Parent Educational Involvement and Student Achievement: Disentangling Parent Socialization and Child Evocative Effects Across Development

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PARENT EDUCATIONAL INVOLVEMENT AND STUDENT ACHIEVEMENT: DISENTANGLING PARENT SOCIALIZATION AND CHILD EVOCATIVE EFFECTS ACROSS DEVELOPMENT

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ABSTRACT

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Longitudinal structural equation models of parent educational involvement (PEI) and student mathematics and literacy achievement were examined for 1364 students, followed from 54 months through 8th grade. Path analyses revealed evidence of bi directionality between PEI and achievement and moderation by economic risk. Specifically, two pathways of association were analyzed: parent socialization and child evocative effects. Parent socialization pathways confirmed the positive association of PEI with both math and literacy achievement -increased parent involvement was significantly associated with increased achievement across development. No evidence of child evocative pathways was found for the full sample. Additionally, economic risk was found to moderate pathways of parent socialization between PEI and achievement. Parent socialization pathways suggested involvement was most strongly and positively associated with high achievement for children with greatest levels of economic risk across childhood. These results underscore the argument that parent educational involvement should be an important goal of practice and policy aimed at closing the achievement gap between lower and higher income children. Indeed, PEI does matter more for some children than others. National policies and school procedures should be geared towards promoting PEI early among the low income parents of underperforming children, for these children not only have the most to gain from having their parents engaged in their education, but also have the most to lose.

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CHAPTER 1: INTRODUCTION

"…Education policies will open the doors of opportunity for our children. But it is up to us to ensure they walk through them. In the end, there is no program or policy that can substitute for a mother or father who will attend those parent-teacher conferences, or help with homework after dinner, or turn off the TV, put away the video games, and read to their child. I speak to you not just as a President, but as a father when I say that responsibility for our children's education must begin at home."

Presidential Address to Congress, February 23, 2009

At this time of heightened attention about the future of U.S. education policy, it is critical to understand the role family educational involvement plays in promoting children"s achievement (Fege, 2006). The No Child Left Behind Act of 2001 identified increasing parent educational involvement as one of the six targeted areas of reform, and the current Administration has furthered this agenda by supporting the National Coalition for Parent Involvement in Education, among other federally funded initiatives. There is an increasing empirical consensus that children in more involved families achieve at higher levels than those in less involved families (Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996; Jeynes, 2005; 2007). Research has also indicated that increased family involvement over time is associated with improved child achievement (Dearing, Kreider, Simpkins, & Weiss, 2006).

Parental Educational Involvement (PEI) is generally defined as a host of parenting practices and behaviors, including activities in the home (e.g., help with homework and educational expectations), activities in the school (e.g., attending open houses and volunteering in the classroom), and both formal and informal communication with teachers, school administrators, and other parents (Pomerantz, Moorman, & Litwack, 2007). In general, meta-analyses demonstrate positive moderate associations between these elements of PEI and student achievement across childhood (see Fan & Chen, 2001 for review). Much of this work, however, has been cross-sectional in design, despite theoretical calls to child growth and its implications

for the ways in which successful PEI must likely adapt to the biological, cognitive and psychosocial developmental needs of the child (Spera, 2005; Pomerantz et al, 2007). Thus, although PEI s now a well-established construct within the developmental psychology literature and educational policy arena, it has arguably not been investigated extensively enough via longitudinal models for us to have a thorough understanding of the „big picture" developmental trajectories of PEI and achievement.

It is possible that studies of the association between PEI and achievement can be improved by conducting a more nuanced investigation of the relationship across child development. Developmental research overwhelmingly relies upon non-experimental studies that estimate associations between PEI and achievement under the assumption that there are no reciprocal, bidirectional effects, despite developmental theory suggesting otherwise (Pomerantz et al, 2007). Theoretically, one would anticipate that evocative and transactional processes are likely the rule in child development rather than the exception.

Contemporary developmental theory suggests that PEI must be understood as a part of a greater contextual sphere of development. The bio ecological model provides a useful framework for understanding the embedded mechanisms and dynamic relationships between parents, their children, and their school and social contexts (Bronfrenbrenner & Morris, 1994). This paradigm suggests that a child exists within a nested system of environments, all of which contain actors (such as their parents, teachers, family and peers) that affect their development. In this model, the child is not a passive recipient of knowledge, but rather actively engaging in and with his world around him. The dynamic relationships of the child with their environment suggest that it is not just the child which is developing in response to the interactions- the child"s environment and the actors within it are dually changed by the child living within them. The ecological

framework provides particular insight when unpacking the relationships embedded within parent educational involvement. From this model we can hypothesize that the child is not just affected by their parent‟s involvement in their education, but also has the capacity to evoke their parent‟s involvement.

More generally, PEI is best understood as a process embedded within a greater family context, and developmentalists have identified that parents and children develop within a complex web of familial relationships (Park & Buriel, 1998). Family systems theory further informs our understanding of PEI by suggesting that family members exist and develop together in bi-directional relationships (Minichuin, 1985). These relationships are the roots of the interdependent developmental processes which have been found to evoke and prohibit parental educational involvement and student achievement. As a result, it is prudent to our understanding of PEI to investigate the potential bidirectional trajectories between PEI and achievement.

In addition to potential bidirectional effects over time, developmental theory further suggests that PEI may matter more for some children than others (Pomerantz et al, 2007). Researchers have posited and explored a number of biological and social factors which can contribute to the impact of PEI on student achievement and socio-emotional well being across childhood (Hill & Taylor, 2004; Fan & Chen, 2001; Dearing et al, 2006). The literature suggests that educational risk factors, such as poverty and mother‟s education level, may make PEI particularly valuable for some children more than others (Brooks-Gunn & Duncan, 1997). Studies have found that PEI may assist children from low income, at risk families and neighborhoods, to overcome socio cultural obstacles to academic achievement (Lee & Bowen, 2006; Pomerantz et al, 2007; Dearing et al, 2006; Hill & Taylor, 2004).

As a result, one such context worthy of further investigation is the moderating role of economic risk. A moderator is a variable that alters the relationship between a predictor and an outcome (Baron & Kenny, 1986). In this case, it would indicate both if the effect of PEI on student achievement and if the effect of achievement on PEI is differentiated for children at different levels of economic risk. The literature has considered SES a global indicator of risk for numerous developmental processes and outcomes, including PEI and student academic achievement (Dearing et al, 2006; Pomerantz et al, 2007). Children from low SES backgrounds tend to have parents with lower levels of education and lower income than their peers (see review in Henderson & Mapp, 2002). It is critical to therefore delineate the role which SES plays in the pathways of PEI and achievement across child development.

Towards this end, the present paper addressed two primary research questions:

1. Is there a bidirectional relation between parent educational involvement and student achievement from early childhood through adolescence?
2. Do pathways of association significantly vary by a child"s level of economic risk?

Pathways indicative of parent socialization and child evocative effects[1] were examined, providing a more nuanced examination of the bidirectional relations between family involvement in education and child achievement than exists in the present literature. The potential moderating effects of economic risk were examined to help further determine for whom family educational involvement matters most. It was expected that these path analyses will reveal evidence of a bidirectional relationship between PEI and student achievement across childhood. Specifically, it was hypothesized that the bidirectionality would differ by student"s initial level of achievement at first grade; wherein low achievement would predict increased levels of involvement and high

[1] For clarity of language, the proposed study is using the term "effects" although it is recognized that causal inferences cannot be made from these data.

initial achievement would predict greater levels of involvement and in turn, greater levels of achievement. As for the moderation analysis, it is anticipated that economic risk would moderate the relationship between PEI and student achievement, insofar as parent involvement will have the greatest benefit for children from low socio economic status across childhood.

CHAPTER 2: LITERATURE REVIEW

Several classic theoretical perspectives highlight the pivotal role parents play in helping their children achieve a wide variety of developmental milestones (e.g., Bandura, 1988; Bronfenbrenner, 1986; Erikson, 1963; Freud, 1965; Vygotsky, 1978). In infancy, children rely on their caregivers to fulfill their basic sustenance and safety needs. As they grow, the socialization focus shifts to successful adaptation in a complex social world, with children‟s capacities to learn from their parent‟s direct and indirect instruction increasing with age. Parent educational involvement is a case in point as parents may invest socialization resources in their child to promote school achievement. Yet, naïve socialization theories that make no room for genetics and the child‟s evocative role are largely rejected by developmental science.

Broadly defined, parent educational involvement includes a wide variety of investments in children‟s academic success. Indeed, most theorists now define parent educational involvement (PEI) as a multifaceted set of attitudes, behaviors, and social relationships (Fan & Chen 2001; Henderson & Mapp, 2002). This multifaceted set includes parental beliefs about education and their involvement (e.g., educational expectations for their child), activities and processes within the home (e.g., help with homework), activities in the school (e.g., attending open houses), and both formal and informal communication with teachers, school administrators, and other parents (Pomerantz et al, 2007). There is growing consensus that the aforementioned domains of PEI be studied separately to preserve the integrity of both the distinct representations of PEI and to disentangle the unique developmental consequences of these involvement domains on student outcomes.

Home involvement. From infancy through the schooling years, a primary aspect of PEI is a parent‟s engagement with their child in the home, including learning stimulation (e.g., parent-

child talk and joint reading activities) and the provision of learning supports (e.g., books and puzzles) (Hill & Taylor, 2004). Dozens of studies have demonstrated that by promoting a nonthreatening environment for problem solving and decision making and by scaffolding learning experiences within a warm emotional climate, parents can positively impact their child"s development and achievement. (Bradley & Corwyn, 2004; Bradley, Corwyn, McAdoo, & García Coll, 2001a; Votruba-Drzal, 2003). Additionally, child achievement is maximized when home environments are enriched with learning supports such as books, puzzles and educational toys and media (Bradley, Corwyn, McAdoo, & García Coll, 2001a; Eccles et al., 1993; Eccles & Midgley, 1989; Hudson, & Lawson, 1996). Researchers are cautious to note that it is not merely the provision of these learning supports, but the quality of the interaction between the parent and child while using these tools which acts as the mechanism which promotes positive student outcomes (Hart & Risley, 1995; Snow, Burans, & Griffin, 1998).

As children enter elementary school, the role of PEI in the home often transitions into helping with homework and fostering a home routine structure focused on achievement throughout middle childhood (Epstein, 1998; Grolnick & Ryan, 1989; Steinberg, 1996; Sui-Chu & Williams, 1996). The National Center for Educational Statistics (2002) reports that approximately 75% of parents identified that they help "at least sometimes" with their child"s homework. Research on home PEI during middle childhood has linked parental help with homework to both student achievement and the development of personal attributes which promote achievement, such as self -regulation, self-esteem and perception of academic competence (Grolnick & Slowiaczek, 1994; Hoover-Dempsey et al., 2001; Shumow & Miller, 2001). The literature suggests that when parents are involved in homework, they are often engaging in interactive learning processes with their child (Hoover-Dempsy et al., 2001), and by means of modeling (Bandura, 1997),

reinforcement (Skinner, 1989) and parental instruction (Rogoff, 1990), improve the child‟s developmental capacity for achievement. It is dually noted that not all studies of parent involvement in homework have found positive effects on student achievement and that there are indeed between-child differences resulting from between-family differences of assistance (Dearing & Tang, 2010). Correlational investigations have yielded mixed findings, suggesting both positive (Keith et al, 1993; Cooper, 1989) and negative (Cooper, 1989; Epstein, 1988) relationships between homework involvement and achievement dependent upon how parent involvement was quantified (composite vs categorical score), respectively. Researchers look to theoretical models of family systems and parent engagement to explain the negative findings, hypothesizing such reasons as differences in parent‟s motivations for assisting, parent‟s means to assist, parent‟s instructional methods, and children‟s competence and emotional climate (Hoover-Demspey et al, 2001). In some instances, studies suggest that direct involvement with homework can result in excessive pressure on the child, creating parent and child expectations for achievement which are inconsistent with student capabilities (Cooper et al, 1999). In sum, it is critical for future research of homework involvement to identify the unique parent and student characteristics which improve student achievement.

Despite the developmental shifts towards autonomy and individuation of adolescence, the literature suggests that PEI in the home can still play a productive role in promoting student achievement (Spera, 2005; Wentzel & Battle, 2001). Studies of home involvement during middle and high school identify the most successful PEI as those actions and intentions which are geared toward learning stimulation, positive support and future goal orientation (Catsambis, 1998; Fan & Chen, 2001), rather than that which is geared more towards monitoring adolescence behavior or negatively motivated by a student failure (Cooper et al, 2000; Epstein et al, 1997; Izzo et al,

1999). Although there is a decline, on average, in both school and communicative PEI during adolescence (see later discussion in *school* and *communicative* sections, respectively), investigations of PEI in the home context suggest that parents who continue to create a home environment conducive to learning stimulation and to promote a high value of education, have children who not only score higher on achievement tests, but also are more likely to graduate and attend college (Catsambis, 1998; Gutman & Midgley, 2000; Henderson & Map, 2002).

In sum, the literature suggests that PEI in the home context has a protective effect on students as they progress through the school years (Henderson & Mapp, 2002). Studies suggest that parental home involvement is associated with positive achievement in literacy and math throughout the school years, as well as positive socio-emotional developmental gains across childhood and adolescence. It is important to keep in mind however, that empirical work on the developmental value of home learning environments is overwhelming based on correlational designs that do not account for child evocative effects making causal inferences difficult.

School Involvement. Parent educational involvement in the school includes such activities as visiting the classroom, volunteering with parent organizations and attending open houses and events (Cooper et al, 2000; Eccles, 1999; Epstein et al 1994; Fan & Chen, 2001). Indeed, based on assumptions of the value of parents spending time in their child"s school, the heart of multiple national and local educational agendas encourage parent participation in school activities. Moreover, the US Department of Education reports that approximately two-thirds of parents are involved in their children"s school, by means of attending general school meetings and teacher conferences (2006). Level of involvement, however, is not equally distributed in the population; involvement levels are, on average, lowest among families whose children face the most obstacles to educational success, such as children growing up in poverty, those with language

barriers and those with less educated parents (Fan & Chen, 2001: Ogbu, 1981). Please see the section on socioeconomic status for further discussion of the pervasive impact of socioeconomic status on the relationship between PEI and student achievement.

Longitudinal investigations of school PEI find positive effects on children‟s contemporaneous and later developmental outcomes (Dearing et al, 2006; Grolnick et al, 2000; Hill et al, 2004). Children whose parents are more involved in their school have largely been found to score better on both literacy and math assessments, as well as to have fewer behavioral issues and spend less time in special education (Fan & Chen, 2001; Izzo et al, 1999; Miedel & Reynolds, 1999; Pomerantz et al, 2005). In addition, increased involvement by parents predicts improvements in child achievement and social skills, perhaps most so for children facing multiple risks for academic failure (Dearing et al., 2006). Researchers identify a number of mechanisms by which these activities might matter, including through improved teacher-child relationships, improved child attitudes towards school and learning (Dearing et al, 2004) and improved parent- child connectedness (Epstein, 1988).

