	(1.17)	(0.17)		(0.17)	(0.15)	(0.16)	(0.16)		(0.16)	(0.13)
Self-Regulation	0.37	0.34		0.34	-0.02	0.02	-0.02		-0.02	-0.15
(TRF Self-Control)	(0.34)	(0.35)		(0.35)	(0.27)	(0.34)	(0.31)		(0.31)	(0.26)
Behavior Problems	0.05	0.10		0.10	0.12	-0.04	0.03		0.03	0.17
(TRF Externalizing Beh)	(0.15)	(0.16)		(0.16)	(0.12)	(0.13)	(0.12)		(0.12)	(0.11)
Early Demographics										
Maternal Age at 1 month					0.02					0.06
					(0.11)					(0.09)
Maternal Education at 1m					0.18					0.82***
					(0.25)					(0.22)
Child Sex										
Child - Hispanic					-1.10					-0.80
					(1.68)					(1.90)
Child - Black					-4.18*					-4.19**
					(2.12)					(1.60)
Child - Birthweight					0.44					0.40
					(2.05)					(2.27)

Table 34: (Continued)

Child – Age in grade 1					0.52					0.43***
					(0.13)					(0.11)
Child -Bayley 15 + 24m					0.25***					0.31***
					(0.04)					(0.04)
Maternal PPVT 36 m					0.12**					0.05
					(0.04)					(0.03)
Residential Mobility during EC					-0.27					0.38
					(0.35)					(0.44)
Marital Transitions during EC					0.84					0.43
					(0.48)					(0.47)
Maternal Employment Hours during EC					0.05					0.01
					(0.04)					(0.03)
Number of Children during EC					-0.06					-0.51
					(0.50)					(0.48)
Health of Child during EC					2.71*					-0.55
					(1.25)					(1.08)
Early Childhood Poverty 200%					-0.28					-2.17
					(1.34)					(1.40)
Middle Childhood Poverty 200%					-4.49**					-0.41
					(1.57)					(1.30)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.82***	0.82***	0.82***	0.82***	0.82***	0.85***	0.85***	0.86***	0.86***	0.85***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		0.03		0.03	0.02		0.02		0.02	0.01
(CBQ + CBCL)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.01		-0.02	-0.01		-0.04*		-0.04*	0.01
(CBQ + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Behavior Problems		-0.01		-0.04	-0.04		-0.01		-0.01	0.00
(CBCL + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Middle Childhood LRSS										

Table 34: (Continued)

Avg Attention Problems	0.01*	0.01*	0.01*	0.00	0.00	0.00	0.00	-0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.01
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				-0.00
				(0.00)				(0.00)
Maternal Education at				0.00				-0.01
1m				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.10*				-0.04
				(0.05)				(0.05)
Child - Black				-0.04				-0.03
				(0.04)				(0.04)
Child - Birthweight				0.06				-0.08
				(0.07)				(0.05)
Child – Age in grade 1				-0.01***				-0.01**
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00**				-0.01***
				(0.00)				(0.00)
Maternal PPVT 36 m				-0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.00				-0.02*
during EC				(0.01)				(0.03)
Marital Transitions				0.00				0.01
during EC				(0.01)				(0.01)
Maternal Employment				-0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.01				-0.01
during EC				(0.01)				(0.01)
Health of Child during				-0.01				0.01
EC				(0.03)				(0.03)
Early Childhood				-0.01				0.01
Poverty200%				(0.04)				(0.04)

Table 34: (Continued)

Middle Childhood Poverty200%					0.00 (0.04)					-0.02 (0.03)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.00 (0.06)	-0.00 (0.06)	-0.00 (0.06)			0.09 (0.06)	0.09 (0.06)	0.08 (0.06)
Self-Regulation			0.20 (0.11)	0.19 (0.11)	0.22* (0.11)			0.04 (0.12)	0.04 (0.12)	0.04 (0.13)
Behavior Problems			0.05 (0.05)	0.05 (0.05)	0.04 (0.05)			0.01 (0.05)	0.01 (0.05)	0.03 (0.05)
Time-varying Covariates										
Poverty200					-0.08 (0.21)					0.27 (0.16)
Marital Status (yes/no)					0.84 (0.46)					-0.30 (0.52)
Child Health					0.47 (0.58)					0.33 (0.51)
Number of Children					0.77 (0.75)					-0.53 (0.79)

Table 35: Coefficients for WJ Letter-Word Identification for the Un-imputed (N=886) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	484.93***	484.96***	484.16***	484.22***	484.07***	486.83***	486.83***	485.85***	485.84***	485.62***
	(0.86)	(0.84)	(0.93)	(0.86)	(0.80)	(0.79)	(0.77)	(0.83)	(0.78)	(0.67)
Early Childhood LRSS										
Attention Problems		-2.98*		-3.05*	-0.54		-0.47		-0.21	1.07
(CBQ + CBCL)		(1.21)		(1.23)	(1.16)		(1.32)		(1.33)	(1.19)
Self-Regulation		1.94		2.05	0.35		4.14**		4.31**	1.68
(CBQ + SSRS)		(1.25)		(1.30)	(1.23)		(1.19)		(1.21)	(0.98)
Behavior Problems		1.58		1.77	0.26		0.08		-0.09	-0.96
(CBCL + SSRS)		(1.17)		(1.19)	(1.13)		(1.32)		(1.32)	(1.10)
Middle Childhood LRSS										
Avg Attention Problems	-1.31***	-1.15***		-1.18***	-0.87**	-1.05***	-0.95***		-0.96***	-0.57**
(TRF Attn Problems)	(0.26)	(0.26)		(0.27)	(0.25)	(0.23)	(0.23)		(0.23)	(0.21)
Self-Regulation	0.81	0.82		0.69	0.33	0.00	0.05		-0.02	0.16
(TRF Self-Control)	(0.52)	(0.52)		(0.53)	(0.48)	(0.49)	(0.50)		(0.51)	(0.44)
Behavior Problems	0.16	0.27		0.24	0.24	-0.03	0.07		0.05	0.30
(TRF Externalizing Beh)	(0.22)	(0.21)		(0.22)	(0.20)	(0.19)	(0.18)		(0.18)	(0.16)
Early Demographics										
Maternal Age at 1 month					-0.33					0.05
					(0.20)					(0.19)
Maternal Education at 1m					0.14					1.55***
					(0.45)					(0.41)
Child Sex										
Child - Hispanic					-0.40					3.17
					(3.27)					(3.36)
Child - Black					-1.50					1.38
					(3.42)					(3.42)

