# Low Income and School Performance in Middle Childhood: Persistence, Timing, and Mediators

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## Abstract

Although the association between low family income and diminished academic achievement is well documented, questions remain as to how low income affects school performance and, ultimately, high school graduation. Economic disadvantage may act directly or through mediators such as parenting behavior or fewer resources in the home. Using data from the 1997 Child Development Supplement to the Panel Study of Income Dynamics, this study examines how the duration and timing of low income affect children's cognitive achievement, behavior and health, and the extent to which these contribute to grade retention in middle childhood. Results suggest that all three, behavior, achievement and health, contribute to grade retention. The effects of income operate on behavior through parenting and neighborhood while the effects of income on achievement operate more through the home environment. Public assistance receipt in the early years is related to lower grade retention.

## Introduction

Extensive research has previously documented the association between low income in childhood and lowered academic achievement (Duncan & Brooks-Gunn, 1997; Guo & Harris, 2000; Duncan, Brooks-Gunn & Klebanov, 1994; Smith, Brooks-Gunn & Klebanov, 1997). The negative impact of low income can have lasting consequences on children's future job prospects and earning capability as children from low income families are less likely to graduate from high school and ultimately obtain fewer total years of education (Duncan, Brooks-Gunn, Yeung & Smith, 1998; Axinn, Duncan & Thorton, 1997).

While the association between low family income and diminished academic achievement is well documented, questions remain as to how low income affects school performance and, ultimately, high school graduation. Economic disadvantage may work to diminish school performance directly or indirectly through lower cognitive and emotional resources in the home or neighborhood environment that limit cognitive achievement, increase behavior problems, and/or increase health problems. Current educational policy emphasizes cognitive skills over emotional and social skills; however, socioemotional adjustment may constitute just as large a barrier to school success. Little research has examined the contribution of both sets of skills, and this paper addresses this gap.

It is not just lower resources that matter, but also the timing and duration of the low income during childhood. Does a period of low resources in early childhood affect children's attainments more than a period of low resources in middle childhood? Do children from families who are continually low-income fare worse than those from families whose economic situations improve? How do children from families in which income drops or rises fare in comparison to other children?

Finally, most of the research on poverty effects on children has focused on either the IQ and achievement of preschool children (Yeung, Linver & Brooks-Gunn, 2002; Smith, et al., 1997) or on the completed schooling of adolescents and young adults (Duncan & Brooks-Gunn, 1997). Middle childhood, from ages 6 to 12, has been recognized as an extremely important developmental stage for developing cognitive competencies and behavioral traits, laying the foundation for future academic achievement and behavior patterns (Alexander & Entwisle, 1988; Erikson, 1950). Children first enter the formal school system during this period and their initial experiences may have long-term effects on achievement. As children become more aware of society as a whole and their place within it, they also become increasingly vulnerable to negative messages and are more likely to perceive limitations because of individual or family characteristics (Garcia Coll, et al., 1996). Although studies have shown that the IQs of children from low income families are compromised even before they enter elementary school (Duncan, et al., 1994), it is during the middle school years that this diminished ability coupled with the increased self and societal awareness can manifest itself in impaired academic achievement and increased behavioral problems. The extent to which these competencies and patterns in middle childhood persist into adolescence and beyond has been studied and debated (Huston, 2003; Furstenberg, Cook, Eccles, Elder & Sameroff, 1999). Few articles have addressed the impact of low income on the academic achievement of children in middle childhood, ages 6-13, where the foundation for future success or failure takes shape. Behavior problems can become more obvious and entrenched during these middle childhood years, with implications for social interaction and school performance.

The focus of this study is the association between low income and one measure of school performance, grade retention. It examines mediating paths through parenting practices and the school achievement and behavior of children during middle childhood. Using data from the 1997 Child Development Supplement (CDS) to the Panel Study of Income Dynamics (PSID), this study explores the relationship between children's families' economic well-being over their entire childhood and being held back in school during the elementary school years. The advantage of this study is that information on events during the whole period of childhood is included for each child and family.

## Theoretical Perspectives on Effects of Income on Child Performance

There are at least three major theories that explain why the experience and duration of low family income should affect children's achievement and behavior: *resource theory*, *family stress theory*, and *the critical period approach*.

Resource theory argues that money provides families critical resources for children's learning. To the extent that low-income parents simply have less money to invest in books, educational activities and toys, health care, housing, and other advantages that require financial resources, children's cognitive skills and health will be poorer, leading to lower completed schooling. It is expected that this resource disadvantage will cumulate over time. The longer this disadvantage lasts, the greater the impact upon children's school performance. From resource theory we would also predict that aspects of the children's home environment, including the extent of books and magazines and cognitive stimulation in the home, would mediate the effects of income on child development.