It is important to note that similar to the PEI in the home context discussion, when examining school PEI, researchers are careful to mention that the impact which PEI has on student achievement should be considered in terms of the quality, rather than quantity of the interaction. When parents engage in quality interactions at their child‟s school, they may gain "skill related resources" (Pomerantz et al, 2005) such as knowledge of what their child is learning at school and knowledge of their child‟s abilities. This knowledge can enable parents to be more effective at encouraging and extending the child‟s learning outside of school (Gutman & Eccles, 1999; Hill & Taylor, 2004). Additionally, research suggests that children of parents who are involved receive more attention from their teachers for when a teacher views a parent as invested in their

child‟s achievement; they pay more attention to that child (Epstein & Baker, 1982). Taken together, studies suggest that school PEI during middle childhood is a multifaceted process which has the potential to positively impact current and future student achievement.

Researchers have consistently found a significant decline in school PEI during adolescence (Epstein & Dauber, 1991; Milgram and Toubiana, 1999; Muller, 1998; Spera, 2005), with PEI diminishing from approximately 50% during elementary school to roughly 7% in middle and high school (Epstein & Dunbar, 1991; Spera, 2004; Vogels, 2002). This decline in involvement has been attributed to both adolescents‟ developmental need for autonomy (Epstein et al, 1994; Erikson, 1963; Henderson & Mapp, 2002) and schools diminishing their initiation of PEI in middle and high school (Hoover-Dempsey et al, 1987; Hill & Taylor, 1994; Spera, 2005; US Department of Education, 1998). It has been argued that as a result of the developmental needs of the adolescent, schools are justified in decreasing their opportunities for parent engagement in their child‟s schooling, despite multiple studies suggesting that greater levels of school initiated involvement (such as, teacher communication with parents) are positively related to increased parent school involvement during middle and high school (Epstein & Lee, 1995; Fan & Chen, 2001; Pomerantz et al, 2005). Numerous analyses of national longitudinal data sets (including the National Educational Longitudinal Study, NELS: 88, and the NICHD SECC and Youth Development) further document the decline of school initiated PEI and parental school involvement (Epstein & Lee, 1994; Fan & Chen, 2001; Pomerantz et al, 2005) with reports of approximately 65% of parents reporting their child‟s school has never contacted them about their child‟s academic progress (Epstein & Lee, 1994).

In sum, parental educational involvement in school predicts academic achievement and socio-emotional well-being across the early and later school years. On average, school PEI peaks in the

early school years and then drops off as the child transitions into adolescence, but some parents are more likely than others to be involved in school, and the benefits of that involvement may be greatest for children facing the most obstacles to educational success. Child evocative effects and, more generally, a reliance on correlational designs is an important concern in this area too; the extent to which high or low performing children, for example, might evoke higher or lower levels of PEI at school – perhaps resulting in positive or negative feedback loops of accelerating or decelerating involvement and achievement – is critical for understanding the ultimate impact of that involvement.

Involvement through Communication. A third form of parent educational involvement is communication with teachers, administrators and other parents (Fan & Chen, 2001; Stevenson & Baker, 1997). Parent communication about their children‟s education has been found to have a significant effect on academic and socio-emotional well being (Hill & Taylor, 1994), by way of increasing a parent‟s social capital (Laureau, 1996) and control (McNeal, 1999).

In early childhood, parents can socialize with other parents about their child‟s education by way of informal play groups, online parent forums and structured developmental activities (such as Gymboree© and mommy&me©). The literature suggests that parents communicate about their child‟s development and seek affirmation and acquire new information regarding educational opportunities and expectations for their child (Hill & Taylor, 1994; Pomerantz et al, 2005).

Once enrolled in primary school, research suggests that communication plays an increasingly important role in the child‟s development. Longitudinal studies of PEI have found that parents who communicate regularly with their child‟s teacher during elementary school have children who score better academically and socio-emotionally than their peers. Researchers posit that one

reason parent-teacher communication benefits children is through teachers taking a greater interest in those students whose parents communicate with them (Epstein & Baker, 1982; Pomerantz et al, 2005). Researchers further suggest that through communication with their child‟s teacher, parents and teachers are coming to a shared and improved understanding of children‟s unique educational strengths and weaknesses (Eccles, 1999; Epstein & Baker, 1982). In turn, classroom and home practices change to better meet these needs (Hoover-Dempsey et al, 1992, 1995). As a result, communicative PEI increases parents‟ social capital (Laureau, 1996) and further extends their capacity for social control (McNeal, 1999). By communicating with their child‟s educators and the parents of their child‟s peers, parents extend their values and beliefs about education and in turn increase the consistency of the messages relayed to their children throughout their day.

Additionally, the greatest opportunity for school-initiated parent communicative involvement has been found to be during the elementary school years (Epstein et al, 1991). Research on school initiated communication has found that schools are most likely to appeal to parents and communicate opportunities for engagement during primary school than at any other time in a child‟s educational career (Comer & Haynes, 1991; Epstein et al, 199; LaParo & Pianta, 2001). Moreover, children‟s neurological development is vastly maturing their cognitive and socio-emotional functioning at this time. As a result, educational theorists stress the importance of teachers and parents working together during middle childhood to enable learning experiences which capitalize on a child‟s educational potential (Bandura, 1997; Piaget, 1950; Vygotsky, 1978). Indeed, theory suggests and research confirms that school initiated parent communicative involvement is important during middle childhood.

Similarly to the aforementioned decline in school PEI during adolescence, research further suggests a decrease in parental communicative involvement as their child grows into middle and high school. Empirical investigations of PEI in adolescence have found parents largely report that schools do not communicate their child‟s achievement to them, and dually do not provide opportunities for them to communicate with their child‟s teachers and administrators (Epstein & Lee, 1995; Spera, 2005).

Parents who are communicatively involved in their child‟s education have children who, on average, do better in school, both academically and socio-emotionally (Pomerantz et al, 2005; Fan & Chen, 2001). The impact of parent communicative involvement resonates across child development and provides a useful lens through which to understand the impact of PEI as an area for socialization in a child‟s overall growth and achievement.

Taken together, the PEI literature has identified parent educational involvement as a multifaceted set of attitudes, behaviors and social relationships (Fan & Chen, 2001; Henderson & Mapp, 2002) which researchers suggest manifest themselves in primarily three developmental domains for involvement, the family‟s home, child‟s school and parent‟s communication. The impact of parent socialization effects versus child evocative effects on the relationship between PEI and student achievement remains a concern to researchers, and a deeper investigation of such contexts and pathways for development will inform our greater understanding of these trajectories across development.

Involvement in Context

Contemporary developmental theory suggests that PEI must be understood as part of a greater context of development and system of community-family-child relations. The bio-ecological model provides a useful framework for understanding the embedded mechanisms and dynamic

relationships between parents, their children, and their school and social contexts (Bronfrenbrenner & Morris, 1994). This framework suggests that children grow within a hierarchically-nested system of environments, all of which contain actors (such as their parents, teachers, family and peers) and relationships between these actors, both of which directly and/or indirectly may impact development.

Importantly, in the bio-ecological model, children are not passive recipients of socialization, but rather are actively engaging with their world and, thereby, becoming co-determinants of their development. The dynamic relationships of the child with their environment suggest that it is not just the child which is developing in response to the interactions- the child‟s environment and the actors within it are dually changed by the child living within them. The ecological framework provides particular insight when unpacking the mechanisms and relationality embedded within parent educational involvement. From this model we can hypothesize that the child is not just affected by their parent‟s involvement in their education, but also has the capacity to evoke their parent‟s involvement.

Most proximally, PEI is understood to be embedded within a greater family context, and developmentalists have identified that parents and children develop within a complex web of familial relationships (Park & Buriel, 1998). Family systems theory further informs our understanding by suggesting that family members exist and develop together in bi-directional relationships (Minichuin, 1985). These relationships are the roots of the interdependent developmental processes which have been found to evoke and prohibit parental educational involvement and student achievement.

Parent educational involvement does not begin on a child‟s first day of school and the field has given extensive attention to understanding the important role which parents play during early

childhood to promote later student achievement (Dearing et al, 2006). The ecological and family systems models also identify that these relationships are not static, and to adequately capture the trajectories of parent educational involvement over a child‟s development it is necessary to examine a longitudinal model of parent educational involvement and child‟s achievement across early and middle childhood. Therefore individual trajectories of PEI and achievement, as well as pathways of associations between PEI and achievement, should be assessed over time to fully capture the depth and breadth of PEI across childhood.

Much of this work, however, has been cross-sectional in design, despite theoretical calls to child growth and its implications for the ways in which successful PEI must likely adapt to the biological, cognitive and psychosocial developmental needs of the child (Pomerantz et al, 2007; Spera, 2005). For example, as children grow older their increasing need for autonomy, capacities for self-control and meta-cognitive abilities (e.g. planning) suggests that adolescents should be better able to independently manage homework to-do lists in their school planner with minimal to no parental assistance, compared with children in elementary school who may rely more heavily on parental guidance when organizing and executing homework tasks (Eccles & Roeser, 2009).

Two Developmental Pathways linking Involvement and Child Outcomes?

Given our understanding of the fluctuations and transitions of PEI over the course of child development, it is prudent for research to explore the potential pathways of effects of PEI and achievement across childhood and adolescence. The literature has suggested that parents and children mutually contribute to socialization (Belsky, 1984) and as a result the current research will investigate the transactional relationships between PEI and student achievement across childhood.

Parent Socialization. Until recently, the literature overwhelmingly suggested that there is a positive relationship between family involvement and student academic achievement (Jeynes, 2003, Pomerantz et al, 2007). Previous research of parent involvement and academic achievement has found that the direct learning stimulation that happens through parental involvement, such as helping with homework or reading together, has a positive impact on student achievement (Fan & Chen, 200; Hill & Taylor, 2004; Jeynes, 2003; Marjoribanks, 2002). Additional consensus in the field suggests that children project their parents‟ value for education and that this value for education is modeled through parent educational involvement (Coleman et al., 1966; Gottfried et al, 1998; Jodl et al., 2001). Likewise, it appears that educational involvement impacts student cognitive self regulation and social emotional processes that in turn positively affect student achievement (Ibanez et al, 2004; Pintrich et al, 2004). For example, it has been found that student achievement motivation and feelings about school are better for students whose parents are positively involved in their children‟s education (Eccles, 1999, Gottfried et al, 1998). Furthermore, parent communication with their child‟s school has proven to be positively associated with student academic achievement (Epstein et al, 1991).

The term „parent socialization‟ is used to describe the process through which a parent imparts skills, motives, attitudes and behaviors to their child by means of involving themselves in their child‟s education. Inherent in this model is the idea that through a parent engaging in their child‟s education, they are providing their child with social capital necessary for successful adaption in school and life (Parke & Buriel, 1998). Parent socialization effects will be estimated across early and middle childhood, wherein parent involvement is predicting student achievement. This investigation will be confirmatory in nature, and be the foundation from which the more nuanced models are built upon.

Child Evocative Effects. There is yet another hypothesis embedded within the dyadic PEI model which suggests that children‟s behaviors, temperaments and actions play an active role in engaging parents to become involved in their child‟s education. *Child evocative effects* can be understood as child driven impetuses for parent involvement. Children can evoke their parent‟s involvement through essentially two types of actions, positive behaviors or successes (good grades, school awards, athletic achievements, etc) and negative behaviors or failures (poor academic performance, behavioral issues, etc). Recent investigations of PEI have stressed the importance of acknowledging not just how parents get involved, but why they choose to do so (Pomerantz et al 2007). PEI that is driven by student success or failure may look different to both the parent *and* the child. Parents of children who are not succeeding in school may become involved in reaction to the child‟s performance. The previously studied parent socialization models of PEI do not adequately capture the role which children‟s competence experiences, such as their achievement and perceptions of their ability, have in this model. Children of parents who become involved in response to their low achievement may internalize their parent‟s interest in their education negatively (Eccles, 1983, Pomerantz et al, 2007). As a result, their parent‟s involvement can have a diminished effect on their later achievement.

Therefore, child evocative effects can be understood as the second part of the bi-directional relationship which the ecological and family systems models suggest. The child evocative effects model will estimate the relationship between PEI and student achievement across early and middle childhood wherein child achievement is predicting PEI, further explicating the distinct embedded relationships inherent in the study of PEI and achievement.

Economic Risk: A Moderator of PEI?

The literature suggests that parental educational involvement may matter more for some children than others (Gibson, 1979; Henderson & Mapp, 2002). In particular, Dearing and colleagues have argued that involvement may matter most for children at exceptional risk for underachievement, namely children living in families with few socioeconomic resources (e.g., Dearing et al., 2004; Dearing & Tang, 2010). In short, these researchers have argued that PEI could help low SES families and children compensate for disadvantages in the realms of (a) material (e.g., too few learning stimulating toys in the home) and (b) cultural capital (e.g., experience within the social world of schools) disadvantages that often characterize the home lives of children in low income families.

Economic deprivation constrains parents‟ abilities to invest in learning materials for their children (Roscogno & Ainsworth-Darnell, 1999). In addition, several studies suggest that low-income parents are less likely than other parents to engage in learning activities and developmentally-stimulating interactions with their children (Dearing & Taylor, 2007; Hart & Risley, 1995; Votruba-Drzal, 2003). In short, economic deprivation limits material and psychosocial investments in children‟s home learning environments (Dearing, 2009). If family involvement promotes academic achievement, then these children have the most to gain in having their parents involved in their education and from the social and cultural capital which relationships with teachers and schools can afford (Eccles, 2004; Marjoribanks, 2002; Simpkins et al., 2006). Moreover, given that involvement levels are, on average, lowest among families facing economic risk, these families may also have the most to gain with regard to the potential for children to evoke involvement; high levels of child achievement may be an especially salient and powerful evocative stimulus in an economic context that is otherwise constraining parental investments.

Present study

The present study aims to disentangle pathways of association between parent involvement and student achievement from early childhood through adolescence. Specifically, two primary research questions will be addressed:

Research Question One: Is there a bidirectional relation between parent involvement and student achievement from early childhood through adolescence?

1a. It is expected that a bidirectional relationship between PEI and student achievement will exist across childhood (See Figure 1. for visual depiction of anticipated hypothesis). Specifically, two sets of associations are expected: (1) parent socialization effects and (2) child evocative effects. Regarding the parent socialization effects, parent educational involvement will be positively associated with contemporaneous and lagged child achievement; higher levels of involvement will predict higher levels of achievement, even when controlling for previous levels of achievement.