Table 35: (Continued)

Child - Birthweight					-0.44					6.31
					(3.65)					(4.66)
Child – Age in grade 1					0.30					0.36
					(0.24)					(0.21)
Child -Bayley 15 + 24m					0.09					0.28***
					(0.07)					(0.06)
Maternal PPVT 36 m					0.28***					0.08
					(0.06)					(0.05)
Residential Mobility during EC					-0.32					1.07
					(0.66)					(0.78)
Marital Transitions during EC					-0.64					1.35
					(1.28)					(1.16)
Maternal Employment Hours during EC					-0.03					-0.05
					(0.06)					(0.05)
Number of Children during EC					-0.71					-3.18***
					(0.86)					(0.89)
Health of Child during EC					5.79**					2.58
					(2.12)					(1.90)
Early Childhood Poverty 200%					-2.03					-5.15*
					(2.44)					(2.57)
Middle Childhood Poverty 200%					-6.01*					-3.09
					(2.90)					(2.34)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	1.23***	1.23***	1.23***	1.23***	1.22***	1.20***	1.20***	1.20***	1.20***	1.21***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)
Early Childhood LRSS										
Attention Problems (CBQ + CBCL)		-0.00		-0.00	0.01		-0.01		-0.01	-0.00
		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)
Self-Regulation (CBQ + SSRS)		-0.01		-0.02	-0.02		-0.02		-0.02	-0.01
		(0.03)		(0.03)	(0.03)		(0.02)		(0.02)	(0.03)
Behavior Problems (CBCL + SSRS)		-0.01		-0.00	-0.01		0.03		0.02	0.02
		(0.03)		(0.03)	(0.03)		(0.03)		(0.03)	(0.03)

Table 35: (Continued)

Middle Childhood								
LRSS								
Avg Attention Problems	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00
(TRF Attn Problems)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Self-Regulation	0.00	0.00	0.00	-0.01	-0.01	-0.00	-0.00	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	0.01	0.01	0.01	0.01	-0.01	-0.01	-0.00	-0.00
(TRF Externalizing Beh)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				0.00				0.01
				(0.00)				(0.00)
Maternal Education at				0.00				-0.02
1m				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.11				-0.09
				(0.10)				(0.08)
Child - Black				-0.10				0.09
				(0.07)				(0.07)
Child - Birthweight				0.13				-0.15
				(0.13)				(0.09)
Child – Age in grade 1				-0.01*				-0.00
				(0.01)				(0.00)
Child -Bayley 15 + 24m				0.00				-0.00
				(0.00)				(0.00)
Maternal PPVT 36 m				0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.02				-0.05**
during EC				(0.02)				(0.02)
Marital Transitions				-0.01				0.08**
during EC				(0.03)				(0.03)
Maternal Employment				0.00				-0.00
Hours during EC				(0.00)				(0.00)
Number of Children				0.03				-0.02
during EC				(0.02)				(0.02)

Health of Child during EC					-0.02					-0.05
					(0.05)					(0.05)
Early Childhood Poverty200%					-0.02					0.01
					(0.06)					(0.06)
Middle Childhood Poverty200%					0.04					0.06
					(0.08)					(0.06)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.20	0.19	0.20*			0.06	0.05	-0.03
			(0.10)	(0.10)	(0.10)			(0.09)	(0.09)	(0.10)
Self-Regulation			0.39	0.40	0.42*			0.07	0.05	0.11
			(0.20)	(0.20)	(0.20)			(0.17)	(0.16)	(0.17)
Behavior Problems			0.17	0.17	0.21*			0.03	0.04	0.09
			(0.10)	(0.10)	(0.09)			(0.08)	(0.08)	(0.08)
Time-varying Covariates										
Poverty200					0.16					-0.16
					(0.33)					(0.27)
Marital Status (yes/no)					0.70					-0.98
					(0.70)					(1.04)
Child Health					2.39*					0.26
					(1.06)					(0.83)
Number of Children					0.33					-2.12
					(1.62)					(1.22)

Table 36: Coefficients for WJ Picture Vocabulary for the Un-imputed (N=886) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	497.01***	497.02***	496.89***	496.91***	496.96***	495.19***	495.20***	495.16***	495.16***	485.13***
	(0.49)	(0.48)	(0.52)	(0.49)	(0.38)	(0.50)	(0.49)	(0.53)	(0.49)	(0.49)
Early Childhood LRSS										
Attention Problems		-2.51***		-2.46***	-0.27		-2.33**		-2.10*	-0.79
(CBQ + CBCL)		(0.65)		(0.66)	(0.59)		(0.84)		(0.85)	
Self-Regulation		1.40*		1.42*	0.09		2.22**		2.30**	0.07
(CBQ + SSRS)		(0.65)		(0.64)	(0.56)		(0.73)		(0.73)	
Behavior Problems		1.59**		1.64*	0.07		1.70*		1.73*	-0.02
(CBCL + SSRS)		(0.63)		(0.64)	(0.60)		(0.80)		(0.81)	
Middle Childhood LRSS										
Avg Attention Problems	-0.56***	-0.44**		-0.48**	-0.21	-0.61**	-0.50**		-0.50**	-0.71***
(TRF Attn Problems)	(0.15)	(0.14)		(0.14)	(0.11)	(0.18)	(0.16)		(0.17)	
Self-Regulation	0.48	0.44		0.47	0.10	-0.00	0.09		0.02	0.08
(TRF Self-Control)	(0.28)	(0.28)		(0.30)	(0.21)	(0.32)	(0.32)		(0.33)	
Behavior Problems	0.10	0.15		0.17	0.18	-0.06	0.00		-0.01	0.10
(TRF Externalizing Beh)	(0.12)	(0.12)		(0.12)	(0.09)	(0.13)	(0.12)		(0.13)	
Early Demographics										
Maternal Age at 1 month					0.00					-0.15
					(0.09)					(0.12)
Maternal Education at 1m					-0.16					0.70**
					(0.23)					(0.26)
Child Sex										-0.08
										(0.99)
Child - Hispanic					0.50					1.39
					(1.54)					(2.14)
Child - Black					-0.21					-2.06
					(1.43)					(1.96)

Table 36: (Continued)