Resources affect not only educational materials but also residential location, neighborhood, and schools. All affect the financial investments made in children (See Figure 1). While characteristics of neighborhoods are not independent of family finances, variation in neighborhoods may influence children independent of family characteristics. A variety of theories have been developed to explain the effects of neighborhoods (Mayer & Jencks, 1989). The most promising are those based upon socialization and peer influence. Socialization theories argue that communities with strong institutions, committed residents with ties to one another through common values and norms (social capital) and who watch out for the children, and extensive parent involvement in local schools are likely to result in children having few behavior problems (Sampson, Raudenbush & Earls, 1997). Peer influence theories argue that neighborhoods that contain youth with delinquent behavior and values and that are not controlled by parents or community may wind up with serious behavior and school problems. However, early research showed that it was the lack of middle-class families, not the presence of low-income families that was associated with increased school drop-out and out-of-wedlock births (Brooks-Gunn, Duncan, Klebanov & Sealand, 1993). Recent research supports the importance of social ties or social capital in preventing delinquent behavior (Sampson, et al., 1997). We, therefore, measure the quality of the neighborhood in positive terms. We expect some of the effect of economic resources to be mediated by the quality of the neighborhood in which the family lives.

Another issue is whether permanent or transitory income effects are most important. The research is unequivocal in this regard; long-term income is much more highly associated with children's outcomes than short-term measures (Mayer, 1997). Long-term income is a more permanent characteristic of the family; families are able to save and borrow against

temporary financial setbacks. Here we are able to characterize income for substantial periods of the child's life rather than depending upon short-term measures.

T*he critical period approach* focuses on the importance of the early years for children's development. Recent reports argue that cognitive stimulation and better health care in the period from birth to age 5 are crucial for laying the foundation for subsequent development (Shonkoff & Phillips, 2000). If critical resources are lacking during that period, development is compromised. Disparities in children's capabilities at kindergarten entrance have been found to predict subsequent academic performance (Shonkoff & Phillips, 2000). Anything that disrupts development during the preschool period can lead to later difficulties, even if the conditions that caused disruption are no longer present. This approach suggests that improved resources in the middle childhood years may not compensate for low or inadequate resources in the early years of life While most would argue that the early years are important, this approach argues that it is difficult to make up for early deficits later on. Research by Duncan and colleagues (Duncan, et al., 1998) shows much larger effects of living in a low income family during the preschool period on eventual completed schooling and high school completion than during the middle childhood or adolescent years.

The third theory is family stress theory. According to the family stress model (Conger & Elder, 1994), low income is expected to affect the parenting behavior of the mother, including warmth, cognitive stimulation, and school engagement. This is because low income leads to economic strain, which causes emotional distress such as depression (Belle, 1990; McLoyd & Wilson, 1991). This emotional distress, in turn, compromises parenting ability and reduces the ability to remain engaged in the children's schooling or to engage in preventive health care (Elder & Conger, 2000; Furstenberg, et al., 1999). Poor

parenting leads to reduced achievement and more behavior problems in children (Petterson & Albers, 2001; Yeung, et al., 2002). Family stress theory has an immediate focus. Periods of economic or financial stress can result in emotional stress or chronic health problems in children, conditions that may operate through emotional distress among parents and poor parenting. However, the effects are likely to be short-term because the theory predicts that parenting would improve once the financial problems have been resolved. According to this theory, we would expect to see negative effects of low-income on children during the period of financial stress. Once the family economy improves, children's behavior and health should return to normal. One study showed that children whose family financial situation declined were more at risk for poor behavior and achievement than those whose situation improved or who had no change in their circumstances (Moore, Glei, Driscoll, Zaslow & Redd, 2002). This theory implies that the level of emotional health of parent and level of warmth and emotional support of parent for the child will act as mediators between income and child behavior, health, and performance. In contrast to the critical period approach, family stress theory suggests, therefore, that the effects of low resources may be temporary. We expect that current levels of resources and economic conditions will have a greater effect on children's performance than earlier conditions. This approach also predicts that behavior and performance of children with increased income from early to later periods will not differ from those who never experienced low income. However, those whose incomes fall will experience lower performance. This approaches does not clearly predict that those whose incomes remain low over both early and middle childhood will be disadvantaged relative to those who never experienced low income. It would depend on the amount of strain they experience.

A fourth explanation cites *correlated disadvantages or selection*. According to this hypothesis, the relationship between income and child outcomes is spurious. Rather, certain characteristics of parents and families result in both low income and poor human capital for children (Mayer, 1997). Examples include low parental literacy and poor mental and physical health. Female headship and large family size may also create disadvantages affecting both resource availability and child outcomes. In addition, events that result in low income, such as a divorce or loss of employment, may be linked to problems with children's performance and behavior. Controlling for these other factors should reduce the effect of income and changes in income per se, but it is important to adjust for these factors in order to separate the effect of income hardship from other types of hardships the family may be facing and in order to avoid attributing income effects to more permanent parental characteristics.