1b. Regarding the child evocative effects, it is expected that achievement prior to school entry will be positively associated with parent involvement at first grade such that higher levels of achievement at 54 months will predict higher levels of involvement at first grade. However, it is expected that achievement after school entry (i.e., first and third grade) will be negatively associated with lagged parent involvement; for example, lower levels of achievement at first grade will be associated with higher levels of involvement at third grade. In other words, following the expectation that teachers and parents try to intervene when children struggle, low levels of achievement beginning at first grade are expected to evoke higher levels of involvement at later time points.

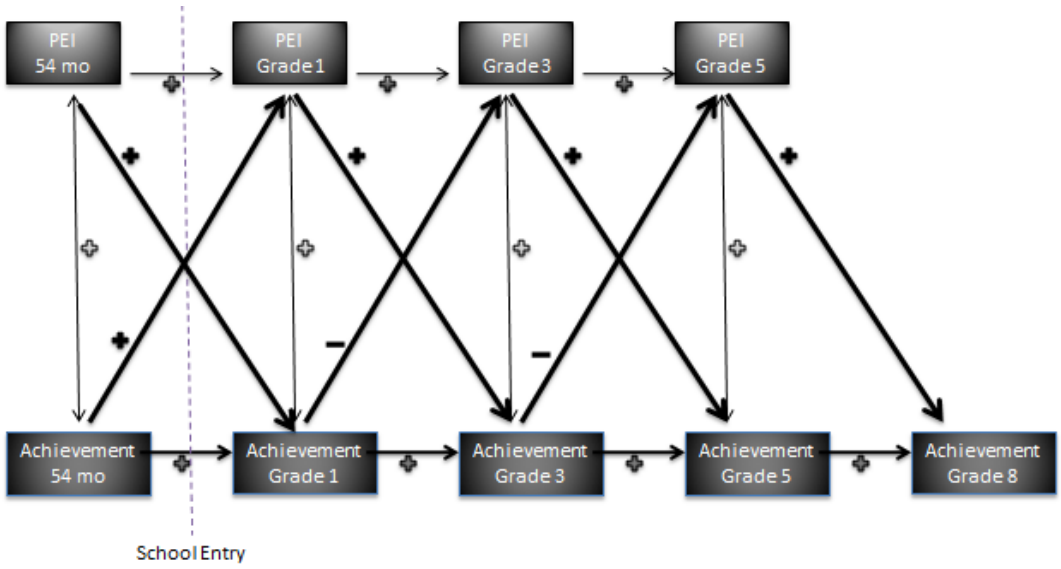


Figure 1. Model of Anticipated Transactional Effects

Research Question Two: Do pathways of association significantly vary by economic risk?

2a. Regarding parent socialization effects, it is anticipated that economic risk will moderate the relationship between PEI and student achievement, insofar as parent involvement will be most strongly and positively associated with high achievement for children with greater levels of economic risk across childhood.

2b. Regarding child evocative effects, it is expected that economic status will moderate the relationship between student achievement and PEI. It is anticipated that the low child achievement will be more likely to evoke higher involvement among lower risk families than higher risk families because lower risk families have fewer barriers to involvement than their higher risk counterparts.

CHAPTER 3: METHODS

Data. Data from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD) were examined for the present study. The NICHD SECCYD is a longitudinal investigation which began collecting data from 1,364 children residing in ten sites across the United States. Participants were selected from 8,986 children born during sampling periods throughout 1991 in 24 hospitals near 10 U.S. research sites. Children were excluded from the sample if their mother was younger than 18 years of age at the child's birth, did not speak English, or had a substance abuse problem; if the family planned to move; or if the child was hospitalized for more than 7 days following birth or had obvious disabilities. Participants were selected by conditional random sampling, which ensured that they reflected the ethnic, economic, and educational diversity of each site's catchment area. The NICHD SECCCYD conducted home visits of the children at 1, 6, 15, 24, 36 and 54 months and in first grade, and supplemented with phone calls every three months. By Phase II, through first grade, 1226 children participated in the study. Data collection expanded to include repeated standardized assessments and observations of child outcomes, as well as an extensive list of teacher, parent and peer reports of child development. Such multifaceted, comprehensive data collection continued and evolved as it was developmentally appropriate to do so. At Phase III, through sixth grade, 1061 children participated and at Phase IV, through ninth grade, 1,009 children participated. This study will utilize data from Phases I, II, III and IV (through 15 years of age). Table 1 displays sample demographics, means and standard deviations, at entry into SECCYD.

Table 1

Descriptive Demographics at Entry into NICHD SECCYD (N=1364)

	%/M (SD)	*% missing*
Child Characteristics		
African American	12%	--
Latino/American	6%	--
White/Caucasian	80.4%	--
Child is a Boy	52%	--
Maternal Characteristics		
Partnered Status	85.5%	0.20%
Mean Education Level in years	14.23 (2.51)	0.10%
Family Characteristics		
Early Income-to-Needs Score	3.70 (2.87)	25.88%
Average Income-to-Needs Score	3.71 (3.01)	4.03%

Measures

Demographics. Mothers reported on a variety of family demographics at the birth of the child, including family ethnicity, mother"s education level, mother"s partnered status and family income.

Ethnicity. Mothers reported on the race of the child as White, Black, or Latino at birth, and parents who selected "other" were excluded from the NICHD sample.

Maternal Education. Mother‟s highest level of education completed (in years) was reported by mothers when study children were 1 month old. The mean of the sample was 14.2 years, roughly equivalent to an Associate‟s degree.

Partner Status. Mothers self-reported on their partner status at one month after the child was born. For this analysis, mothers who chose married or partnered- living together, were coded as „partnered‟ (*n* = 1165, 85.5%) and mothers who self-identified as separated, divorced, widowed, not living together, not involved or other were grouped into „not partnered‟ (*n* =197, 14.5%).

Family Income. Household income was collected at each data collection time-point. In order to capture the effects of poverty, an income-to-needs composite score was created using the ratio of family income to the appropriate U.S. Census poverty threshold, based on family size and number of children in the home. Generally, a ratio of less than 1 is considered poor; there is a growing consensus among policymakers and analysts, however, that this threshold fails to capture families who fall above the designated "poverty line" but still would be considered "low income" in their livelihoods. As an alternative, many researchers use a score of less than 2 (i.e., income twice the poverty line) to indicate low-income families. This level of income relative to needs will be used in the present study to assess economic risk. Complete descriptive statistics for average income-to-needs ratio from 54 months through eighth grade can be found in Table2. Two income-to-needs scores were created for the present study. First, to be used as a control for all analyses, income-to-needs scores at months[2] 6, 15, 36, and 54 were averaged to create an early income-to-needs average (*M* = 3.70, *SD* = 2.87).

[2] It is noted that income-to-needs data at birth and one month are not used in this paper due to recommendation of the NICHD ECRN acknowledgement that there were problems with data collection at these time points.

Second, to divide participants for the multigroup analyses, income-to-needs scores were averaged across the entire study (at months 6, 15, 36, and 54 and grades 1, 3, 5 and 8), creating an index of "permanent" income-to-needs (M = 3.68, SD = 2.97, see Table 2*)*. Using this average income-to-needs across the entire study period, children were divided into high and low risk groups (i.e., low income vs. other) for the multigroup moderation analyses. It is important to note one special set of imputation analyses for this variable, however.

Although Full Information Maximum Likelihood (FIML) is the recommended imputation method for missing values within structural equation models, group variables for multigroup analyses cannot be imputed in this way – they must be complete or imputed prior to estimating the structural model. Thus, as is recommended in the SEM literature (see Sauer & Dick, 1993 for review), the Expected Maximum (EM) Algorithm was invoked prior to splitting the sample into two groups in order to maintain the entire sample (N=1364). The EM algorithm was used to replace missing values for average income-to-needs scores (55 values, 4.03%) based on all other available data for each case. Comparative descriptive statistics for average income-to-needs score based on listwise deletion versus imputation can be found in Table 3.

Table 2

Descriptive Statistics for Average Income-to-Needs Score for sample, 6 months through Eighth Grade

	Measurement Period								
Child Outcome	6 mo	15 mo	24 mo	36 mo	54 mo	1st grade	3rd grade	5th grade	8th grade
Average Income-to-Need Score									
N	1271	1234	1190	1208	1073	982	982	996	9.24

M	3.53	3.60	3.62	3.52	3.60	3.95	4.39	4.53	5.26
(SD)	(3.19)	(3.29)	(3.11)	(3.12)	(3.17)	(3.03	(3.77)	(4.06)	(5.79)

Table 3

Comparative Descriptive statistics for Average Income-to-Needs Score before and after Expected Maximum (EM) Algorithm

	Pre EM Algorithm			Post EM Algorithm		
	N	Mean	*SD*	*N*	Mean	*SD*
Average Income-to-Needs Score	1309	3.71	3.01	1364	3.68	2.97

Once invoking the EM algorithm, this permanent income-to-needs score was used to divide the sample into two groups for the multigroup analyses. Since a score of less than 2 (i.e., income twice the poverty line) has been accepted as indicative of low income families, children at *high risk*, *n*=393, had an income to needs ratio of less than 2 (*m* = 1.07, *SD* = 0.57) and children at *low risk, n*= 971, had an income to needs ratio greater than 2 (*m* = 4.73, *SD* = 2.89).

Parent Involvement. This study utilized two measures to capture PEI across childhood. Table 4 outlines the two measures used to capture PEI in this research and when they were assessed.

Table 4

Parent Involvement Measure and Assessment Timeline

Measure	54 Months	Grade 1	Grade 3	Grade 5
HOME Involvement	R			
Parent Teacher Involvement Scale		T	T	T

Note: Reporters are as follows: R=Researcher Report, T= Teacher Report

To capture parent educational involvement during early childhood the Home Observation for Measurement of the Environment (HOME) Inventory was used. The HOME Inventory is designed to measure the quality and quantity of stimulation and support available to a child in the home environment. The focus is on the child *in* the environment, the child as a recipient of inputs from objects, events, and transactions occurring in connection with the family surroundings. The HOME is composed of 55 items clustered into eight subscales (Learning Materials, Language Stimulation, Physical Environment, Parental Responsivity, Learning Stimulation, Modeling of Social Maturity, Variety in Experience, and Acceptance of Child). Each item is scored in binary fashion (yes/no). Information used to score the items is obtained during the course of the home visit by means of observation and semi-structured interview. All observations and interviews were conducted with the child‟s mother. In the present study, the total HOME score from the eight subscales was used at 54 months, (N = 1045, m = 46.0, SD= 5.46), capturing parent educational involvement in the early home environment.

To assess PEI in middle childhood, teacher report on the Parent- Teacher Involvement Questionnaire (Stipek, 1995, Miller-Johnson, Maumary-Gremaud, & Conduct Disorders Research Group, 1995) was used. The teacher form used at first grade had 21 items and at third & fifth grade contained 12 items. In order to capture items directly assessing parent involvement from the surveys, questions were selected based on face validity. Next, principal component factor analysis was run separately for each group of selected items at first, third and fifth grade to make sure that items selected were appropriate. Each factor analysis produced conceptually meaningful factors with eigenvalues of greater than 1; and items with moderate to high factor loadings (>.50) on one factor loading were retained for each group. This identified 14 items from the first grade survey (α = .75), seven items from both the third grade (α =.92) and fifth grade (α

=.92) survey. Items were averaged to create their PEI score at each grade. Table 5 provides descriptive statistics for the selected scales across the measurement time period (54 months through 5th grade) and Table 6 the items from the Parent Teacher Involvement Questionnaire selected for inclusion in the present study.

Table 5

Descriptive Statistics For Parent Educational Involvement Outcomes, 54months through Grade Five

	Measurement Period			
Child Outcome	54mo	1st grade	3rd grade	5th grade
Parent Educational Involvement				
N	1045	802	956	907
M	46.0	2.63	3.35	3.27
(SD)	(5.46)	(0.67)	(0.93)	(0.93)

Table 6

*Parent-Teacher Involvement Questionnaire items selected for inclusion in PEI Construct**

Item	1st Grade	3rd Grade	5th Grade
1. How often has this child‟s parent called you this school year?	×		
2. How often has this child‟s parent written you a note this school year?	×		
3. How often has this child‟s parent stopped by to talk to you this school year?	×		
4. How often has this child‟s parent visited your school for a special event (e.g., book fair) this school year?	×		
5. How often has this child‟s parent attended a parent-teacher conference this school year?	×	×	×
6. How often has this child‟s parent been to PTA meetings	×	×	×

this school year?			
7. How much is this parent interested in getting to know you?	×	×	×
8. How often does this parent ask questions or make suggestions about his/her child?	×	×	×
9. How much do you feel this parent has the same goals for his/her child that the school does?	×	×	×
10. How often does this parent send things to class like story books or objects?	×	×	×
11. To the best of your knowledge, how much does this parent do things to encourage this child‟s positive attitude towards education (e.g., take him/her to the library, play games to teach child new things, read to him/her, help him/her make up work after being absent)?	×	×	×
12. How often does this parent volunteer at school?	×	×	×
13. How involved is this parent in his/her child‟s education and school life?	×	×	×
14. How important is education in this family?	×	×	×

*Note- Teacher report was used for all items

Student Achievement. Student achievement was assessed using the *Woodcock-Johnson Psycho-educational Battery – Revised* (WJ-R, Woodcock & Johnson, 1989) across childhood and adolescence. Table 7 outlines the assessment schedule for WJ-R.

Table 7

Selected NICHD WJ-R Student Achievement Measure Timetable

	54mo	1st grade	3rd grade	5th grade	8th grade
Mathematics Achievement					
Applied Problems	×	×	×	×	×
Literacy Achievement					
Letter-Word	×	×	×	×	

The WJ-R provided standardized information about the children‟s academic ability at 54 months, first, third, fifth and eighth grade. In the present study, two of the subscales, *applied*

problems (mathematics achievement) and *letter-word identification (literacy achievement)*, were used. *Applied problems* measured the child"s skill at analyzing and solving practical problems in mathematics. To solve the problems, the child must recognize the procedure to be followed and then perform relatively simple calculations. *Letter-word identification* measured the child"s cognitive achievement. The first five letter-word identification items involve symbolic learning, or the ability to match a pictographic representation of a word with an actual picture of the object. The remaining items measured the child"s reading identification skills for isolated letters and words. These WJ-R subscales demonstrated excellent reliability and validity in standardization samples and the SECCYD (α"s ranged from .96-.98 across all data collection points for applied problems and from .94-.97. for letter-word). In this study, total standardized scores were used. Table 8 provides descriptive statistics for the selected subscales across the measurement time period (54 months through 8th grade).