Child - Birthweight					1.64					3.6
					(2.45)					(2.84)
Child – Age in grade 1					0.18					0.42**
					(0.11)					(0.13)
Child -Bayley 15 + 24m					0.18***					0.23***
					(0.03)					(0.05)
Maternal PPVT 36 m					0.26***					0.17***
					(0.03)					(0.04)
Residential Mobility					0.27					-0.21
during EC					(0.29)					(0.42)
Marital Transitions					-0.61					1.02*
during EC					(0.54)					(0.46)
Maternal Employment					-0.03					-0.01
Hours during EC					(0.03)					(0.04)
Number of Children					-0.68					-2.07***
during EC					(0.42)					(0.56)
Health of Child during					1.00					5.20***
EC					(1.00)					(1.23)
Early Childhood Poverty					-2.78*					-2.69
200%					(1.19)					(1.51)
Middle Childhood					-1.64					-3.77*
Poverty 200%					(1.28)					(1.60)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.44***	0.44***	0.44***	0.44***	0.44***	0.48***	0.48***	0.48***	0.48***	1.20***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		-0.01		0.00	-0.00		0.03		0.04*	-0.01
(CBQ + CBCL)		(0.01)		(0.01)	(0.01)		(0.02)		(0.02)	
Self-Regulation		-0.02		-0.02	-0.03		-0.01		-0.02	-0.01
(CBQ + SSRS)		(0.01)		(0.01)	(0.02)		(0.01)		(0.01)	
Behavior Problems		-0.02		-0.02	-0.02		-0.02		-0.03	0.02
(CBCL + SSRS)		(0.01)		(0.02)	(0.01)		(0.01)		(0.01)	

Table 36: (Continued)

Middle Childhood								
LRSS								
Avg Attention Problems	0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Self-Regulation	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.01	-0.00
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	
Behavior Problems	-0.00	-0.00	0.00	-0.00	-0.00	-0.00	-0.00	0.00
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	
Early Demographics								
Maternal Age at 1 month				-0.00				0.01
				(0.00)				(0.00)
Maternal Education at				-0.00				-0.01
1m				(0.01)				(0.01)
Child Sex								0.04
								(0.02)
Child - Hispanic				-0.03				0.03
				(0.04)				(0.06)
Child - Black				-0.02				-0.05
				(0.04)				(0.04)
Child - Birthweight				-0.01				0.03
				(0.07)				(0.07)
Child – Age in grade 1				-0.01**				-0.01***
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.003
				(0.00)				(0.001)
Maternal PPVT 36 m				-0.00				0.00
				(0.00)				(0.00)
Residential Mobility				0.01				-0.01
during EC				(0.01)				(0.01)
Marital Transitions				0.01				-0.00
during EC				(0.01)				(0.01)
Maternal Employment				0.00				0.00
Hours during EC				(0.00)				(0.00)
Number of Children				-0.00				0.01
during EC				(0.01)				(0.01)

Table 36: (Continued)

Health of Child during EC					-0.01					-0.03
					(0.03)					(0.02)
Early Childhood Poverty200%					-0.05					
					(0.03)					
Middle Childhood Poverty200%					0.05					
					(0.04)					
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.07	0.06	0.04			0.02	0.03	-0.00
			(0.05)	(0.05)	(0.05)			(0.05)	(0.05)	(0.05)
Self-Regulation			0.08	0.08	0.06			0.09	0.10	0.11
			(0.08)	(0.08)	(0.09)			(0.08)	(0.08)	(0.09)
Behavior Problems			0.05	0.05	0.06			0.03	0.03	0.04
			(0.04)	(0.04)	(0.04)			(0.04)	(0.04)	(0.04)
Time-varying Covariates										
Poverty200					0.48*					-0.26
					(0.19)					(0.19)
Marital Status (yes/no)					0.57					-0.57
					(0.47)					(0.52)
Child Health					-0.64					-0.44
					(0.47)					(0.42)
Number of Children					0.26					0.62
					(0.84)					(0.65)

Table 37: Coefficients for WJ Applied Problems for the Un-imputed (N=886) Analysis Samples Based on 3-Level HLM

Average Intercept across Middle Childhood	Males					Females				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MCLRSS at level 1	Between - within	Full model w Poverty
Intercept	493.71***	493.71***	493.15***	493.18***	493.18***	492.19***	492.29***	491.68***	491.69***	491.53***
	(0.59)	(0.57)	(0.65)	(0.59)	(0.51)	(0.52)	(0.49)	(0.57)	(0.51)	(0.42)
Early Childhood LRSS										
Attention Problems		-3.18**		-3.10***	-1.30		-1.96*		-1.74*	-0.90
(CBQ + CBCL)		(0.92)		(0.95)	(0.81)		(0.85)		(0.86)	(0.75)
Self-Regulation		1.20**		1.36	0.52		2.64***		2.87***	1.00
(CBQ + SSRS)		(0.89)		(0.92)	(0.84)		(0.69)		(0.71)	(0.62)
Behavior Problems		2.36**		2.36**	1.42		0.92		0.83	0.01
(CBCL + SSRS)		(0.82)		(0.84)	(0.73)		(0.84)		(0.87)	(0.72)
Middle Childhood LRSS										
Avg Attention Problems	-0.98***	-0.86***		-0.91***	-0.52***	-1.01***	-0.91***		-0.89***	-0.67***
(TRF Attn Problems)	(0.18)	(0.17)		(0.18)	(0.17)	(0.14)	(0.14)		(0.14)	(0.14)
Self-Regulation	0.23	0.26		0.21	-0.19	0.05	0.19		0.13	0.12
(TRF Self-Control)	(0.36)	(0.35)		(0.37)	(0.29)	(0.34)	(0.33)		(0.34)	(0.29)
Behavior Problems	0.01	0.08		0.09	0.04	0.10	0.21		0.17	0.30
(TRF Externalizing Beh)	(0.15)	(0.15)		(0.15)	(0.12)	(0.12)	(0.11)		(0.11)	(0.10)
Early Demographics										
Maternal Age at 1 month					-0.00					0.07
					(0.12)					(0.11)
Maternal Education at 1m					0.16					0.86**
					(0.28)					(0.26)
Child Sex										
Child - Hispanic					-2.53					-1.26
					(1.80)					(2.13)
Child - Black					-5.53*					-2.51
					(2.31)					(1.97)

Table 37: (Continued)