## Effects of Low Income on Achievement and Behavior

### Income and Achievement in Adolescence and Young Adulthood

Most research has focused upon the completed schooling of adolescents and young adults. Research has found direct negative impacts of low income to be pronounced and persistent for cognitive ability and achievement in the school years, with effects on behavior weaker and less consistent (Duncan & Brooks-Gunn, 1997). For example, poor achievement and aggressive behavior are both linked to falling behind in school (Guo, Brooks-Gunn & Harris, 1996), leading to school dropout and to lower total schooling completed later on (Cairns, Cairns & Neckerman, 1989; Jimerson & Kaufman, 2003). Duncan and colleagues (Duncan, et al., 1998) found significant effects of family income in early childhood (0-5) on

eventual years of school completed at 20 or older; however, no effects were significant in middle childhood. The effects were also stronger for low-income than for middle-income families.

Income and Achievement in Early Childhood

Family income has been shown to have a direct effect on a measure of cognitive achievement, the Woodcock-Johnson letter-word score (Yeung, et al., 2002). In contrast, the same study found effects of family income in the first three years on behavior problems between ages 3 and 5 to be indirect, rather than direct. Income affected behavior through parenting practices. Other studies have found a direct effect on cognitive achievement of changes in income. An increase in the ratio of income to the poverty line over the first three years was associated with increased school readiness and improved receptive and expressive language at 36 months (Dearing, McCartney & Taylor, 2001). These effects were larger for children in poor compared with nonpoor families. The home environment mediated a small proportion of the effect of income change. Smith and colleagues (Smith, et al., 1997) also found large and significant negative effects of poverty-level income on the standardized test scores of preschool-age children.

Income and Achievement in Middle Childhood

Studies that have specifically examined the association between low income and academic achievement in middle childhood have consistently found that income is positively related to scores on standard achievement tests and negatively related to being held back in school (Smith, et al., 1997; Pagani, Boulerice & Tremblay, 1997). Although studies have

found a link between low income and behavior problems in middle childhood (Pagani, et al., 1997), the association weakens after controlling for confounding variables such as family structure and transitions.

While the effects of achievement deficits may be small, there are long-term consequences for children who perform so poorly that they are held back from advancing a grade or referred to special education (Guo, et al., 1996). It has been argued that holding children back a grade exacerbates academic problems and actually contributes to lower graduation rates (Potter, 1996; Jimerson & Kaufman, 2003). Thus, this paper focuses on grade retention as well as academic achievement.

## Other Events and Circumstances

The contribution of confounding variables such as family structure and transitions, parenting attitudes and practices, and neighborhood characteristics is less well-known (Duncan, et al., 1994; Duncan & Brooks-Gunn, 1997; Guo & Harris, 2000; Hanson, McLanahan & Thomson, 1997). Low parental achievement could be linked through inherited traits or through education and behavior to children's achievement. Families with many children at the birth of child may be less able to devote resources to any one child (Zajonc & Markus, 1975). Children of mothers who started childbearing at a young age may continue to remain disadvantaged throughout childhood (Hofferth & Reid, 2002). Children who begin life low in birth weight may also be disadvantaged later on (McCormick, Workman-Daniels & Brooks-Gunn, 1996). Finally controls need to be included for race/ethnic background, since these factors have been shown to influence both income and children's achievement and behavior (Jencks & Phillips, 1998). These factors are fixed for

each child. Maternal education is unlikely to change much over the period of consideration. Age of child at interview is fixed. Number of children is likely to change, but this is treated as a control. There are four key factors that change over the period—welfare receipt, family structure, maternal employment, and geographic mobility. All have been linked to income and to child achievement or behavior, and we discuss each in turn.

Effects of Welfare Receipt during Childhood

Low-income families receiving welfare differ in financial resources from those who do not. Welfare-receiving families generally have incomes considerably below the poverty level. Thus, if welfare and non-welfare receiving low-income families are compared, the former will be less well off. It is important, first, that welfare and non-welfare families with similar incomes be compared to evaluate the effects of program receipt. While low income has generally been found to be detrimental to children's achievements, the provision of financial cash assistance through programs such as AFDC should result in improvements in children's well-being relative to comparable families without such cash assistance. This may offset any stigma related to participation. Consistency and stability of income may also contribute to child well-being.

However, if people who receive cash assistance respond by reducing their efforts to become self-sufficient, cash assistance will not improve their economic well-being. Welfare recipiency may affect the attitudes and values of parents, and their behaviors (such as employment). It is also stigmatizing to mothers, who may view themselves more negatively as a result. This "welfare culture" model emphasizes deviant values, attitudes, and behaviors of parents that are transmitted to their children through the parenting process.