Table 8

Descriptive Statistics For Child Achievement Outcomes, 54months through Grade Eight

	Measurement Period				
Child Outcome	54mo	1st grade	3rd grade	5th grade	8th grade
WJ Applied Problems					
N	1053	1023	1013	993	887
M	425.05	470.99	497.33	509.82	524.57
(SD)	(19.49)	(15.74)	(13.19)	(12.85)	(16.77)
WJ Letter Word Identification					
N	1056	1025	1014	993	
M	369.99	452.96	493.86	510.12	

(SD)	(21.98)	(24.11)	(18.73)	(17.52)

Data Analyses Plan and Model Specifications

The primary research questions were addressed by estimating path models using LISREL[3] (Jureskog and Surbom 1989) software. Following Kline (1998) and Hu and Bentler (1999), model fit was examined using multiple indices. Specifically, I used root mean square error of approximations (RMSEA, values of <.06) to evaluate the models (Hu & Bentler, 1999). In addition, although the statistical significance of absolute chi square values can be a misleading indicator in samples as large as the SECCYD, change in chi square across varying nested model specifications was used in the present study (e.g., when comparing unconstrained and constrained nested models), as it is the conventional test of improved model fit regardless of sample size (Kline, 1998).

Separate models were run for each child outcome, applied problems and letter word. Due to attrition, using listwise deletion to estimate variance-covariance components resulted in over a 50% loss of participants (*n*"s ranged from 430-487). Moreover, demographic covariates and child outcomes correlated with missingness, including Black and Hispanic ethnicity, income-to-needs assessments, and achievement outcomes and parent educational involvement scores after 1st grade. Thus, data were not missing completely at random. As such, full-information maximum likelihood (FIML) estimation was used to impute missing values (Applied Problems, 19.97%; Letter-Word, 18.86%), allowing the full sample to be included in analysis. FIML is the recommended approach for moderate to large amounts of missing data in descriptive studies

[3] It is important to differentiate between the term associations and effects in the following analyses. An important feature of the SEM software is that is allows for distinction between direct, indirect and total effects. Therefore it is important to consider effects not as evidence of causality (as this is an impossible result for non-experimental data) but rather as indicative of relationships between variables of interest.

such as the present analyses,[4] even when the missing at random assumption is violated (Widaman, 2006; Schafer & Graham, 2002).

The initial, hypothesized model included lagged associations, (for example, involvement at 54 months→ applied problems at grade one and applied problems at 54 months → achievement at grade one, etc.) In addition, errors for contemporaneous PEI and achievement measures were allowed to correlate across time and autoregressive paths from earlier to later assessments of PEI (e.g., PEI54 to PEI1) and WJ (e.g., WJ54 to WJ1) were estimated. Child and family covariates were specified as predictors of parent involvement and student achievement at 54 months, including: maternal education level, average income-to-needs score from 6-54 months, mother‟s partner status, child‟s gender, and child‟s ethnicity.[5]

Models were first tested for the full sample (research question one) and then re-estimated allowing pathways to vary by economic risk (research question two). The models presented in this paper represent the best fitting models for the two research questions, respectively. Null results and those which inform the best fitting models are also reported.

[4] It is noted that on average, listwise deletion and FIML results were generally similar for all achievement outcomes.

[5] Alternative exclusion coding was used in these analyses, wherein the largest ethnic group, White (80.4%) was omitted from each model as a comparison group to Hispanic and Black, respectively.

CHAPTER 4: RESULTS

In Table 9, zero-order correlations are presented for measures of primary interest. Three patterns were evident in these unconditional associations. First, all seven of the control variables were associated with PEI, applied problems and letter-word, with the strongest associations evident at 54 months. These relationships demonstrate the importance of controlling for demographic covariates, particularly prior to school entry. Second, PEI assessments were related across time (e.g., PEI54 months→ PEI1st grade), as were Achievement measures (e.g., Letter-word54months → Letterword1st grade). Correlations across time for PEI ranged from .49 to .59 and were largest from first to third grade. Correlations for applied problem ranged from .59 to .78 and were largest from fifth to eighth grade. For letter-word, these correlations ranged from .56 to .86, and were largest from third to fifth grade

Third, correlations between PEI and child achievement between 54 months and eighth grade, including lagged associations, were consistently significant and positive. Contemporaneous associations between PEI and applied problems ranged in size from .26 to .42, with the largest association at 54 months. For PEI and letter-word, contemporaneous associations ranged from .28 to .42, and the association was largest at 54 months. Lagged parent socialization associations (PEI → Achievement) for applied problems ranged from .27 to .36, and were largest at 54 months and smallest at grade one. For letter-word, lagged parent socialization associations ranged from .29 to .35, and were again largest at 54months and smallest at grade one. Lagged child evocative associations (Achievement → PEI) for applied problems were nearly identical across middle childhood, with the largest association at first grade (r = .29) and smallest association at 54 months and third grade, (r = .27) respectively. For letter-word, child evocative

associations were again nearly identical across middle childhood, with the largest association at 54 months (r = .27) and smallest association at first and third grade, (r = .26) respectively.

Table 9.

Summary of Correlations for Items for Analysis (n=1364)*

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.^
1. PEI 54	.49	.45	.47	.42	.36	.39	.42	.38	.42	.35	.38	.41	.43	.32	.44	-.38	-.10	.35	.07
2. PEI G1		.59	.54	.27	.26	.27	.29	.28	.27	.28	.29	.33	.35	.32	.35	-.27	-.15	.29	-.03
3. PEI G3			.55	.32	.29	.30	.33	.32	.25	.26	.28	.30	.33	.28	.32	-.26	-.09	.26	.03
4. PEI G5				.31	.28	.27	.32	.32	.27	.25	.26	.28	.34	.24	.36	-.25	-.04	.24	.04
5. AP 54					.59	.56	.56	.49	.56	.44	.48	.45	.33	.24	.34	-.33	-.03	.28	.12
6. AP G1						.69	.69	.63	.48	.57	.53	.51	.26	.21	.34	-.29	-.03	.25	-.07
7. AP G3							.78	.66	.44	.53	.61	.60	.26	.24	.30	-.31	-.01	.26	-.04
8. AP G5								.74	.43	.50	.58	.60	.30	.28	.35	-.35	.01	.28	-.03
9. AP G8									.44	.45	.51	.52	.31	.25	.34	-.31	-.01	.26	-.09
10. LW 54										.56	.51	.49	.33	.18	.35	-.19	-.07	.15	.10
11. LW G1											.75	.67	.26	.15	.27	-.19	-.06	.17	.06
12. LW G3												.86	.29	.22	.31	-.30	-.04	.26	.03
13. LW G5													.32	.22	.32	-.31	-.05	.28	.01
14. MomEd														.28	-.42	.18	.09	-.18	-.05
15. Partner															.33	-.38	-.07	.34	-.01
16. Inc2Need																-.29	-.09	.25	.03
17. Black																	-.06	-.93	.01
18. Hispanic																		-.33	.03
19. White																			-.02

*All correlations are significant at p<.05; ^20. Male

In Table 10, zero-order correlations are presented separately for High and Low Risk groups. Three patterns are evident that mirror those in the full sample. First, all seven of the control variables were associated with PEI, applied problems and letter-word, with the strongest associations evident at 54 months for both High and Low Risk groups, again demonstrating the importance of controlling for demographic covariates, particularly prior to school entry. Second, PEI assessments were related across time (e.g., PEI54→ PEI 1st grade), as were Achievement measures (Letter-word54months → Letter-word 1st grade). Correlations across time for PEI ranged from.39 to .51 for the High Risk group and were largest from first to third grade. For the Low Risk group, lagged correlations ranged from .29 to .48 and were largest from both first to third grade and third to fifth grade, respectively (r = .48). Lagged associations for the High Risk group applied problem scores ranged from .55 to .81, and were largest from third to fifth grade. For the Low Risk group, coefficients ranged from .53 to .70, and were largest again from third to fifth grade. Lagged associations for letter-word ranged from .49 to .87, and were largest from third to fifth grade for the High Risk group. For the Low Risk group, lagged associations ranged from .52 to .82, with the largest association from third to fifth grade.

Third, correlations between PEI and child achievement between 54 months and eighth grade, including lagged associations, were consistently significant and positive for both groups. For the High Risk group, contemporaneous associations between PEI and applied problems ranged from .21 to .30, with the largest association at 54 months. For the Low Risk group, contemporaneous associations between PEI and applied problems ranged from .09 to .30, with the largest association at 54 months. For the High Risk group, PEI and letter-word, contemporaneous associations ranged from .15 to .35, with the largest at 54 months. For the Low Risk group, PEI and letter-word, contemporaneous associations ranged from .11 to .31, and the

association was largest at 54 months. Lagged parent socialization associations (PEI → Achievement) for the High Risk group applied problems ranged from .21 to .31, and were largest at third grade and smallest at grade one. The Low Risk group applied problems lagged parent socialization coefficients ranged from .10 to .21, and were largest at 54 months and smallest at grade one. For letter-word, the High Risk group lagged parent socialization associations ranged from .16 to .27, and were again largest at 54months and smallest at grade one. The Low Risk group letter word lagged parent socialization associations ranged from .14 to .21, and were again largest at 54months and smallest at grades one and three. Lagged child evocative associations (Achievement → PEI) for applied problems for the High Risk group ranged from .15 to .26, with the largest association at third grade and smallest association at fifth grade. For the Low Risk group, lagged child evocative associations for applied problems ranged from .10 to .14, with the largest association at third and fifth grade and smallest association at first grade. For letter word child evocative associations for the High Risk group, coefficients ranged from .14 to .23, with the largest association at first and third grade, and smallest association at fifth grade. The letter word child evocative associations for the Low Risk group ranged from .09 to .13, with the largest association at fifth grade and smallest association at grade one.

Table 10.

Summary of Correlations for Analyses items for High Risk Group(n=393) and Low Risk Group (n=971)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
1. PEI 54	-	.40	.33	.30	.30	.29	.36	.36	.29	.35	.27	.29	.33	.32	.15	.35	-.25	-.02	.23	.12
2. PEI G1	.29	-	.51	.43	.17	.23	.21	.24	.27	.23	.23	.16	.24	.21	.21	.34	-.22	-.10	.23	-.09
3. PEI G3	.29	.48	-	.39	.20	.26	.24	.31	.32	.18	.23	.22	.24	.25	.20	.19	-.13	-.03	.13	.04
4. PEI G5	.33	.43	.48	-	.15	.19	.15	.21	.30	.18	.20	.14	.15	.16	.08	.15	-.12	.04	.06	.03
5. AP 54	.30	.10	.19	.21	-	.55	.49	.50	.34	.45	.37	.41	.36	.21	.13	.30	-.22	.00	.19	.15
6. AP G1	.21	.09	.14	.15	.53	-	.70	.69	.59	.43	.59	.56	.52	.17	.12	.24	-.24	.07	.20	-.05
7. AP G3	.21	.10	.15	.14	.51	.63	-	.81	.65	.42	.55	.63	.65	.18	.13	.25	-.24	.13	.17	-.04
8. AP G5	.24	.08	.15	.17	.49	.64	.70	-	.79	.39	.51	.62	.63	.23	.21	.21	-.32	.13	.25	-.03
9. AP G8	.26	.08	.15	.16	.48	.58	.62	.67	-	.39	.47	.48	.52	.26	.17	.25	-.28	.13	.23	-.12
10. LW 54	.31	.09	.12	.14	.51	.41	.37	.35	.38	-	.49	.50	.51	.22	.02	.21	-.10	-.07	.13	.02
11. LW G1	.21	.11	.11	.11	.27	.50	.44	.41	.36	.52	-	.74	.65	.16	.03	.21	-.13	.02	.13	.00
12. LW G3	.22	.14	.12	.13	.41	.42	.52	.45	.43	.43	.72	-	.87	.15	.11	.22	-.21	.09	.19	.02
13. LW G5	.24	.15	.14	.16	.39	.40	.47	.47	.43	.39	.61	.82	-	.20	.12	.20	-.23	.07	.19	-.04
14. MomEd	.39	.28	.20	.25	.27	.25	.25	.26	.29	.27	.18	.25	.26	-	.15	.25	.07	.02	-.07	.04
15. Partner	.13	.13	.05	.07	.08	.06	.10	.07	.08	.07	.01	.05	.04	.13	-	.46	-.30	-.01	.27	-.09
16. Income	.24	.14	.13	.17	.19	.19	.17	.20	.20	.23	.11	.16	.14	.42	.11	-	-.38	-.03	.38	-.03
17. Black	-.21	-.06	-.11	-.13	-.25	-.18	-.20	-.19	-.19	-.07	-.08	-.18	-.19	-.14	-.25	-.11	-	-.15	-.90	.09
18. Hispanic	-.09	-.14	-.06	-.03	.01	-.04	-.08	-.04	-.05	-.02	-.07	-.08	-.11	-.07	-.03	-.03	-.02	-	-.29	.07
19. White	.20	.11	.13	.14	.17	.13	.15	.10	.12	-.01	.04	.13	.15	.11	.20	.05	-.93	-.33	-	-.13
20. Gender	.06	-.03	.-2	.03	.13	-.09	-.05	-.-5	-.10	.13	.08	.03	.03	.05	.06	.05	-.06	.00	.05	-

*All correlations are significant at p<.05; ^High Risk Group correlations are presented above the diagonal and Low Risk Group correlations are presented below the diagonal

Path Models for Research Question One: Is there a bidirectional relation between parent involvement and student achievement from early childhood through adolescence?

As a first step in estimating path models for associations between PEI and child achievement, contemporaneous and lagged relations were constrained to be equal across children, regardless of socioeconomic risk. Model fit for the proposed pattern of associations (see Figure 1) was examined first. Models were estimated separately for math (applied problems) and literacy (letter-word recognition) outcomes.

The standardized path coefficients for the hypothesized relations of primary interest are displayed in Figure 2 for applied problems and Figure 3 for letter word. Table 11 shows the unstandardized coefficients and standard errors for these paths.