Child - Birthweight					-1.88					3.28
					(1.71)					(2.79)
Child – Age in grade 1					0.53**					0.53**
					(0.15)					(0.14)
Child -Bayley 15 + 24m					0.18***					0.34***
					(0.05)					(0.04)
Maternal PPVT 36 m					0.11**					0.05
					(0.04)					(0.03)
Residential Mobility					-0.05					0.17
during EC					(0.39)					(0.50)
Marital Transitions					0.62					0.38
during EC					(0.75)					(0.73)
Maternal Employment					0.04					-0.02
Hours during EC					(0.04)					(0.03)
Number of Children					0.42					-0.63
during EC					(0.50)					(0.52)
Health of Child during					2.52					-1.01
EC					(1.42)					(1.17)
Early Childhood Poverty					-0.00					-2.61
200%					(1.50)					(1.58)
Middle Childhood					-5.26**					0.50
Poverty 200%					(1.63)					(1.45)
Level 2 Linear Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Between-children differences)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Intercept	0.82***	0.82***	0.82***	0.82***	0.82***	0.85***	0.85***	0.86***	0.86***	0.85***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Early Childhood LRSS										
Attention Problems		0.01		0.01	0.01		0.03		0.03	0.03
(CBQ + CBCL)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)
Self-Regulation		-0.02		-0.02	-0.01		-0.02		-0.02	-0.02
(CBQ + SSRS)		(0.02)		(0.02)	(0.02)		(0.01)		(0.02)	(0.02)
Behavior Problems		-0.04*		-0.03	-0.03		-0.01		-0.01	-0.02
(CBCL + SSRS)		(0.02)		(0.02)	(0.02)		(0.02)		(0.02)	(0.02)

Table 37: (Continued)

Middle Childhood								
LRSS								
Avg Attention Problems	0.01***	0.01**	0.01**	0.01*	0.00	0.00	0.00	0.00
(TRF Attn Problems)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Self-Regulation	0.01	0.01	0.01	0.00	-0.00	-0.00	-0.00	-0.01
(TRF Self-Control)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Behavior Problems	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01
(TRF Externalizing Beh)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Early Demographics								
Maternal Age at 1 month				-0.00				0.00
				(0.00)				(0.00)
Maternal Education at 1m				0.00				-0.01
				(0.01)				(0.01)
Child Sex								
Child - Hispanic				0.10*				-0.11*
				(0.05)				(0.05)
Child - Black				-0.01				-0.06
				(0.05)				(0.05)
Child - Birthweight				0.07				-0.10
				(0.07)				(0.06)
Child – Age in grade 1				-0.01***				-0.01
				(0.00)				(0.00)
Child -Bayley 15 + 24m				-0.00				-0.00***
				(0.00)				(0.00)
Maternal PPVT 36 m				-0.00				0.00
				(0.00)				(0.00)
Residential Mobility during EC				0.01				-0.02
				(0.01)				(0.01)
Marital Transitions during EC				-0.02				0.01
				(0.02)				(0.02)
Maternal Employment Hours during EC				-0.00				-0.00
				(0.00)				(0.00)
Number of Children during EC				0.01				-0.02
				(0.01)				(0.01)
Health of Child during EC				-0.00				0.02
				(0.03)				(0.03)

Early Childhood Poverty200%					0.02					0.02
					(0.04)					(0.04)
Middle Childhood Poverty200%					0.01					0.02
					(0.05)					(0.04)
Level 1 Slope	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
(Time-varying variables and within-child change)	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty	Between MC LRSS at level 2	Between with EC LRSS	Within MC LRSS at level 1	Between - within	Full model w Poverty
Middle Childhood LRSS										
Attention Problems			0.06	0.06	0.05			0.09	0.09	0.02
			(0.07)	(0.07)	(0.07)			(0.07)	(0.07)	(0.07)
Self-Regulation			0.27*	0.26*	0.29*			0.06	0.06	0.12
			(0.12)	(0.12)	(0.12)			(0.13)	(0.13)	(0.13)
Behavior Problems			0.07	0.07	0.11			0.04	0.04	0.06
			(0.06)	(0.06)	(0.06)			(0.05)	(0.05)	(0.06)
Time-varying Covariates										
Poverty200					-0.22					0.39*
					(0.20)					(0.19)
Marital Status (yes/no)					0.85					-0.84
					(0.62)					(0.62)
Child Health					0.28					0.25
					(0.67)					(0.58)
Number of Children					1.06					-0.91
					(1.06)					(0.83)

BIBLIOGRAPHY

Achenbach, T. M. (1991). Manual for the Child Behavior Checklist/4-18 and Profile. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M., Edelbrock, C., & Howell, C. T. (1987). Empirically based assessment of the behavioral/emotional problems of 2- and 3-year old children. *Journal of Abnormal Child Psychology, 15,* 629-650.

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

Alexander, K.L., Entwisle, D. R. & Horsey, C. S. (1997). From first grade forward: Early foundations of high school dropout. *Sociology of Education, 70*, 87-107.

Annett, R. D., Bender, B. G., & Gordon, M. (2007). Relating children's attentional capabilities to intelligence, memory, and academic achievement: A test of construct specificity in children with asthma. *Child Neuropsychology*, 13, 64-85.

Anselmi et al. (2008). Continuity of behavioral and emotional problems from pre-school years to pre-adolescence in a developing country. *Journal of Child Psychology and Psychiatry, 49*, 499-507.

Bayley, N. (1969). *Bayley Scales of Infant Development: Manual.* New York: The Psychological Corporation.

Berlin, L.J., Brooks-Gunn, J. Spiker, D., & Zaslow, M. J. (1995). Examining observational measures of emotional support and cognitive stimulation in black and white mothers of preschoolers. *Journal of Family Issues, 16*, 664-686.

Birch, S. H., & Ladd, G. W. (1997). The teacher-child relationship an early school adjustment. *Journal of School Psychology, 35*, 61-79.

Bierman, K. L., Nix, R. L., Greenberg, M. T., Blair, C., & Domitrovich, C. E. (2008). Executive functions and school readiness intervention: Impact, moderation, and mediation in the Head Start REDI program. *Development and Psychopathology, 20*, 821-843.

Blair, C, & Diamond, A. (2008). Biological processes in prevention and intervention: The promotion of self-regulation as a means of preventing school failure. *Development and Psychopathology, 20*, 899-911.

Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten, *Child Development, 78*, 647-663.

Bronfenbrenner, U., & Morris, P.A. (1998). The ecology of developmental processes. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 1. Theoretical Models of human development*. New York: Wiley.