The effects of welfare per se, therefore, are ambiguous, since welfare families clearly have the lowest incomes but they are also receiving benefits that poor non-welfare families do not. Research that has compared children in poor, welfare receiving families with children in poor, non-welfare families has found that, for the most part, children's achievement differed by poverty and not by AFDC receipt (Duncan & Chase-Lansdale, 2002; Zill, Moore, Smith, Stief & Coiro, 1991). The children's home environment, as measured by the Home Observation for the Measurement of the Environment (HOME) scale (Caldwell & Bradley, 1984), also differed by poverty, not AFDC. On a few measures, including having the TV on 7 or more hours daily, frequency of hugging, and having a home with a dark interior, children from poor welfare-receiving families were the most disadvantaged (Zill, et al., 1991). This is consistent with either the lower resources or the welfare culture hypothesis. On other measures, children in poor AFDC-receiving families were at an advantage; they were more likely to have health coverage and were in better health. These latter findings are consistent with the expectation that AFDC improves child health by providing needed resources.

Recent studies have identified parenting differences between AFDC-receiving and non-AFDC-receiving poor families. Comparing families that had received AFDC within the last 12 months with those that had not, poor, non-AFDC families were found to be more effective in monitoring, supervising, and disciplining their adolescent children than AFDC families (Kalil & Eccles, 1998). This is consistent with the correlated disadvantages and welfare culture hypotheses. However, no difference in children's achievement or behavior was found.

There is some evidence that duration of welfare receipt matters. Low-income families who had received welfare less than 2 years had better scores on a test of school readiness (Zaslow, McGroder, Cave & Mariner, 1999) than those in longer-term AFDC families. However, this measure was not associated with positive social behaviors, internalizing behavior problems, or health. Ku and Plotnick (2003) measured welfare as the number of childhood years receiving welfare, divided into childhood periods, and by average annual welfare income. Family income was reported as average annual family cash income including welfare benefits plus the cash value of food stamps. The authors found a negative effect of number of years of welfare receipt over the entire childhood period on completed schooling. However, they did not examine welfare receipt just among low-income families. Given that income was measured as a continuous variable, the welfare variable could simply be an indicator for low income. Haveman and Wolfe (1994), in contrast, examined the effect of welfare receipt only among those in poverty. Years spent in poverty were associated with a smaller number of years of schooling completed. They also found a small but significant positive impact of welfare receipt between ages 6 and 15 above and beyond the poverty effect. The results of this and the previous studies suggest that poverty is the most critical variable affecting child development; the additional effects of welfare receipt may be positive when children from families with low incomes are considered. In this paper we utilize an indicator of low income as well as an indicator of welfare experience.

Family Structure Changes

Extensive research has documented the association between family structure and children's achievement and behavior (McLanahan & Sandefur, 1994). Much of the research

on family structure has contrasted children living in one-parent families with those living in two-parent families. This research has examined children of all ages, although much of the research has been on educational outcomes during high school, and later adolescent outcomes such as high school graduation and college attendance (Sigle-Rushton & McLanahan, 2002). Among the specific outcomes that have been studied are 1) psychological and behavioral problems; 2) educational achievement such as test scores and grades; and, 3) educational attainment such as high school graduation, college attendance, and college completion.

Much of the work on the relationship between family structure and psychological and behavioral problems among young children has focused on the effects of a change in family structure, especially divorce. Research has shown that divorce is a traumatic experience for children, which has significant effects on their psychological well-being. Shyness and aggression are much more common among children whose families break up than among children whose families remain intact (Jekielek, 1998; Cherlin, Furstenberg & Chase-Lansdale, 1991). When researchers have examined the impact of living in different types of families, they have found that children from single-parent families are more likely than those from intact families to have behavior problems in school (Entwisle & Alexander, 1996; Thomson, Hanson & McLanahan, 1994). Some research suggests that family structure may have stronger effects on aggression among boys than among girls, but fairly similar effects on anxiety or depression (Jekielek, 1998; Sigle-Rushton & McLanahan, 2002). Research also shows that children living in single-mother families have lower levels of achievement in school than children living in two-parent families (Morrison & Cherlin, 1995; Entwisle & Alexander, 1995; Entwisle & Alexander, 1996; Lang & Zagorsky, 2001). The research

suggests a strong relationship between family structure and test scores (Pong, Dronkers & Hampden-Thompson Gillian, 2002) and family structure and grades (Thomson, et al., 1994).

Children residing in one-parent families also have lower levels of eventual educational attainment than do those residing in two-parent families. Children from one-parent families are less likely to remain in school than are children from two-parent families (Astone & McLanahan, 1991; Painter & Levine, 2000; Lang & Zagorsky, 2001). DeLeire and Kalil (2002) found that children who were living with both biological parents were more likely than children from other types of families to complete high school and go on to college. Research that has looked at more than snapshot measures of family structure, e.g., studies that look at the years that children have spent in different types of families, find that years spent in a two-parent family is strongly associated with educational attainment (Bjorklund, Ginther & Sundstrom, 2002).