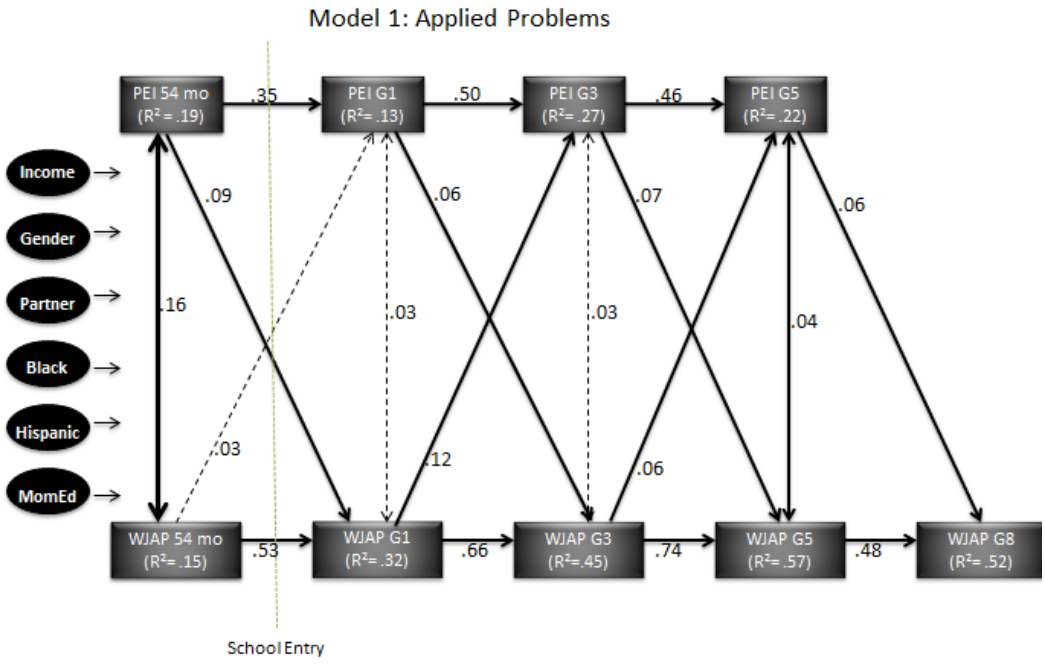


Figure 2. Standardized path coefficients in structural equation models relating PEI and Student Applied Problems Achievement across middle childhood. Covariates include gender, ethnicity, maternal education, partnered status and income-to-needs score; χ^2 (132)= 6.3; RMSEA= 0.09, (90% CI = .083–.094); *Note.* Solid paths are significant, dashed paths are insignificant.

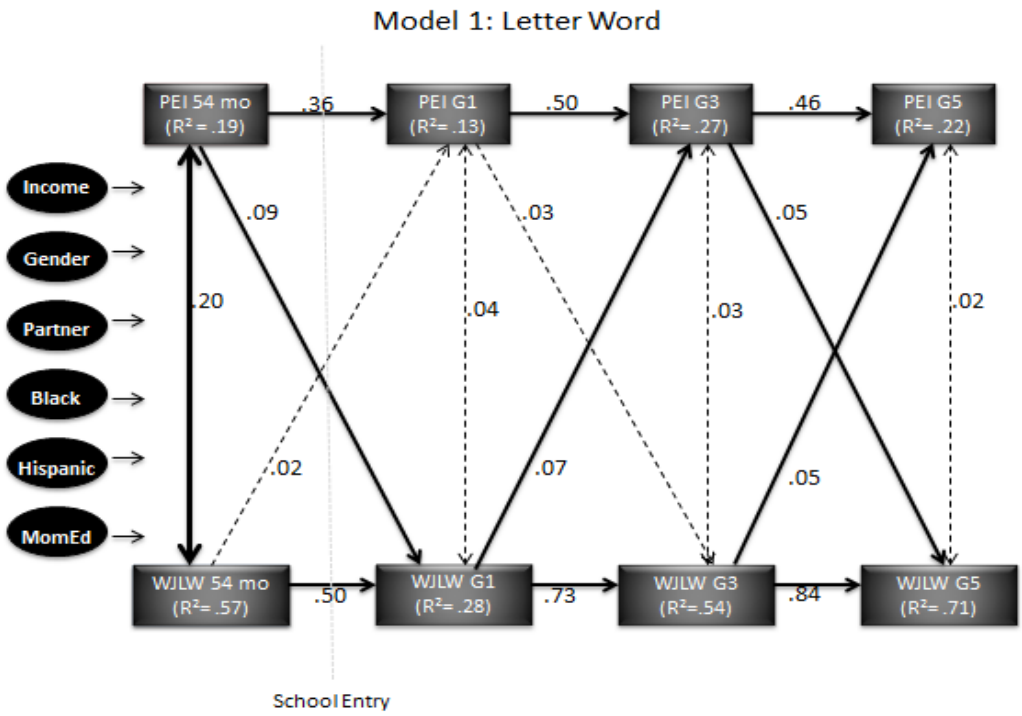


Figure 3. Standardized path coefficients in structural equation models relating PEI and Student Letter-Word Achievement across middle childhood. Covariates include gender, ethnicity, maternal education, partnered status and income-to-needs score. χ^2 (132) = 4.0; RMSEA= 0.07, (90% CI = .060–.072); *Note.* Solid paths are significant, dashed paths are insignificant.

Table 11

Full Information Maximum Likelihood Estimates and Selected Fit Indices For Hypothesized Transactional Model*

	Applied Problems		Letter-Word	
	b	*(SE)*	*b*	*(SE)*
Paths				
WJ54→ PEIG1	0.001	(0.001)	0.001	(0.001)
WJG1→ PEIG3	**0.007***	**(0.002)**	**0.003***	**(0.001)**
WJG3→PEIG5	**0.004***	**(0.002)**	**0.003***	**(0.001)**
PEI54→ WJG1	**0.28***	**(0.09)**	**0.45***	**(0.14)**
PEIG1 →WJG3	**1.19***	**(0.56)**	1.01	(0.70)
PEIG3→ WJG5	**0.96***	**(0.32)**	**0.73***	**(0.36)**
PEIG5→ WJG8	**0.71***	**(0.27)**	--	--
Contemporaneous Associations				

WJ54 ↔ PEIG54	**13.83***	**(2.31)**	**19.74***	**(2.70)**
WJG1↔PEIG1	0.27	(0.25)	0.56	(0.39)
WJG3↔PEIG3	0.33	(0.23)	0.39	(0.30)
WJG5↔PEIG5	**0.41***	**(0.20)**	0.27	(0.23)
Selected Fit Indices				
p value	0.00		0.00	
RMSEA	0.09		0.07	
χ^2	829.93		525.11	
df	132		132	
90% CI	.083–.094		060–.072	

Note. Models also include gender and ethnicity as covariates; 90% CI = 90% Confidence Interval, RMSEA= Root Mean Square Error of Approximation; x^2 = adjusted chi square; *df* =Degrees of Freedom

For parent socialization pathways, all of the hypothesized associations were significant for applied problems; PEI at 54 months was positively associated with applied problems at first grade (β = .09), PEI at first grade was positively associated with applied problems at third grade (β = .06*)*, PEI at third grade was positively associated with applied problems at fifth grade (β = .07), and PEI at fifth grade was positively associated with applied problems at eighth grade (β = .06) Hypothesized parent socialization pathways for letter-word were significant from PEI at 54 months to letter-word achievement at first grade (β = .09) and from PEI at third grade to applied problems at fifth grade (β = .05).

Hypothesized lagged relations for child evocative effects were statistically significant from achievement at first grade to PEI at third grade (applied problems, β = .12; letter-word*,* β = .07) and from achievement at third grade to PEI at fifth grade (applied problems, β = .06*;* letter-word*,* β = .05*)* for both achievement outcomes. In addition, contemporaneous associations were statistically significant for applied problems at 54 months (β = .16) and fifth grade (β = .04), but the only statistically significant contemporaneous association for letter-word was at 54 months (β = .20).

In considering these results, however, it is important to note that this initial model, as proposed model in Figure 1, provided a poor fit to the data for applied problems,

χ^2(df=132)=829.93, p =0.0, RMSEA= 0.09, (90% CI = .083–.094) and letter-word, χ^2(df=132)=525.11, p =0.0, RMSEA= 0.07, (90% CI = .060–.072). Generally, a relative chi-square (x^2, the chi-square fit index divided by the degrees of freedom) value of less than 3, and a RMSEA <.06 indicate good fit (Bollen, 1989; Hu & Bentler, 199l; Kline, 1998).Thus, although the results for the unconstrained initial model do suggest evidence of bi-directionality, empirically based model adjustments were made to each model to maximize fit.

Additional pathways suggested by model modification indices were added one at a time, for each model, starting with the largest estimated decrease in chi square. In addition to several new paths between covariates and variables of interest, the resulting model for applied problems included the following additional pathways of socialization and evocative effects: (a) for PEI at third grade, PEI a and achievement at 54 months were included; (b) for PEI at fifth grade, PEI at 54 months and first grade were included; (c) for achievement at third grade, achievement and PEI at 54 months were added; (d) for achievement at fifth grade, achievement at 54 months and first grade as well as PEI at 54 months were added; and (e) for achievement at eighth grade, achievement at 54 months, first and third grade was added to the model. The resulting model for letter-word included the following additional pathways of socialization and evocative effects: (a) for PEI at third grade, PEI at 54 months was added; (b) for PEI at fifth grade, PEI at 54 months and first grade were added; (c) for achievement at third grade, achievement and PEI at 54 months were added; and (d) for achievement at fifth grade, achievement at 54 months and first grade and PEI at 54 months and third grade were added.

The standardized path coefficients for the resulting models are displayed in Figure 4 for applied problems and Figure 5 for letter-word. Table 12 shows the unstandardized coefficients and standard errors for these paths. Overall, the resulting models for applied problems: χ^2(31) =

25.95, p = 0.02, RMSEA= 0.00, (90% CI = .00–.016), and letter-word: χ^2(df=22)=13.30, p = 0.05, RMSEA= 0.00, (90% CI = .00–.012), provided good fit to the data.

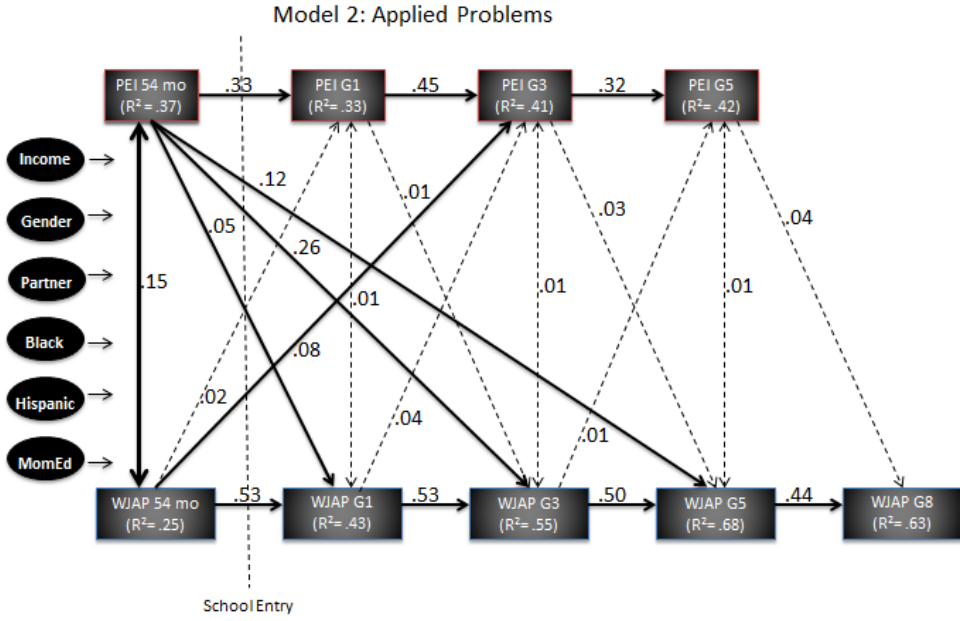


*Figure 4.*Final standardized path coefficients in structural equation models relating PEI and Student Applied Problems Achievement across middle childhood. Covariates include gender, ethnicity, maternal education, partnered status and income-to-needs score; $\chi^2(31) = 25.95$, p = 0.02, RMSEA= 0.00, (90% CI = .00–.016); *Note.* Solid paths are significant, dashed paths are insignificant.

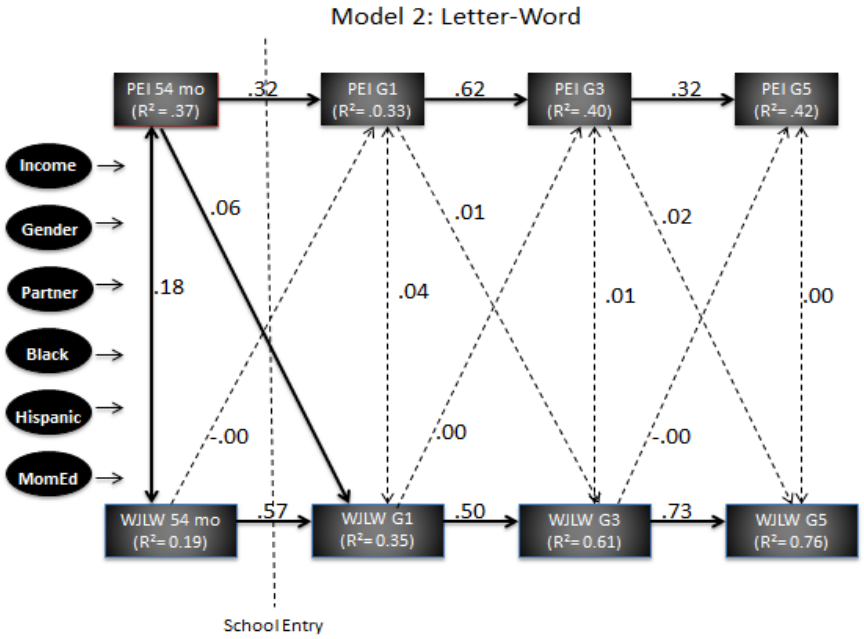


Figure 5. Final standardized path coefficients in structural equation models relating PEI and Student Letter-Word Identification across middle childhood. Covariates include gender,

ethnicity, maternal education, partnered status and income-to-needs score; χ^2(df=22)=13.30, p = 0.05, RMSEA= 0.00, (90% CI = .00–.012); *Note.* Solid paths are significant, dashed paths are insignificant.