Brown, A., Bransford, J., Ferrera, R., & Campione, J. (1983). Learning, remembering, and understanding. In J. H. Flavell & E. M. Markman (Eds.), P. H. Mussen (series Ed.), *Handbook of Child Psychology, vol. 3. Cognitive Development,* New York: Wiley.

Bub, K. L., McCartney, K., & Willette, J. B. (2007). Behavior problem trajectories and first-grade cognitive ability and achievement skills: A latent growth curve analysis. *Journal of Educational Psychology, 3,* 653-670.

Buckner, J. C., Mezzacappa, E., & Beardslee, W. R. (2003). Characteristics of resilient youths living in poverty: The role of self-regulatory processes. *Development and Psychopathology, 15*, 139–162.

Burchinal, M. R., Peisner-Feinberg, E., Pianta, R., & Howes, C. (2002). Development of academic skills from preschool through second grade: Family and classroom predictors of developmental trajectories. *Journal of School Psychology, 40*, 415- 436.

Caldwell, B. & Bradley, B. (1984). Home Observation for Measurement of the Environment. Little Rock, AR: University of Arkansas at Little Rock.

Chatterji, M. (2006). Reading achievement gaps, correlates, and moderators of early reading achievement: Evidence from the Early Childhood Longitudinal Study(ECLS) kindergarten to 1st grade sample. Journal of Educational Psychology, 98, 489-507.

Cole, P. M. Teti, L. O. & Zahn-Waxler, C. (2003). Mutual emotion regulation and the stability of conduct problems between preschool and early school age. Development and Psychopathology, 15, 1-18.

Cooper, D., & Farran, D. (1988). Behavioral risk factors in kindergarten. *Early Childhood Research Quarterly, 3,* 1-19.

Cooper, D. H., & Speece, D. L. (1988). A novel methodology for the study of children at risk for school failure. *The Journal of Special Education, 22*, 186-198.

Dearing, E., Kreider, H., Simpkins, S., & Weiss, H. B. (2006). Family involvement in school and low-income children' literacy: Longitudinal associations between and within families. *Journal of Educational Psychology, 98*, 653-664.

Dearing, E., McCartney, K., & Taylor, B. A. (2001). Change in family income-to-needs matter more for children with less. *Child Development, 72*, 1779-1793.

Denham, S. A. (1998). *Emotional Development in Young Children.* The Guilford Series on Social and Emotional Development. The Guilford Press.

Denham, S. A., Zoller, D., & Couchoud, E. A. (1994). Socialization of preschoolers' emotion understanding. *Developmental Psychology, 30*, 928-936.

Duncan, G. & Brooks-Gunn, J, (1997). *Consequences of growing up poor*. New York: Russell Sage Foundation.

Duncan, G. & Brooks-Gunn, J. (2000). Family poverty, welfare reform, and child development. *Child Development, 71*, 188-196.

Duncan, G. J., Brooks-Gunn, J., & Klebanov, P.K. (1994). Economic deprivation and early childhood development. *Child Development, 65*, 296-318.

Duncan, G. J., Brooks-Gunn, J., Yeung, W. J., & Smith, J. R. (1998). How much does poverty affect the life chances of children? American Psychological Review, 63, 406-423.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K, Huston, A. C., Klebanov, P., et al., (2007). School readiness and later achievement. *Developmental Psychology, 43*, 1428-1446.

Duncan, G. J., Magnuson, K. A, & Ludwig, J. (2004). The endogeneity problem in developmental Studies. *Research in Human Development, 1&2,* 59-80.

Dunn, L. M. & Dunn, L. M. (1981). *Peabody Picture Test-Revised Manual for Forms L and M.* Circle Pines, MN: American Guidance Service.

Dweck, C. S.(2002). The development of ability conceptions. In *The Development of Achievement Motivation*. (pp 57-88).A. Wigfield & J. Eccles (Eds.) Academic Press.

Egeland, B., Carlson, E., & Sroufe, L.A. (2004). Resilience as process. *Development and Psychopathology, 5,* 517-528.

Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multi-level models: A new look at an old issue. *Psychological Methods, 12*, 121-138.

Ensminger, M. E. & Slusarcick, A. L. (1992). Paths to high school graduation or dropout: A longitudinal study of a first grade cohort. *Sociology of Education, 65*, 95-113.

Entwisle, D. R., Alexander, K. L., & Olson, L.S. (2007). Early schooling: The handicap of being poor and male. *Sociology of Education, 80*, 114-138.

Epstein. D., Elwood, J., Hey, V. & Maw, J. (Eds.) (1998). Failing boys? Issues in gender and achievement. Open University Press. Philadelphia, PA.

Evans, G. W. & English, K. (2002). The environment of poverty: Multiple stressor exposure, psychophysiological stress, and socioemotional adjustment. *Child Development, 73*, 1238-1248.

Foulk, B., & Morrow, R. D. (1989). Academic survival skills for young child at risk for school failure. *Journal of Education Research*, *82*, 158-165.

Garmezy, N., & Rutter, M. (1983). Stress, coping, and development in children. Vol xvi, pp.364, Baltimore, MD, US: Johns Hopkins University Press.

Green, L., & Francis, J. (1988).Children's learning skills at the infant and junior stages: A follow-on study. *British Journal of Educational Psychology, 58*, 120-126.

Gresham, F., & Elliot, S. (1991). Social skills rating system. Circle Pines, MN: American Guidance Service.

Gutman, L. M., Sameroff, A. J., & Cole, R. (2003). Academic growth curve trajectories from 1st grade to 12th grade: Effects of multiple social risk factors and preschool child factors. *Developmental Psychology, 39,* 777-790.

Hair, E., Halle, T., Terry-Humen, E., Lavelle, B., & Calkins, J. (2006). Children's school readiness in the ECLS-K: Predictions to academic, health, and social outcomes in first grade. *Early Childhood Research Quarterly, 21*, 431-454.

Hamre, B. K. & Pianta, R. C. (2001). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development, 76*, 949-967.

Hedges, L. V. & Nowell, A. (1995). Sex differences in mental test scores, variability, and number of high-scoring individuals. *Science, 269*, 41-45.

Herbert, J. & Stipek, D. (2005). The emergence of gender differences in children's perceptions of their academic competence. *Journal of Applied Developmental Psychology, 26*, 276-295.

Hill, A. L., Dengan, K. A., Calkins, S. D., & Keane, S. P. (2006). Profiles of externalizing behavior problems for boys and girls across preschool: The roles of emotion regulation and inattention. *Developmental Psychology, 42,* 913-928.