These studies use different data sets and include different control variables in the analysis. Consequently the association between family structure and children's achievement and behavior emerges as stronger in some studies than in others. These relationships are particularly strong before controlling for family income (McLanahan & Sandefur, 1994). However, because single-parent families tend to have significantly lower incomes than two-parent families, and family income is strongly associated with educational outcomes, including family income as a control variable often explains a good deal of the relationship between family structure and school achievement. Maternal depression and parenting behaviors also are important intervening variables for children's behavior (Sigle-Rushton & McLanahan 2002). Thus Brooks-Gunn and Duncan conclude that income explains children's achievement whereas family structure explains more of children's behavior problems.

Because of our interest in the timing of low income across children's lives we examine family structure and family structure changes during early and middle childhood. We expect changes in family structure to be associated with behavior problems, Most of the studies of divorce (Hetherington & Clingempeel, 1992) find that the effects of family structure changes to be temporary; consequently, we expect effects of recent changes to be more important than changes in earlier periods.

Maternal Employment Changes

A number of studies have explored the effect of maternal employment in the early years of a child's life on later academic achievement and behavior problems. The most recent data from the NICHD study of early child care suggest that maternal employment after the first year of life and associated child care arrangements are associated with improved cognitive achievement (NICHD Early Child Care Research Network, 1998). Studies have documented small but consistent negative effects of extensive employment during the child's first year of life on later cognitive achievement (Brooks-Gunn, Han & Waldfogel, 2002). Studies also find increased incidence of behavior problems associated with extensive non-maternal care during the preschool years. Children of mothers who are less sensitive and use poor quality child care or extensive care were less secure (NICHD Early Child Care Research Network, 1997).

Although family income also allows parents to purchase higher quality substitute care for their children if the mother works outside the home (Hofferth & Wissoker, 1992; NICHD Early Child Care Research Network, 1997), research has not found poverty to affect the quality of child care as measured on large-scale surveys nor have these survey measures of

child care quality been found to affect intellectual development (Guo & Harris, 2000). Therefore, we do not include measures of child care quality in this study.

Residential Mobility

Several studies have found that children who move frequently have lower test scores and lower grade point averages than children who move less often (Tucker, Marx & Long, 1998; Temple & Reynolds, 1999; Audette, Algozzine & Warden, 1993; Ingersoll, Scamman & Eckerling, 1989). Grade retention is also higher for children who have experienced three or four moves compared with their more stable counterparts (Simpson & Fowler, 1994; Wood, Halfon, Scarlata, Newacheck & Nessim, 1993). The effects of residential mobility may be exacerbated by school changes as well, and multiple school changes have been shown to be associated with lower academic achievement (Felner, Primavera & Cauce, 1981; Tucker, et al., 1998). Although causal mechanisms are not fully understood, moving disrupts the child's social networks and peer relationships, which can result in declines in child well-being (Coleman, 1988). Changing schools by itself can be a problem because it disrupts the child's continuity of learning as the new school must determine the needs and appropriate placement of the child (Kerbow, 1996). Confounding the research is the fact that movers are more at-risk academically than non-movers—they are more likely to be low income, minority, and from single-parent households (Schachter, 2004).

## Outcomes and Mediating Pathways

Grade Retention

Grade retention for children in middle childhood is the outcome of interest. Grade retention one of the pathways through which early achievement and behavior might affect later schooling. Poor achievement and bad behavior might cause schools to retain them in grade. Research shows grade retention to be associated with school drop-out and lower educational attainment (Cairns, et al., 1989; Jimerson & Kaufman, 2003; Rumberger, 1995).

While substantial research has documented the overall relationship between income and school success (Duncan & Brooks-Gunn, 1997), there is less understanding of the process by which this occurs. The hypothesized pathways are shown in Figure 1.

Parenting, Parent Well-Being, and Neighborhood Quality

Low income is expected to influence parent well-being and parenting, as well as neighborhood quality. Research by Conger and Elder has demonstrated the link between economic and financial strain and poor parenting (Conger & Elder, 1994; Conger, Conger & Elder, 1997). This is also shown in Yeung and colleagues (Yeung, et al., 2002) for children 3-5 years of age.

Child Achievement, Behavior and Health.

Parenting and neighborhood quality, in turn, are expected to influence children's achievement, behavior problems, and health. Although parenting practices have not been found to explain the effects of low income or family structure on child achievement and behavior in some studies (Hanson, et al., 1997), studies with more detailed parenting behaviors and measures of achievement and behavior have found mediating effects (Conger & Elder, 1994; Yeung, et al., 2002). Previous research has found significant neighborhood effects even after adjusting for various demographic and economic controls. In particular, a

good neighborhood, as measured by the presence of affluent neighbors, was found to be associated with higher childhood IQ and less school drop-out (Brooks-Gunn, et al., 1993). Research suggests that the context in which children grow, their immediate surroundings, are critical to the types of activities and extent of independence that parents permit and encourage (Furstenberg, et al., 1999), affecting their school success as well.