Table 12

Full Information Maximum Likelihood Estimates and Selected Fit Indices For Transactional Model*

	Applied Problems		Letter-Word	
	b	*(SE)*	*b*	*(SE)*
Paths				
WJ54→ PEIG1	0.001	(0.001)	-0.001	(0.001)
WJG1→ PEIG3	0.002	(0.002)	0.002	(0.001)
WJG3→PEIG5	0.001	(0.002)	-0.002	(0.002)
PEI54→ WJG1	**0.16***	**(0.09)**	**0.47***	**(0.13)**
PEIG1 →WJG3	0.23	(0.56)	0.09	(0.10)
PEIG3→ WJG5	0.41	(0.31)	0.32	(0.37)
PEIG5→ WJG8	0.73	(0.44)	--	--
PEI54→ WJG3	**0.26***	**(0.07)**	--	--
PEI54→ WJG5	**0.12***	**(0.06)**	--	--
WJ54 → PEIG3	**0.004***	**(0.002)**	--	--
Contemporaneous Associations				
WJ54 ↔ PEIG54	**16.73***	**(2.43)**	**22.34***	**(2.82)**
WJG1↔PEIG1	0.16	(0.24)	0.67	(0.38)
WJG3↔PEIG3	0.09	(0.22)	0.19	(0.29)
WJG5↔PEIG5	0.10	(0.18)	0.002	(0.22)
Selected Fit Indices				
p value	0.02		0.05	
RMSEA	0.00		0.00	
χ^2	25.95		13.30	
df	31		22	
90% CI	.00–.016		.00–.012	

Note. Models also include gender and ethnicity as covariates; 90% CI = 90% Confidence Interval, RMSEA= Root Mean Square Error of Approximation; x^2 = adjusted chi square; *df* =Degrees of Freedom

For hypothesized parent socialization pathways, for both achievement outcomes, only the path from PEI at 54 months to achievement at first grade was significant (applied problems, β = .05; letter-word, β = .06). When considering child evocative effect pathways, in short, none of

the hypothesized lagged relations were statistically significant. Indeed, most relations were close to zero. Additionally, the only statistically significant contemporaneous associations in the best fitting model was at 54 months for both applied problems (β = .15) and letter-word (β = .18).

There were, however, significant lagged socialization associations that were not hypothesized in the original model (see Figure 4). First, PEI at 54 months was significantly associated with applied problems at grades three (β = .26) and five (β = .12). Higher involvement at 54 months predicted higher applied problem scores across middle childhood. Second, applied problems at 54 months was significantly and positively associated with PEI at grade three (β = .08) such that higher achievement prior to school entry predicted later higher levels of involvement at third grade. Third, demographic covariates were significantly associated with PEI and achievement across the study timeline. Table 13 displays standardized path coefficients and standard errors for pathways from covariates to achievement and PEI in the final model.

Table 13

Full Information Maximum Likelihood Covariate Pathway Estimates For Final Transactional Models, Applied Problems and Letter-Word*

	Applied Problems		Letter-Word	
	b	*(SE)*	*b*	*(SE)*
Hypothesized Associations				
Male Gender →WJ54	**4.69***	**(1.06)**	**3.73***	**(1.23)**
Maternal Education → WJ54	**2.04***	**(0.26)**	**2.34**	**(0.27)**
Black → WJ54	**-13.84**	**(1.75)**	**-4.87***	**(2.02)**
Hispanic → WJ54	-2.34	(3.98)	-7.45	(4.60)
Partner → WJ54	3.28	(1.72)	1.24	(1.98)
Early Inc-to-Needs→ WJ54	**0.24***	**(0.06)**	**1.25***	**(0.27)**
Male Gender →PEI54	**0.65***	**(0.27)**	**0.64***	**(0.27)**
Maternal Education → PEI54	**0.79***	**(0.07)**	**0.79***	**(0.07)**
Black → PEI54	**-3.93***	**(0.45)**	**-3.86***	**(0.45)**
Hispanic → PEI54	**-2.48***	**(1.02)**	**-2.58***	**(1.01)**
Partner → PEI54	**1.27***	**(0.44)**	**1.26***	**(0.44)**

Early Inc-to-Needs→ PEI54	**0.24***	**(0.06)**	**0.24***	**(0.06)**
Additional Associations				
Male Gender → WJG1	**-4.52***	**(0.77)**	**--**	**--**
Maternal Education → WJG1	**0.55***	**(0.20)**	**--**	**--**
Early Inc-to-Needs → WJG1	**0.35***	**(0.17)**	--	--
Black → WJG1	**-3.59***	**(1.27)**	**-5.31***	**(1.98)**
Maternal Education → WJG3	**--**	**--**	**0.45***	**(0.20)**
Black → WJG3	**--**	**--**	**-5.71***	**(1.22)**
Early Inc-to-Needs → WJG3	**--**	**--**	0.16	(0.17)
Maternal Education → WJG5	**--**	**--**	**0.34***	**(0.14)**
Black→ WJG5	**-2.14***	**(0.1)**	**-2.10***	**(0.93)**
Partner → WJG5	1.44	(0.75)	--	--
Maternal Education → WJG8	**0.77***	**(0.16)**	--	--
Male Gender → WJG8	**-2.28***	**(0.73)**	--	--
Male Gender→ PEIG1	**-0.08**	**(0.04)**	1.18	(1.26)
Partner → PEIG1	**0.25***	**(0.06)**	**0.22***	**(0.07)**
Maternal Education → PEIG1	**0.06***	**(0.01)**	**0.05***	**(0.01)**
Early Inc-to-Needs→ PEIG1	--	--	0.01	(0.01)
Hispanic → PEIG1	**-0.48***	**(0.14)**	**-0.49***	**(0.14)**
Black→ PEIG1	--	--	-0.10	(0.07)
Maternal Education → PEIG3	0.02	(0.01)	0.02	(0.01)
Partner → PEIG3	0.13	(0.08)	**0.17***	**(0.08)**
Early Inc-to-Needs→ PEIG3	0.01	(0.01)	**0.01***	**(0.01)**
Maternal Education → PEIG5	--	--	0.02	(0.01)
Hispanic → PEIG5	**0.44***	**(0.18)**	**0.45***	**(0.18)**
Early Inc-to-Needs → PEIG5	**0.03***	**(.01)**	**0.02***	**(0.01)**

**p< .05*

Path Models for Research Question Two: Do pathways of association significantly vary by economic risk?

As a first step to assess group differences, best fitting pathways of parent socialization and child evocative effects (see description on page 44) were allowed to vary across economic risk groups for each achievement outcome. To determine if both socialization and evocative paths significantly differed across groups, they were allowed to vary in separate models. For example, when socialization paths were allowed to vary, the evocative effects were constrained to be equal and vice versa. The overall likelihood-ratio test comparing the constrained and unconstrained models for parent socialization paths between PEI and applied problems

achievement were statistically significant; in other words, model fit was improved by allowing pathways of socialization to differ for the economic risk groups. The pathways were not, however, significantly different across risk groups for the child evocative effect pathways in the applied problems model. However, the overall likelihood-ratio test comparing the constrained and unconstrained models for both parent socialization and child evocative effect paths between PEI and letter-word achievement were statistically significant; model fit was improved by allowing both pathways of socialization and evocative effects to differ for the economic risk groups. Table 14 displays the chi square statistics for the null hypothesis (H_0) and unconstrained models (H_{ps}) and (H_{ce}) respectively.

Table 14

Chi Square Comparison for Constrained and Unconstrained Multigroup Models for all Achievement Outcomes

	Applied Problems			Letter-Word		
	χ^2	*df*	RMSEA	χ^2	*df*	RMSEA
H_0	421.65*	108	0.07	297.57*	109	0.05
H_{ps}	350.79*	91	0.07	257.62*	93	0.05
H_{ce}	402.02*	89	0.07	241.69*	84	0.05
$x^2\Delta H_{ps}$	79.86*	17		39.95*	16	
$x^2\Delta H_{ce}$	19.63	19		55.88*	25	

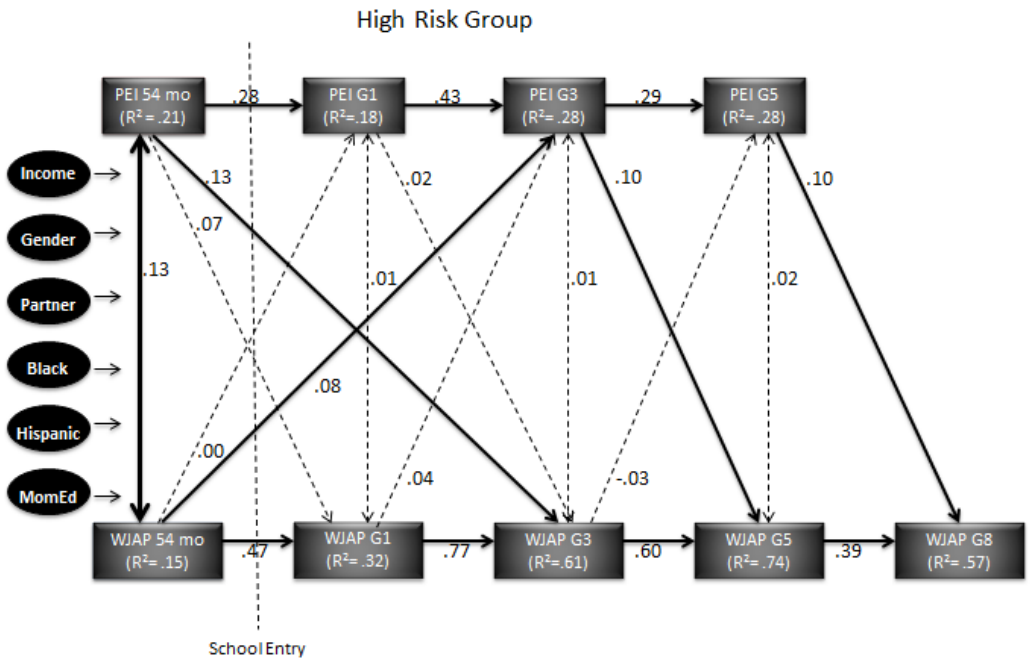
*$p < .05$; x^2= Chi-Square; *df* =Degrees of Freedom; RMSEA= Root Mean Square Error of Approximation; H_{ps}=unconstrained parent socialization pathways; H_{ce}= unconstrained child evocative effects.

As such, allowing socialization paths to vary across groups improved applied problems model fit and allowing both socialization and evocative paths to vary across groups improved

letter-word model fit. Although there were improvements across both models, fit remained poor, overall. Therefore, empirically based model adjustments were made to maximize fit.

Additional pathways suggested by model modification indices were added for each group. The resulting model for applied problems included the additional pathway of achievement at 54 months predicting PEI at grade five. The resulting model for letter-word included the additional pathway of PEI at grade one predicting achievement at grade 5.

The resulting standardized path coefficients for the hypothesized relations of primary interest for applied problems are displayed in Figure 6. Table 15 shows the unstandardized coefficients and standard errors for these paths. Overall, the resulting model for applied problems provided adequate to the data, albeit just shy of good fit thresholds: $\chi^2(83) = 331.11$, p = 0.0, RMSEA= 0.06, (90% CI = .059–.074).



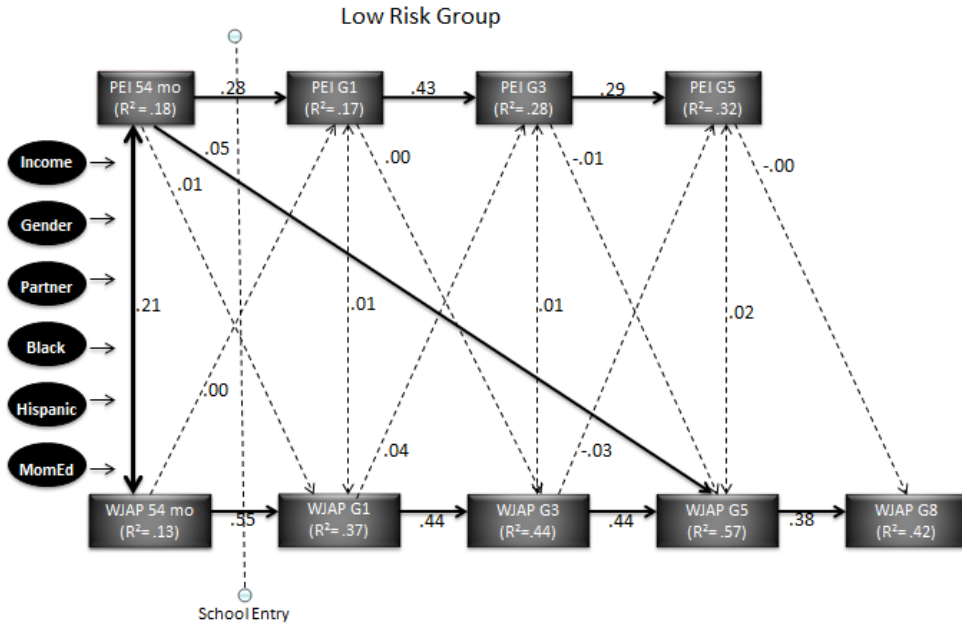


Figure 6. Multigroup structural equation models relating PEI and Student Applied Problems Achievement across middle childhood for High Risk and Low Risk. Covariates include ethnicity, gender, maternal education level and partnered status. *Note.* Solid paths are significant, dashed paths are insignificant.

Table 15

Full Information Maximum Likelihood Estimates and Selected Fit Indices For Multi Group*

Comparison Model: Applied Problems

		High Risk		Low Risk	
		b	*(SE)*	*b*	*(SE)*
Paths					
	WJ54→ PEIG1	0.001	(0.001)	0.001	(0.001)
	WJG1→ PEIG3	0.002	(0.002)	0.002	(0.002)
	WJG3→PEIG5	-0.002	(0.002)	-0.002	(0.002)
	PEI54→ WJG1	0.27	(0.18)	0.04	(0.11)
	PEIG1 →WJG3	0.48	(1.09)	0.05	(0.66)
	PEIG3→ WJG5	**1.37***	**(0.60)**	-0.10	(0.35)
	PEIG5→ WJG8	**0.72***	**(0.38)**	-0.02	(0.13)
	PEI54→ WJG3	**0.35***	**(0.14)**	--	--
	PEI54→ WJG5	**--**	**--**	**0.13***	**(0.07)**
	WJ54 → PEIG3	**0.004***	**(0.002)**	--	--
Contemporaneous					

Associations				
WJ54 ↔ PEIG54	**11.09 ***	**(4.42)**	**18.00***	**(2.64)**
WJG1↔PEIG1	0.13	(0.23)	0.13	(0.23)
WJG3↔PEIG3	0.06	(0.22)	0.06	(0.22)
WJG5↔PEIG5	0.19	(0.18)	0.19	(0.18)
Select Fit Indices				
p value		0.00		
RMSEA		0.06		
χ^2		328.82		
df		85		

Note. Models also include gender and ethnicity as covariates; ***p*< .05, RMSEA= Root Mean Square Error of Approximation; χ^2= adjusted chi square; *df* =Degrees of Freedom

Overall, when looking at the hypothesized pathways for the Low Risk group, none of the associations- parent socialization or child evocative effects- were significant. For the High Risk group, however, there were significant associations across two of the hypothesized parent socialization pathways. The parent socialization pathways from third grade PEI to fifth grade achievement (β = .10), and from fifth grade PEI to eighth grade achievement (β = .10), were statistically significant (p<.01). Lastly, the only statistically significant contemporaneous associations was at 54 months for both the High Risk (β = .13) and Low Risk (β = .21) groups.