Hinshaw, S. P. (1992). Externalizing behavior problems and academic underachievement in childhood and adolescence: Causal relationships and underlying mechanisms. *Psychological Bulletin, 111*, 127-155.

Hogan, A.E., Scott, K.G. & Bauer, C.R. (1992). The Adaptive Social Behavior Inventory (ASBI): A new assessment of social competence in high risk three year olds. *Journal of Psychoeducational Assessment, 10*, 230-239.

Howse, R. B., Lange, G., Farran, D. C., & Boyles, C. D. (2003). Motivation and self-regulation as predictors of achievement in economically disadvantaged young children. *Journal of Experimental Education, 71*, 151-174.

Houston, A. C. & Ripke, M. N. (2006). Development Contexts in Middle Childhood: Bridges to Adolescence and Adulthood. Cambridge Studies in Social and Emotional Development. Cambridge University Press, N.Y.

Hyde, J. S., Fennema, E., & Lamon, S. J. (1990). Gender differences in mathematics performance: A meta-analysis. *Psychological Bulletin*, *107*, 139-155.

Hyde, J. S., & Linn, M. C. (1988). Gender differences in verbal ability: A meta-analysis. *Psychological Bulletin*, *104*, 53-69.

Jimerson, S. R. Durbow, E. H., Adam, E., Gunnar, M., & Bozoky, I. K.(2006). Associations among academic achievement, attention, and adrenocortical reactivity in Caribbean village children. *Canadian Journal of School Psychology, 21*, 120-138.

Jones, H.A. & Chronis-Tuscano, A. (2008). Efficacy of teacher in-service training for Attention Deficit/Hyperactvity Disorder. *Psychology in the Schools, 45*, 2008

Klibanoff, R. S., Levine, S. C., Huttenlocher, J., Vasilyeva, M., Hedges, L. V. (2006) Preschool children's mathematical knowledge: The effect of teacher "math talk." *Developmental Psychology, 42*, 59-69

Kloneberg, T., Fernell, E., OLesen, P.J.,Johnon, M., Gustafsson, P.,& Dahlstreom, K. (2005). Computerized training of working memory in children with ADHD: A randomized control trail. *Journal of American Academy of Child & Adolescent Psychiatry, 44*, 177-185.

Kochanska, G., & Knaack, A. (2003). Effortful control as a personality characteristics of young Children: Antecedents, correlates, and consequences. *Journal of Personality, 71*, 1087-1112.

Kochanska, G., Murray, K. T. & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36,* 220-232.

Kochanska, G., Tjebkes, T. I. & Forman, D. R. (1998). Children's emerging regulation of conduct: Restraint, compliance, and internalization from infancy to the second year. *Child Development*, *69,* 1378-1389.

Kopp, C. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25,* 343-354.

Kopp, C. (1992). Emotional distress and control in young children. In N. Eisenberg and R. A. Fabes (Eds.) *Emotion and its Regulation in Early Development*, number 55, Jossey-Bass Publishers.

Kuperschmidt, J. B., & Coie, J. D. (1990). Preadolescent per status, aggression, and school adjustment as predictors of externalizing problems in adolescence. *Child Development, 61,* 1350-1362.

Ladd, G. W., Birch, S. H., & Buhs, E.S. (1999). Children's social and scholastic lives in kindergarten: Related spheres of influence? *Child Development, 58,* 1168-1189.

Ladd, G. W., Kochenderfer, B. J., & Coleman, C. (1997). Classroom peer acceptance, friendship, and victimization: Distinct relational systems that contribute uniquely to children's school adjustment. *Child Development, 68*, 1181-1197.

Ladd, G. W., & Price, J. M. (1987). Predicting children's social and school adjustment following the transition from preschool to kindergarten. *Child Development, 58*, 1168-1189.

Lawson, K. R., & Ruff. H. A. (2004). Early attention and negative emotionality predict later cognitive and behavioural function. *International Journal of Behavioral Development, 28*, 157-165.

Li-Grining, C. P. (2007). Effortful control among low-income preschoolers in three cities: Stability, change, and individual differences. *Developmental Psychology, 43*, 208-221.

Li-Grining, C. P., Votruba-Drzal, E., & Maldonado, C. (2007, April). Navigating the transition to school: How learning-related social skills relate to academic trajectories. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

Li-Grinning, C. P., Votruba-Drzal, E., Bachman, H. J., & Chase-Lansdale, P. L. (2006). Are certain preschoolers at risk in the era of welfare reform? The moderating role of children's temperament. *Child and Youth Services Review, 28*, 1102-1123.

Li-Grinning, C. P., Votruba-Drzal, E., Bachman, H. J., & Maldonado, C. (revise-resubmit to Child Development, 2009). Academic trajectroires across middle childhood: The role of children's learning-related social skills at kindergarten entry.

Liew, J., Eisenberg, N., & Rieser, M. (2004). Preschooler's effortful control and negative emotionality, immediate reactions to disappointment, and quality of social functioning. *Journal of Experimental Child Psychology, 89*, 298-319.

Lin, H-L, Lawrence, F. R., & Gorrell, J. (2003). Kindergarten teacher's views of children's readiness for school. *Early Childhood Research Quarterly, 18*, 225-237.

Maccoby, (1990). Gender and relationships: A developmental account. *American Psychologist, 45,* 513-520.

Markwardt, F. (1989). *Peabody Individual Achievement Test-Revised.* Circle Pines, MN: American Guidance Service.

Masten, et al. (2005). Developmental Cascades: Linking academic achievement and externalizing and internalizing symptoms over 20 years. *Developmental Psychology, 41*, 733-746.

Masten, A. & Coatsworth, J. D. (1998). The development of competence in favorable and unfavorable environments: lessons from research on successful children. American Psychologist, 53, 205-220.

Mau, W.-C., & Lynn, R. (2007). Gender differences in homework and test scores in mathematics, reading and science at tenth and twelfth grade. *Sexualties, Evolution, and Gender*, 2, 119-125.

McClelland, M. M., Acock, A. C., & Morrison, F. J. (2006). The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Childhood Research Quarterly, 21*, 471-490.

McClelland, M. M., Cameron, C. E., Connor, C. M., Farris, C. L., Jewkes, A. M., & Morrison, F. J. (2007). Links between behavioral regulation and prechoolers's literacy, vocabulary, and math skills. *Developmental Psychology, 43*, 947-959.