Our measures of cognitive achievement are based upon standardized tests administered by interviewers in the child's home. While some studies have examined measures of IQ (Brooks-Gunn, et al., 1993; Brooks-Gunn, Duncan & Maritato, 1997), IQ is believed to be relatively immutable and therefore not likely to be affected by changing income and family structure. Behavior problems are measured by a standard set of questions asked of the primary caregiver and include both externalizing or aggressive problems and internalizing or withdrawn problems.

There are several pathways through which chronic health conditions may impede school performance. These include increased absenteeism, disrupted sleep, poor medical management of the condition, adverse effects of medication, and psychological problems (Celano & Geller, 1993; Diette, et al., 2000). The diminished function and alteration of social interactions for these children can also lead to behavior problems, which could affect their performance and attachment to school (Gortmaker, Walker, Weitzman & Sobol, 1990).

Hypotheses

1. If resource theory holds, then we would expect that cumulative length of time spent in a family with low income would be associated with lower cognitive achievement and

more chronic health conditions. Being low income over the entire period should be associated with poorest achievement, health, and behavior.

   a. Cognitive stimulation in the home environment should explain much of the difference in achievement between children in low-income and other families.
   b. Neighborhood quality will also explain some of the difference in achievement.

2. According to family stress theory, improvements in income between early and middle childhood should be associated with no detriment in achievement, behavior or health. However, reductions in income should be associated with reduced achievement, health, and greater behavior problems and a greater chance of being held back in school. Children in families with stable low income do not differ from children in families with high incomes over the entire period.
   a. The warm relationship between parent and child should explain children's behavior problems.
   b. Maternal depression should also explain some of children's behavior and chronic health problems.
   c. Parents who are more engaged in the child's schooling will have children with higher test scores and fewer behavior problems.
3. The critical period approach would suggest that low income in early childhood should be associated with low achievement and performance in middle childhood, regardless of whether income improves.
4. More behavior problems, lower reading achievement, and more chronic health conditions should be associated with a greater chance of grade retention.

## Data, Measurement, and Methodology

*Data*

The study sample was drawn from the 1997 Child Development Supplement (CDS) to the Panel Study of Income Dynamics (PSID). The PSID is a 35-year longitudinal survey of a representative sample of U.S. men, women, children, and the families in which they reside. Although a supplementary sample of recent immigrants was added in 1997, these families were not used here since only one wave of data was available. When weights are used, the PSID has been found to be representative of U.S. individuals and their families (Fitzgerald, Gottschalk & Moffitt, 1998b). The PSID is unique in collecting information on families prospectively in real time, rather than collecting information retrospectively. It is also unique in the detail provided on annual family economic circumstances, employment, and family structure. No other data set has such long-range detail on families. With funding from the National Institute of Child Health and Human Development (NICHD), data were collected in 1997 on up to two randomly selected 0-12-year-old children of PSID respondents both from the primary caregivers and from the children themselves (Hofferth, Boisjoly & Duncan, 1999). A small number who had turned 13 by the interview date are included in the analysis. The CDS survey period began in March 1997 and, with a break from mid-June through August, ended on December 6, 1997. Interviewers were completed with 2,380 child households containing 3,563 children under age 13. The response rate was 90% for those families regularly interviewed in the core PSID. From this sample of children we selected children who were not recent immigrants and who were 6 to 12 years of age at the time of the interview. Of these 1676 children, 977 had complete information on all of the variables in the analysis. The major reason for missing information was that only 80% of eligible children were tested and only 77% of mothers took the passage comprehension test. A few

additional cases were missing family structure or maternal work and a few additional cases were missing whether held back in school. Post-stratification weights based upon the 1997 Current Population Survey were used to make the data nationally representative. Sample sizes and statistical tests are based upon the actual number of cases. In addition, robust standard errors were obtained using Stata (StataCorp, 2001) to adjust for including multiple children in some of the families.

Although most of our measures were available for the full sample of 977 children, in some of our analyses we also included two variables—neighborhood quality and maternal depression—that were available for the 60% of children whose primary caregiver completed a self-administered household survey. Because of the potential selectivity of this subsample, we conducted comparable analyses on both samples except when that variable was included. Weights for this subsample that take into account attrition from the full sample were used to attempt to reduce the effects of differential attrition (Hofferth, et al., 1999).

*Measures of Independent Variables*

Although our major variable is income, welfare receipt, maternal work history, residential mobility, and family structure and transitions are also important independent variables. These are created for the entire life course of the child, from birth to the time of the 1997 survey.

Low Family Income

We examined a variety of measures of family income, based upon research conducted by Duncan and colleagues and summarized in Duncan & Brooks-Gunn (1997; 1998). This

includes average family income, average income to needs, and proportion of time in poverty in the child's early and middle childhood years. The measurement of income is discussed in depth in Mayer (Mayer, 1997). The argument for using a categorical measure of low income is that the effect of additional income is nonlinear; an increase in income at low levels should matter more than an increase at the upper levels. Recent research shows that this is the case; increasing income for children from poor families improved their achievement to levels equal to those of children of higher income families, whereas changing the income of children from high-income families did not affect achievement (Dearing, et al., 2001). Because of the standard understanding of the meaning of the poverty line and its use in public policy, we use the ratio of income to the poverty line. This adjusts for differences in family size and was originally based upon the cost of the food needs of a given size family. Given the decline in fraction of large families, most of the variation in the ratio of income to needs today results from income differences.