In addition, there were three significant lagged associations that were not hypothesized in the original model (see Figure 6). First, PEI at 54 months was significantly associated with applied problems at third grade for the High Risk group (β = .13) and applied problems at fifth grade for the Low Risk group (β = .05). Higher involvement at 54 months predicted higher applied problem scores at for both groups during middle childhood. Second, for the High Risk group, applied problems at 54 months was significantly and positively associated with PEI at grade three (β = .08) such that higher achievement prior to school entry predicted later higher levels of involvement at third grade. Third, demographic covariates were significantly associated with PEI and achievement across the study timeline. Table 16 displays standardized path

coefficients and standard errors for pathways from covariates to achievement and PEI in the final model.

Table 16

Full Information Maximum Likelihood Covariate Pathway Estimates For Final Multigroup Model, Applied Problems*

	High Risk		Low Risk	
	b	*(SE)*	*b*	*(SE)*
Hypothesized Associations				
Male Gender →WJ54	**4.68***	**(1.05)**	**4.68***	**(1.05)**
Maternal Education → WJ54	**1.80***	**(0.26)**	**1.80***	**(0.26)**
Black → WJ54	**-12.76***	**(1.77)**	**-12.76***	**(1.77)**
Hispanic → WJ54	-4.59	(5.06)	-4.59	(5.06)
Partner → WJ54	1.16	(1.78)	1.16	(1.78)
Early Inc-to-Needs→ WJ54	0.42	(0.24)	0.42	(0.24)
Male Gender →PEI54	**1.69***	**(0.51)**	**0.35***	**(0.27)**
Maternal Education → PEI54	**0.67***	**(0.07)**	**0.67***	**(0.07)**
Black → PEI54	**-3.31***	**(0.44)**	**-3.31***	**(0.44)**
Hispanic → PEI54	-1.83	(1.27)	**-2.59***	**(1.01)**
Partner → PEI54	**0.56***	**(0.45)**	**0.56***	**(0.45)**
Early Inc-to-Needs→ PEI54	0.01	(0.06)	0.01	(0.06)
Additional Associations				
Male Gender → WJG1	**-4.26***	**(0.43)**	**-4.55***	**(0.89)**
Maternal Education → WJG1	0.16	(1.96)	**0.60***	**(0.23)**
Early Inc-to-Needs → WJG1	0.67	(1.46)	0.28	(0.18)
Black → WJG1	-2.64	(1.52)	**-3.97***	**(1.92)**
Black→ WJG5	**-3.21***	**(1.12)**	-0.62	(1.20)
Partner → WJG5	1.71	(1.00)	-0.37	(1.29)
Early Inc-To-Needs → WJG5	0.16	(0.10)	0.16	(0.10)
Male Gender→ PEIG1	-0.08	(0.04)	**-0.08***	**(0.01)**
Partner → PEIG1	0.18	(0.08)	**0.18***	**(0.06)**
Maternal Education → PEIG1	**0.05***	**(0.18)**	**0.05***	**(0.01)**
Hispanic → PEIG1	**-0.35***	**(0.18)**	**-0.57***	**(0.24)**
Maternal Education → PEIG3	0.01	(0.01)	0.01	(0.05)
Partner → PEIG3	0.07	(0.08)	0.07	(0.01)
Early Inc-to-Needs→ PEIG3	0.00	(0.01)	0.00	(0.01)
Hispanic → PEIG5	**0.44***	**(0.19)**	**0.44***	**(0.19)**
Early Inc-to-Needs → PEIG5	0.02	(0.01)	0.02	(0.01)

*p< .05

The resulting standardized path coefficients for the hypothesized relations of primary interest for letter-word are displayed in Figure 7. Table 17 shows the unstandardized coefficients and standard errors for these paths. Overall, the resulting multigroup model for letter-word recognition provided a good fit to the data: $\chi^2(59) = 191.44$, p = 0.0, RMSEA= 0.05 (90% CI = .049–.067)

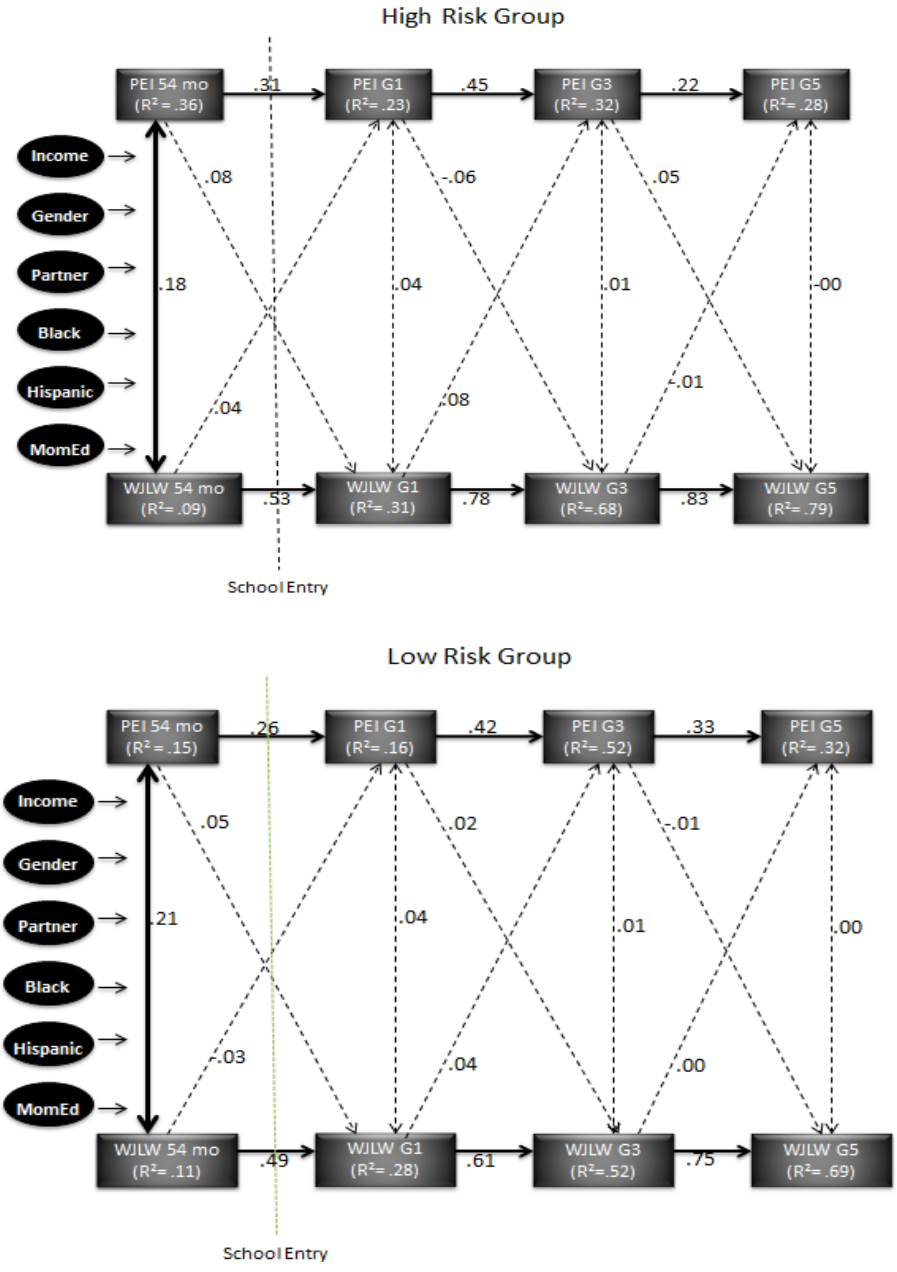


Figure 7. Multigroup structural equation models relating PEI and Student Letter-Word Achievement across middle childhood for High Risk and Low Risk. Covariates include ethnicity, gender, maternal education level and partnered status. *Note.* Solid paths are significant, dashed paths are insignificant

Table 17

Full Information Maximum Likelihood Estimates and Selected Fit Indices For Multi Group Comparison Model: Letter-Word*

	High Risk		Low Risk	
	b	*(SE)*	*B*	*(SE)*
Paths				
WJ54→ PEIG1	0.001	(0.002)	-0.0001	(0.001)
WJG1→ PEIG3	0.003	(0.002)	0.007	(0.001)
WJG3→PEIG5	-0.0004	(0.003)	0.00	(0.002)
PEI54→ WJG1	0.42	(0.27)	0.27	(0.17)
PEIG1 →WJG3	-1.39	(1.37)	0.56	(0.85)
PEIG3→ WJG5	0.90	(0.76)	-0.26	(1.41)
Contemporaneous Associations				
WJ54 ↔ PEIG54	**17.33***	**(4.90)**	**20.23***	**(2.98)**
WJG1↔PEIG1	0.61	(0.38)	0.61	(0.38)
WJG3↔PEIG3	0.11	(0.28)	0.11	(0.28)
WJG5↔PEIG5	0.003	(0.22)	0.003	(0.22)
Select Fit Indices				
p value		0.00		
RMSEA		0.05		
χ^2		191.44		
df		59		
90% CI		0.049- 0.067		

Note. Models also include gender and ethnicity as covariates; **p< .05;* RMSEA= Root Mean Square Error of Approximation; x^2= adjusted chi square; *df* =Degrees of Freedom

In sum, none of the hypothesized associations- parent socialization or child evocative effects- for both the High or Low Risk groups were significant. The only statistically significant contemporaneous associations was at 54 months for both the High Risk (β = .18) and Low Risk (β = .21) groups.

There were, however, demographic covariates that were significantly associated with PEI and achievement across the study timeline. Table 18 displays standardized path coefficients and standard errors for pathways from covariates to achievement and PEI in the final model.

Table 18

Full Information Maximum Likelihood Covariate Pathway Estimates For Final Transactional Models, Letter-Word Problems*

	High Risk		Low Risk	
	b	*(SE)*	*b*	*(SE)*
Hypothesized Associations				
Male Gender →WJ54	**0.64***	**(2.37)**	**4.94***	**(1.42)**
Maternal Education → WJ54	**2.15***	**(0.65)**	**2.01**	**(0.35)**
Black → WJ54	-3.59	(2.94)	**-1.03**	**(3.08)**
Hispanic → WJ54	-7.75	(5.88)	0.002	(7.83)
Partner → WJ54	-4.37	(2.84)	1.34	(3.39)
Early Inc-to-Needs→ WJ54	**5.63***	**(2.52)**	**0.92***	**(0.29)**
Male Gender →PEI54	**1.59***	**(0.51)**	0.32	(0.30)
Maternal Education → PEI54	**0.82***	**(0.14)**	**0.57***	**(0.07)**
Black → PEI54	**-2.84***	**(0.63)**	**-2.86***	**(0.65)**
Hispanic → PEI54	-1.29	(1.26)	-2.74	(1.65)
Partner → PEI54	0.99	(0.61)	0.50	(0.72)
Early Inc-to-Needs→ PEI54	**2.85***	**(0.53)**	0.10	(0.06)
Additional Associations				
Black → WJG1	-2.11	(2.78)	**-6.77***	**(3.03)**
Maternal Education → WJG3	**0.43***	**(0.41)**	**0.51***	**(0.22)**
Black → WJG3	-5.74*	**(1.76)**	**-6.10***	**(1.79)**
Early Inc-to-Needs→ WJG3	0.79	(1.34)	0.13	(0.18)
Maternal Education → WJG5	-0.19	(0.32)	**0.33***	**(0.16)**
Black→ WJG5	-0.92*	(1.34)	**-3.12***	**(0.83)**
Male Gender→ PEIG1	**-0.17***	**(0.02)**	-0.04	(1.26)
Partner → PEIG1	0.16	(0.01)	0.19	(0.11)
Maternal Education → PEIG1	0.04	(0.17)	**0.05***	(0.62)
Early Inc-to-Needs→ PEIG1	0.01	(0.11)	0.01	(0.14)
Hispanic → PEIG1	-0.33	(0.02)	**-0.56***	**(0.04)**
Maternal Education → PEIG3	**0.05***	**(0.03)**	0.01	(0.02)
Partner → PEIG3	0.21	(0.03)	-0.04	(0.01)
Early Inc-to-Needs→ PEIG3	-0.11	(0.12)	0.01	(0.01)

Maternal Education → PEIG5	0.02	(0.03)	0.02	(0.24)
Hispanic → PEIG5	0.44	(0.24)	0.47	(0.03)
Early Inc-to-Needs → PEIG5	-0.03	(0.10)	0.01	(0.01)

*$p < .05$

CHAPTER 5: DISCUSSION

The present study set forth to disentangle models of parent socialization and child evocative effects as they relate to parent educational involvement and student achievement across child development. Additionally, this research looked to identify if a child‟s level of economic risk moderated the relationship between parent educational involvement and student achievement. Results pertaining to bidirectional pathways for the full sample are discussed first, followed by discussion of variations by economic risk. Lastly, study limitations, policy recommendations and future directions will be discussed.

Bidirectional Pathways relating Involvement and Child Outcomes

Bio-ecological models (Bronfrennbrenner & Morris, 1994) and transactional models (Sameroff &Chandler, 1975; Sameroff, 2009) of development suggest that child growth is the product of bidirectional interactions between the child and their environment; children are not passive recipients of influence but rather actively engaged in evoking and promoting their development. This investigation of the relationship between PEI and student math and literacy achievement across development suggests evidence of parent socialization pathways across middle childhood, but less evidence of child evocative effects.

Pathways of parent socialization have classically been considered the dominant relationship between PEI and achievement. The term „parent socialization‟ is used to describe the process through which a parent imparts skills, motives, attitudes and behaviors to their child. Parent engagement in their child‟s education, for example, is expected to provide children with the social and human capital necessary for successful adaption in school and life (Parke & Buriek, 1998).

Indeed, there is an increasing empirical consensus that children in more involved families achieve at higher levels than those in less involved families (Cooper et al, 1996; Jeynes, 2005; 2007), and research has also indicated that increased family involvement over time is associated with improved child achievement (Dearing et al, 2006). Very few studies, however, have considered socialization pathways, while systematically controlling for potential evocative effects. In this way, the present study contributes to the cumulative knowledge on parent educational involvement.