McClelland, M. M. & Morrison, F. J. (2003). The emergence of learning-related social skills in preschool children. *Early Childhood Research Quarterly, 18*, 206-224.

McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly, 15*, 307-329.

McDermott, P. A., Leigh, N. M., & Perry, M. A. (2002). Development and validation of the Preschool Learning Behavior Scale. *Psychology in the Schools, 39*, 353-365.

McDowell, D. J., O'Neil, R., & Parke, R. D. (2000). Display rule application in a disappointing situation and children's emotional reactivity: Relations with social competence. *Merrill-Palmer Quarterly, 46*, 306-324.

McLoyd, V. C. (1998). Socioeocnomic disadvantage and child development. *American Psychologist, 53*, 185-204.

McWayne, C. M., Fantuzzo, J. W., & McDermott, P.A. (2004). Preschool competency in context: An investigation of the unique contribution of child competencies to early academic success. *Developmental Psychology, 40*, 633-645.

Miech, R., Essex, M. J., & Gooldsmith, H. H. (2001). Socioeconomic status and the adjustment to school: The role of self-regulation during early childhood. *Sociology of Education*, 74, 102-120.

Miles, S. B. & Stipek, D. (2006). Contemporaneous and longitudinal associations between social behavior and literacy achievement in a sample of low-income elementary school children. *Child Development, 77,* 103-117.

Mirsky, A. F., Anthony, B. J., Duncan, C. C., Ahearn, M. B., & Kellam, S. G. (1991). Analysis of the elements of attention: A neuropsychological approach. *Neuropsychology Review, 2,* 109-145.

Mischel, W., Shoda, Y., & Rodriguez, M. L. (1989). Delay of gratification in children. *Science, 244,* 933-988.

Mistry, R. S., Vandewater, E. A., Huston, A. C., & McLoyd, V. C. (2002). Economic well-being and children's social adjustment: The role of family process in an ethnically diverse low-income sample. *Child Development, 73,* 935–951.

Morrison, F.J., Bachman, H.J., & Connor, C. M. (2005). *Improving Literacy in America: Guidelines from Research.* Yale University Press: New Haven, CT.

Nagin, D. S. (2007). Overview of a semi-parametric, group-based approach for analyzing trajectories of development. In D. J. Flannery, A. T. Vazsonyi, & I. D., Waldman, (Ed).The Cambridge handbook of violent behavior and aggression. (pp. 740-749). xix, 817 pp. New York, NY, US: Cambridge University Press.

No Child Left Behind Act of 2001. US Department of Education. Promoting educational excellence for all Americans. Retrieved electronically on March 19, 2009. http://www.ed.gov/nclb/landing.jhtml

NICHD ECCRN (2003). Do children's attention processes mediate the link between family predictors and school readiness. *Developmental Psychology, 39*, 581-593.

NICHD ECCRN (2004). Multiple pathways to early academic achievement. *Harvard Educational Review*, 74, 1-29.

NICHD ECCRN (2005a). Duration and developmental timing of poverty and children's Cognitive and social development from birth through third grade. *Child Development, 76*, 795-810.

NICHD ECCRN (2005b). Predicting individual differences in attention, memory, and planning in first graders from experience at home, child care, and school. *Developmental Psychology, 41*, 99-114

Normandeau, S. & Guay, F. (1998). Preschool behavior and first-grade school achievement: The mediational role of cognitive self-control. *Journal of Educational Psychology, 90*, 111-121.

Parke, R. (2004). Development in the family. *Annual Review of Psychology, 55*, 365-399.

Parker, J. G, & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? *Psychological Bulletin, 102*, 357-389.

Patterson, C. J., Kupersmidt, J. B., & Vaden, N. A. (1990). Income level, gender, ethnicity, and household composition as predictors of children's school based competence. *Child Development, 61*, 485-494.

Patrick, H. (1997). Social self-regulation: Exploring the relations between children's social relationships, academic self-regulation, and school performance. *Educational Psychologist, 32*, 209-220.

Pianta, R. C., Steinberg, M. S., & Rollins, K. B. (1995). "The first two years of school: Teacher-child relationships and deflections in children's classroom adjustment." *Development and Psychopathology, 7*, 295-312.

Pitrowski, C. S., Botsko, M., & Matthews, E. (2000). Parents' and teachers' beliefs about children's school readiness in a high-need community. *Early Childhood Research Quarterly, 15*, 537-558.

Posner, M. I. & Rothbart, M. K. (1998). Attention, self-regulation and consciousness. *Philosophical Transactions of the Royal Society of London, 353,* 1915-1927.

Pungello, E. P., Kupersmidt, J. B., Burchinal, M. R., & Patterson, C. J. (1996). Environmental risk factors and children's achievement from middle childhood to early adolescence. *Developmental Psychology, 32,* 755–767.

Raffaelli, M., Crockett, L. J., & Shen, Y-L. (2005). Developmental stability and change in self-regulation from childhood to adolescence. *The Journal of Genetic Psychology, 166*, 54-75.

Raudenbush, S. W. (1993). A crossed random effects model for unbalanced data with applications in cross-sectional and longitudinal research. *Journal of Educational Statistics,* 18, 321-349.

Raudenbush, S.W. & Bryk, A. S. (2002). Hierarchical Linear Models: Applications and Data Analysis Methods (2nd ed.). London: Sage.

Raudenbush, S. W., Bryk, A., Cheong, Y. F., Congdon, R., & du Toit, M. (2004). *HLM 6: Hierarchical linear and nonlinear modeling*. SSI Scientific Software International.

Raudenbush, S. W., & Sampson, R. (1999). Assessing direct and indirect effects in multilevel designs with latent variables. *Sociological Methods & Research, 28*, 123-153.

Raver, C. (2002). Emotions matter: Making the case for the role of young children's emotional development for early school readiness. *Social Policy Report, 16 (3),* 1-20.

Raver, C. C., & Zigler, E. F. (1997). Focus section: New perspectives on Head Start. Social competence: An untapped dimension in evaluating Head Start's success. *Early Childhood Research Quarterly, 12*, 363-385.

Rimm-Kauffmann, S. E., Pianta, R. C., & Cox, M. J. (2000). Teachers' judgment of problems in the transition to kindergarten. *Early Childhood Research Quarterly, 15*, 147-166.