We replicated Duncan et al's analyses on our sample using the average income 0-5 and 6-12; however, because of the strong correlation (0.6) between income between 0-5 and 6-12, we obtained perverse effects of income in our analyses (results available from the first author). In particular, we found being in a family with higher income in the early period was associated with a significantly greater likelihood of being held back in middle childhood. The effects of being in a high income family in middle childhood were negative, as expected. This is because most of the children who were high income in early childhood remained high income in middle childhood. The two variables are highly collinear. Using the proportion of time spent in a family with income below poverty has the same problem.

Therefore, the effects of temporary versus persistent low income cannot be identified with the Duncan et al. approach of using separate variables for income in different childhood periods. Instead, we created 3 dummy variables: 1) whether the child's family income was less than the poverty line at any time during age 0-5 but not later, 2) whether family income was less than the poverty line at any time during age 6-12 but not earlier, and 3) whether family income was less than the poverty line at some time in both periods. In this way we capture short-term and long-term effects and the timing of low-income experienced by children.

Recent research suggests that one of the problems with the poverty line is that it is categorical and does not capture families that are struggling and that are near but above the cutoff. When we include dummy variables for both "income to needs under poverty" and "income to needs between poverty and twice the poverty line," we found that the effects on children's achievement and behavior of the two income groups were very similar; consequently, in our final specifications our poverty dummy variable indicates above or below twice the poverty line.

To construct the ratio of income to needs each year we extracted the total family income each year of the child's life from the core PSID and divided this by the government poverty threshold (U.S. Census Bureau, 2001). We then averaged the income-to-needs ratios for the periods where the child was aged 0-5 years of age, 6-12 years, and over the child's entire lifetime up to 12 years of age. We then constructed a set of dummy variables to measure when and if the child was ever in a family that was considered "low income" which was defined as less than two times the poverty threshold. If the average income-to needs was less than two when the child was 0-5 but was greater than two when the child was 6-12, the

dummy variable "Low income--child's age 0-5 only" was assigned a value of one. Similarly, if the average income-to-needs was greater than two when the child was 0-5 but less than two when the child was 6-12, then the dummy variable "Low income--child's age 6-12 only" was assigned a value of one. Finally, if the average income to needs was below two for both periods then the dummy variable "Low income--child's age 0-12" was assigned a value of one. Therefore, all groups are mutually exclusive and the children who were never low income were the reference group.

Because there was some concern that by comparing children in low income families with all higher income families we were making the most extreme comparison, we also ran the analyses including a moderate income group of families with incomes two to three times the poverty line in one period but never low income, and high income families with incomes three or more times poverty in both periods. The incomes were higher, as expected, for high income compared with moderate income families. Average achievement levels, although small in absolute size, were significantly different for the two groups, but behavior problems, chronic illness and held back were not (not shown). High income families were more residentially mobile and less likely to have experienced a change in family structure than moderate income families, though the differences were not large. Sample sizes were small for the moderate income group, resulting in larger standard errors. As a result, we combined the moderate-income and high-income groups for our analyses.

Welfare Receipt

To construct the welfare receipt variable we also tested several specifications. Consistent with previous research (Ku & Plotnick, 2003), we used the proportion of the

child's first six years and middle childhood years in a welfare-receiving family. We used the proportion of years on welfare rather than the number of years specification used by Ku and Plotnick since our children were in their middle childhood years in 1997 whereas Ku and Plotnick's subjects were at least age 18. From the core PSID we extracted information on the months of the child's life that the mother received AFDC benefits. We used this information to construct continuous variables containing the percent of the child's life that the mother was on AFDC for two periods--when the child was 0-5 years of age and when they were 6-12. The values ranged between 0 (mother never received AFDC benefits) to 100 (mother received AFDC benefits every month).

Family Structure and Transitions

Data on the marital status of the head of the household was extracted from the core PSID for every year of the child's life. Each year the head of the household was categorized as either: married, single (never married), divorced, widowed, or separated. Using this information we constructed a dummy variable for each year of the child's life on whether the family was one parent (single, divorced, or separated) or two-parent (married or widowed). As have others (Guo & Harris, 2000), the children whose parent was widowed were included with children of two parents because children of widowed parents do not suffer the same economic and achievement disadvantages as children of divorced or never married parents and there are too few cases with widowed parents for separate treatment. Combining information from the dummy variables over the years of the child's life we were able to classify the family structure and transitions when the child was 0-5 years of age and 6-12. If the child was continuously in a one-parent family due to divorce or separation then the

dummy variable "All one parent" was assigned a value of one. If the child had a family transition when they were 0-5 but a stable family structure when they were 6-12 then the dummy variable "Early transition" was assigned a value of one. Similarly, if the child started off in a stable family when they were 0-5 but had a family transition when they were 6-12 then the dummy variable "Later transition" was assigned a value of one. Finally, if there was a transition when the child was 0-5 and 6-12 then the dummy variable "Transition in both periods" was assigned a value of one. Although we would have liked to have classified the transitions in more detail (i.e. divorced and then (re)married, or (re)married and divorced), there were not enough cases to warrant this level of detail. Children that were continuously in two-parent families over the entire period from birth to age 12 were the reference group.