In the present study, pathways of parent socialization confirmed positive associations between PEI and both math and literacy achievement, however not exclusively in the temporally proximal lagged manner that was hypothesized. When looking at the hypothesized associations, which were focused exclusively on time lags of one observation (approximately 2 years, on average), only involvement at 54 months was significantly associated with math and literacy achievement at first grade --none of the other anticipated single time-point lags for socialization were significant. However, involvement at 54 months was further found to be significantly and positively associated with mathematics achievement at first, third and fifth grade, at least when the full sample was examined as one group (i.e., prior to considering moderating effects of risk).

These results highlight the important contribution of parent involvement prior to school entry, suggesting persistent effects of early involvement particularly for mathematics achievement across elementary school; indeed, early parent involvement was more strongly and positively associated with later mathematics achievement than contemporaneous parent involvement.

As such, these results contribute to the growing literature suggesting the importance of parents becoming involved early- parent educational involvement does not begin on the child‟s

first day of school. Through learning stimulation and quality parent-child interactions, parents can provide their children with a foundation for future academic achievement. This finding is most interesting considering the current attention of federal education policies targeting school readiness and the role of the teacher and school as the means through which to engage parent involvement. Rather, this paper suggests that policies should be geared at promoting parent involvement prior to school entry. Perhaps policies should support early childhood educators, caregivers and pediatricians, as well as others who regularly interact with parents and their children, to urge parents to invest in quality educational involvement with their children. Likewise local early education programs and parent groups should promote early educational involvement as a means to later success.

The second hypothesis embedded within the present study was that child achievement would play an active role in engaging parents to become involved in their child‟s education. Child evocative effects are understood as child driven impetuses for parent involvement. Theoretically, children have the potential to evoke their parent‟s involvement through essentially two types of actions, positive behaviors or successes (good grades, school awards, athletic achievements, etc) and negative behaviors or failures (poor academic performance, behavioral issues, etc).

The current analysis did not find evidence of significant child evocative pathways across middle childhood. When controlling for contemporaneous achievement, children‟s math and reading was not significantly associated with later involvement levels. Although these results seem to underscore the powerful role of socialization, it is unlikely that there are, in fact, no evocative effects in the involvement process and, as such, four potential explanations are offered. First, perhaps achievement is not the most salient developmental domain for many parents – it

would be prudent to look at the contribution of additional child indicators, such a behaviors and well-being, which were also identified in the literature as outcomes which may evoke parent involvement (Eccles, 1983, Pomerantz et al, 2007). Second, perhaps the bulk of evocative effects occur in early childhood, prior to the beginning of the present study. Third, parents respond to teacher grades and evaluations and to the extent these assessments are not correlated with achievement test scores the present study would miss evocative effects. Fourth, given that evocative effects were operationalized as achievement scores, it is possible that low and high scores could be cancelling each other out and concealing the existence of significant evocative effects. The standardized coefficients would be negative for low student achievement scores and positive for high student achievement scores and each of these pathways have the potential to significantly evoke PEI. However, in the present study, these scores were not dichotomized as high and low, and the average of such scores would be around zero, which is precisely what was found in all models in this analysis. As such, it is important to consider that measurement and model specification may be masking the existence of significant evocative effects by way of both positive and negative child achievement.

The Moderating Role of Economic Risk

Following bio-ecological of development, scholars have suggested that PEI may matter more for some children than others (Gibson, 1979; Henderson & Mapp, 2002). In particular, Dearing and colleagues have argued that involvement may matter most for children at exceptional risk for underachievement, namely children living in families with few socioeconomic resources (e.g., Dearing et al., 2004; Dearing & Tang, 2010). In short, it is possible that PEI could help low SES families and children compensate for disadvantages that often characterize the home lives of children in low income families with parents who have

relatively low levels of education. Involvement levels are, on average, lowest among families facing socioeconomic risk, but these children may also have much to gain from involvement.

In the present study, there was evidence that associations between involvement and achievement varied as a function of family economic risk. For children‟s math, findings were consistent with study hypotheses: parent involvement appeared was most strongly and positively associated with achievement for children in low-income families. This finding adds to existing evidence on the matter and supports arguments that children at risk for underachievement have the most to gain from having their parents involved in their education. Perhaps involvement helps compensate for deprivation in human, social, and cultural capital domains through parents direct effects on their children (e.g., help with homework) and the assistance and support that relationships with teachers and schools can afford (Eccles, 2004; Marjoribanks, 2002; Simpkins et al., 2006). These findings are particularly interesting considering that pathways of parent socialization were most consistent with hypothesis for mathematics achievement, whilst the literature has predominately considered the relationships between involvement and literacy. It is possible that literacy stimulation is more indirectly encouraged in low-income households than mathematics. For example, children in low income households may be privy to language stimulation and phonemic awareness through observation and communication with family members and media; presentation of numeric concepts may be less apparent in the child‟s environment. Additionally, classic constructions of early parent involvement suggest that parents are more likely to read to their child during early childhood than they are to work on simple math problems unscripted.

It is also of note that the character of socialization pathways changed once allowed to vary by economic risk. Specifically, although early involvement – 54 months – continued to

predict later involvement for low-income children, it did so less persistently than was evidenced in the full sample models. Moreover, later involvement – 3rd and 5th grade – emerged as a significant socialization process for low-income children. Thus, although early involvement may, on average, prove to be the strongest and most consistent predictor of achievement trajectories, enduring involvement also appears to matter for children facing economic risk. One reason for this may be the enduring deprivation that these children face. Indeed, within the present study, economic risk was operationalized as persistent low-income.

Regarding child evocative effects, significance tests revealed evidence of moderation by economic risk for associations with literacy achievement. Interestingly, although in the best fitting multigroup model none of the hypothesized evocative effects pathways were significant, there was one additional, significant pathway- math achievement at 54 months was significantly and positively associated with parent involvement at third grade for the High Risk group. This association suggests that for low income children, higher levels of math achievement prior to school entry may evoke higher levels of involvement in middle childhood, although it is not clear how such a process would unfold whereby parents would delay their involvement until third grade. Regardless, the multigroup analyses did not support the hypothesis that poor academic performance would promote increased PEI for children in low-income families.

It is also worth noting that early achievement scores emerged as the largest contributor to later achievement for children at high risk. Such associations suggest the persistence of early achievement across the developmental trajectory for low-income children, underscoring the importance of early intervention. Low income children have been found to have cumulative barriers to achievement across their development, and coupled with a deficit of affordances (which is usual of a low-income household), these children may be less responsive to later

environmental stimuli such as school socialization processes than their moderate to high income peers.

A Note on Effect Size

It is acknowledged that standardized path coefficients presented in these analyses are considered „small" by seminal statistical criteria (Cohen, 1969). However, McCartney and Rosenthal (2000) urge developmentalists to consider the practical significance of such effects, even when they are <.30. "Real decisions for real children are influenced by the papers developmentalists write, regardless of whether we ever intended our papers to be used in the policy arena" (McCartney and Rosenthal, 2000, 173). Because measurement and methodical decisions likely contributed to these effect sizes (Kagan, 1989; O'Grady, 1982), it is worthwhile to place them in empirical context. For example, statistically significant family involvement effects sizes were often as large as ethnic differences in achievement and between 30% to 50% as large as effect sizes for maternal education and family income-to-needs. Arguably, these relative sizes appear quite meaningful.

Limitations

The NICHD SECC research design provides researchers with ample opportunities to look across child development outcomes; however it is dually noted that conducting secondary data analysis on a pre-existing data set presents the challenge of having to work within the scope of the data that has been collected. As a result the present paper is limited in its sample demographics and constructs used.

Sample Limitations. The study participants included in the NICHD SECC are not a representative national sample. The percentage of non-White families included in this study (18%) is far below current population estimates within the US. Similarly, low income families

are also under-represented in this sample (28.8%). This sample limitation is of the utmost consideration for the present paper, for the parent involvement literature has suggested that parental educational involvement may matter more for some children than others (Gibson, 1979; Henderson & Mapp, 2002). When considering the moderating role of economic risk in a child"s trajectory for achievement, it would have been useful to this analysis to have larger samples of non-White families.

Related to the lack of racial diversity within the sample is the issue that children identified as Hispanic and Black had greater percentages of missing data across the measures used in this paper than White children. Although sophisticated, field accepted techniques were used to account for the missing data in this paper, it is dually noted that attrition could still bias results found.

Lastly, additional sample limitations were inherent in the study"s design. Families that did not speak English as a first language, those having children with disabilities, and those mothers who were under age 18 did not meet the criterion for inclusion in the study. Each of these selection factors has been found separately to contribute to parent educational involvement. Numerous studies have looked at language as a barrier to parent involvement for immigrant and non-English speaking families (Delgado-Gaitan, 1992; Hoover-Dempsey, 1992), and have considered the moderating role of culture (a factor which often covaries with language) in promoting parent educational involvement (Ogbu, 1981, Eccles, 2004). Additionally parent involvement has been found to contribute to the development and well-being of children with disabilities (see Gavidia-Payne & Stoneman, 1997 for review). Lastly, the literature has identified mother"s age as contributing to parent involvement and child achievement, specifically

acknowledging the barriers uniquely faced by young mothers (Fulton et al, 1991; Neuman et al, 1995).

Constructs. Longitudinal analysis, and specifically structural equation modeling, is predicated upon utilizing consistent measures at each time point (Little & Nesselroade, 1999). In order to maintain the developmental integrity of both measures of PEI and student achievement, it was necessary to use different measures in early childhood, middle childhood, and adolescence (Fan & Chen, 2001; Sameroff, 2009). It is noted that although theoretically appropriate, the use of different measures is a methodological limitation.

In this paper, the measure of PEI at 54 months was different than the subsequent PEI measures at first through fifth grade. Perhaps this difference of measure is why the results were strongest regarding parent socialization pathways from 54 months. The HOME Inventory total score captures a broader range of parenting practices and behaviors than teacher report on the Parent-Teacher Involvement Questionnaire, considering such domains at maternal responsivity and sensitivity, and socio-emotional acceptance of the child. Additionally, the HOME Inventory capitalizes on additional social capital contributions to involvement, such as language stimulation, modeling of social maturity, and learning materials in the child‟s physical environment which may or may not be provided by solely the child‟s mother. It is possible that given the comprehensive nature of inputs and affordances quantified through the HOME inventory, any remaining significant coefficients in the path models could be considered value added by school socialization practices above and beyond what is happening in the child‟s home.

In addition, the lagged timing in the conceptual model is a limitation of this study. Tests of transactional latent effects would have been better suited if tested in consecutive grades, as opposed to having two to three years between data collection time points (Sameroff &

MacKenzie, 2003). It is possible that interactions between PEI and achievement that occur during omitted time points (grades two, four, six and seven) contribute to the variance in the reported findings from this analysis.

Furthermore, although extensive covariates were included in these analyses, omitted variables may account for the obtained effects. Specifically, consideration should be given to the contribution of fathers. Exploring the role of fathers, as well as other family members, should be a priority for future research. Such inquiries could highlight how parent educational involvement pathways may vary depending upon the presence or involvement of other family members (Coley, 1998; Pomerantz et al, 2007).

Lastly, the present study operationalized child evocative effects by using the child‟s standardized achievement scores. It is acknowledged that this construct greatly reduces the scope of a child‟s capacity to evoke their parent‟s involvement. A more extensive measure of evocative effects which captures the child‟s active voice in directly seeking the involvement of their parents, and begins to address why and when children evoke their parents to be involved would be most appropriate for this paper.

Conclusions and Future Directions

The present study has provided evidence of the bidirectional relationship between PEI and achievement across child development. Variations across socioeconomic status are consistent with ecological (Bronfrenbrenner & Morris, 1994) and family systems models (Minichuin, 1985, Park & Buriel, 1998), which posit that development occurs not in isolation within one context (i.e., family) or another context (i.e., school), or only after a child enters school, but rather occurs within a longitudinal, interactional system, including home, family and school factors. Moreover, sociodemographic background may change how PEI functions to

promote school achievement. These findings suggest that to understand the factors that may influence student achievement and PEI, it is important to longitudinally examine aspects of the parental, school, and demographic contexts, as well as the relations among them.

Arguably the most important finding from this research is identification of the nuanced transactional relationship between PEI and achievement for low income families. It is imperative for policies to address the barriers to involvement unique to low income parents, and to dually promote the sustained educational involvement of low income parents across child development.

Additional considerations for future research. First, future research should consider the influence of variables omitted from the present study, such as the unique contributions of father involvement and child behaviors to the model. Exploring the role of fathers could highlight how parent educational involvement pathways may vary depending upon the involvement of other family members (Coley, 1998; Pomerantz et al, 2007). It is also prudent for future studies seeking to further explicate the relationships between involvement and achievement to consider child well-being as outcomes of interest. Child behavioral outcomes have been found to often co-vary with achievement across middle childhood (Ibanez et al, 2004; Pintrich et al, 2004; Pomerantz et al, 2007) and it is thus likely that children‟s behaviors contribute to both parent socialization and child evocative effect pathways.

Furthermore, given the moderating effect of socioeconomic risk on relations between PEI and achievement, future research should seek to understand what child, family and school processes foster parent educational involvement. Specifically, longitudinal investigations should seek to understand the dynamics of communicative involvement with achievement across early and middle childhood. Previous literature regarding teacher- parent interactions and school readiness has found that through communication with their child‟s teacher, parents and teachers

are coming to a shared and improved understanding of children‟s‟ unique educational strengths and weaknesses (Eccles, 1999; Epstein & Baker, 1982). In turn, classroom and home practices change to better meet these needs (Hoover-Dempsey et al, 1992, 1995). As a result, communicative PEI increases parents‟‟ social capital (Laureau, 1996) and further extends their capacity for social control (McNeal, 1999). By communicating with their child‟‟s educators and the parents of their child‟‟s peers, parents extend their values and beliefs about education and in turn increase the consistency of the messages relayed to their children throughout their day. Identification of such factors could assist policymakers and early childhood educators in targeting interventions at the proximal processes which evoke involvement for those children who have the most to gain from it.

Lastly, it remains to be determined whether as children develop through adolescence into adulthood, the apparent consequences of PEI are sustained, dissipate, or increase. To the extent that early PEI is associated with later academic achievement in middle childhood, it will be important to learn whether subsequent educational attainment in high school and beyond is related to early PEI.

In sum, this research has contributed a new methodological perspective on the bidirectional relationships between PEI and achievement across childhood. Using path analysis in structural equation modeling, results corroborate with previous findings that both increased PEI is associated with increased child achievement and that PEI matters more for low income children. Building upon the literatures understanding of the unique challenges to achievement and involvement faced by low income families (Dearing et al, 2001; 2006; Desimone, 1999;

Hango, 2007), these analyses support national agendas aimed at promoting parent involvement as a means to closing the achievement gap between lower and higher income students.

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