Rosvold, H. E., Mirsky, A. F., Sarason, I., Bransome Jr., E. D., & Beck, L. H. (1956). A continuous performance test of brain damage. *Journal of Consulting Psychology, 20*, 343-350.

Rothbart, M. K., Ahadi, S. A., & Hershey, K. L. (1994). Temperament and social behavior in childhood. Merrill-Palmer Quarterly, 40, 21-39.

Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), Handbook of child psychology: Vol. 3. Social, emotional, and personality development (5th ed., pp. 105-176). New York: Wiley.

Royston, P. (2005). Multiple imputation of missing values: Update of ICE. *Stata Journal, 5*, 527-536.

Ruff, H. A., & Rothbart, M. K. (1996). *Attention in early development: Themes and variations*. New York: Oxford University Press.

Rutter, M. (1985). Family and school influences on cognitive development. *Journal of Child Psychology and Psychiatry, 26*, 683-704.

Rutter, M. (1995). Psychosocial adversity: Risk, resilience and recovery. *Southern African Journal of Child & Adolescent Psychiatry, 7*, 75-88.

Sameroff, A. J. (1995). General systems theories and developmental psychopathology. D. Cicchetti, Dante & D. J. Cohen (Eds.). In *Developmental psychopathology, Vol. 1: Theory and methods.* (pp. 659-695). xx, 787 pp. Oxford, England: Wiley.

Sameroff, A. J., Seifer, R., Baldwin, A., & Baldwin, C. (1993). Stability of intelligence from preschool to adolescence: The influence of social and family risk factors. *Child Development, 64*, 80-97.

Sameroff, A. J., Seifer, R., & Bartko, W. T. (1997). Environmental perspectives on adaptation during childhood and adolescence. In S. S. Luthar, Burack, J. A., Cicchetti, D, & J. R. Weisz (Eds.), *Developmental psychopathology: Perspectives on adjustment, risk, and disorder*. (pp. 507-526). New York: Cambridge University Press.

Shonkoff, J. P., & Phillips, D. A. (Eds.). (2000). *From neurons to neighborhoods: The science of early childhood development.* Washington, DC: National Academy Press.

Schunk, D. L. & Pajares, F. (2002). The development of academic self-efficacy. In *The Development of Achievement Motivation*. (pp15-31).A. Wigfield & J. Eccles (Eds.) Academic Press.

Smith, J. R., BrooksGunn, J., & Klebanov, P. K. (1996). Consequences of living in poverty for young children's cognitive and verbal ability and early school achievement. In G. J.

Duncan and J. Brroks-Gunn (Eds.), *Consequences of growing up poor* (pp. 132-189). New York: Russell Sage.

Snyder, Y., Hoffman, C., & Geddes, C. (1996). Digest o education statistics, 1996. Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Supplee, L. H., Shaw, D. S., Hailstones, & Hartman, K. (2004). Family and child influences on early academic and emotion regulatory behaviors. *Journal of School Psychology, 42*, 221-242.

Trentacosta, C. J., Izard, C. E. (2.007) Kindergarten children's emotion competence as a predictor of their academic competence in first grade. *Emotion, 7*, 77-88.

U. S. Department of Education. (2007a). *NAEP: The nation's report card* (NCES 2007-494). Washington, DC: Office of Educational Research and Improvement, National Center for Education Statistics.

U. S. Department of Education. (2007b). *NAEP: The nation's report card* (NCES 2007-496). Washington, DC: Office of Educational Research and Improvement, National Center for Education Statistics.

Vitaro, F., Laroque, D., Janosz, M., & Tremblay, R. E. (2001). Negative social experiences and dropping out of school. *Journal of Educational Psychology, 93*, 312-319.

Votruba-Drzal, E. (2006). Economic disparities in middle childhood development: Does income matter? *Developmental Psychology, 42*, 1154-1167.

Yen, C-J. Y., Konold, T. R., & McDermott, P. A. (2004). Does learning behavior augment cognitive ability as an indicator of academic achievement? *Journal of School Psychology*, *42*, 157-169.

Valiente, C., Lemery-Chalfant, K., Swanson, J., & Reiser, M. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology, 100*, 67-77.

Von Hippel, P. T. (2007). Regression with missing Ys: An improved strategy for analyzing multiple imputed data. *Sociological Methodology, 37*, 83-117.

Warrington, M., Younger, M. & Williams, J. (2000). Student attitudes, image, and the gender gap. *British Educational Research Journal, 26*, 393-407.

Webster-Stratton, C. & Reid, M. J. (2004). Strengthening social and emotional competence in young children – The foundations for early school readiness and success. Incredible Years Classroom Social Skills and Problem-Solving Curriculum. *Infants and Young Children, 17, 96-113.*

Webster-Stratton, C., Reid, M. J., & Stoolmiller, M.(2004). Preventing conduct problems and improving school readiness: evaluation of the incredible years teacher and child training programs in high-risk schools. *Journal of Child Psychology and Psychiatry, 49*, 471-488.

Wentzel, (1991).Relations between social competence and academic achievement in early adolescence. *Child Development, 62*, 1066-1078.

Wentzel, K. R. (1993). Does being good make the grade? Social behavior and academic competence in middle school. *Journal of Educational Psychology, 85*, 357-364.

Wesley, P. W., & Buysse, V. (2003). Making meaning of school readiness in schools and communities. *Early Childhood Research Quarterly, 18*, 351-375.

Wilson, B. J. (2003). The role of attentional processes in children's prosocial behavior with peers: Attention shifting and emotion. *Development and Psychopathology, 15*, 313-329.

Woodcock, R. W. & Johnson, M. B. (1989). WJ-R Tests of Achievement: Examiner's Manual. In R. W. Woodcock, & M. B. Johnson, *Woodcock Johnson Psychoeducational Battery-Revised*. Itasca, IL: Riverside.

Woodcock, R. W. & Johnson, M. B. (1990). WJ-R Tests of Achievement: Examiner's Manual. In R. W. Woodcock, & M. B. Johnson, *Woodcock Johnson Psychoeducational Battery-Revised*. Itasca, IL: Riverside.

Yen, C-J, Konold, T. R., & McDermott, P. A. (2004). Does learning behavior augment cognitive ability as an indicator of academic achievement? *Journal of School Psychology, 42*, 157-169.

Yeung, W. J., Linver, M. R., & Brooks-Gunn, J . (2002). How many matters for young children's development: Parental investment and family processes. *Child Development, 73*, 1861-1879.