Work History

Because research has found effects of maternal employment, particularly in the early years of the child's life, on the child's achievement and behavior (Brooks-Gunn, et al., 2002), we also included the percentage of years the mother was employed when the child was age 0-5 and when the child was age 6-12. These data were drawn from the core PSID.

Residential Mobility

Studies have suggested that changing residences frequently can have adverse outcomes for children (McLanahan & Sandefur, 1994). We calculated the percentage of the child's life in each of the two periods (0-5 and 6-12 years) in which they experienced a residential move, ranging from 0 (never moved) to 100% (moved every year).

*Measures of Dependent Variables*

Achievement and Behavior

A child's cognitive development was assessed by using one subtest of the Woodcock-Johnson Revised Test of Basic Achievement passage comprehension, a test that measures vocabulary and comprehension skills (Woodcock & Mather, 1989). This is a measure of reading skills, a key factor in school achievement. We examined the results for three other tests, and they are consistent with the results on this test. A child's socio-emotional development was measured by the Behavior Problems Index, a 30-item scale which measures the existence and severity of child behavior problems. This scale was drawn from the Achenbach scale and designed for survey administration (Peterson & Zill, 1986). Reliability for this item in this sample was .91 (Cronbach's alpha). We also examined but do not present results from two subscales that measure internalizing, distressed or withdrawn behavior and externalizing or aggressive behavior (Rogers, Parcel & Menaghan, 1991).

The primary caregiver was asked whether the child had ever repeated a grade or been held back because the school recommended it. The responses to this question were used to construct a dummy variable for ever held back versus never held back.

Child Health

The health of the child was measured by whether a doctor has ever said the child has one of a set of chronic health problems such as asthma, diabetes, and chronic ear infections. It does not include developmental disabilities. About one-third of children had chronic ear infections, while 10 percent had asthma and another 9 percent had a speech impairment. The remaining conditions were as follows: anemia (5 percent), orthopedic impairment (4

percent), hearing difficulty (3 percent), seeing difficulty (3 percent), epileptic fit (1 percent), and high lead levels (1 percent). Fifty percent of children had at least one of these chronic health problems.

*Measurement of the Demographic Control Variables*

The demographic control variables used in the analyses are divided into two groups: those that characterize the child or family at the child's birth or are permanent characteristics and those that characterize the child or family at the time of the 1997 CDS interview. The variables that were extracted from the PSID in the year in which the child was born include the mother's age in the child's birth year, and the number of children in the family at the time of the child's birth. Data that were obtained from the CDS include race and ethnicity of child (based on the race and ethnicity of the head of the household), whether the child was a low birth weight infant, the gender of the child, and the mother's score on the passage comprehension test (identical to that administered to the child). The latter controls for the mother's verbal achievement, which, given that they are adults, is unlikely to change. Current demographic characteristics obtained during the 1997 CDS interview include the mother's completed education at the survey date, the age of the child at survey date, and the number of children in the family at the survey date.

*Mediating Variables*

We added four parenting variables (cognitive stimulation, parental school engagement, maternal warmth, and maternal depression) and neighborhood quality to the models to measure the extent to which these variables mediate the effects of income, welfare

receipt, maternal work history, and family transitions on the cognitive and behavioral outcomes of children.

Cognitive Stimulation. The cognitive stimulation in the home environment was based on a subset of items from the Home Observation for Measurement of the Environment (HOME) inventory (Caldwell & Bradley, 1984). The subset consisted of 14 items in the inventory that assessed the physical environment in which the children lived as well as the cognitively stimulating materials available to them. Four items measured the extent to which the home environment was clean, cluttered, monotonous and safe. The responses to these items were from direct observation of the interviewer and assigned a value of 0 or 1, with 1 indicating responses that were the most positive (e.g very clean). Other items include the number of books the child had (1=10 or more, 0=fewer), the frequency of reading to the child (1=several times a week, 0=less often), the frequency with which the child reads to him or herself (1=several times a week, 0=less often), whether the child is encouraged to engage in hobbies (1=yes, 0=no), has a musical instrument (1=yes, 0=no), participates in extracurricular activities (1=yes, 0=no), whether the family subscribes to a newspaper (1=yes, 0=no), whether if watching television discusses the programs with a parent (1=yes, 0=no), goes to a museum (1=several times a year, 0=less frequently), and attends a musical or theatrical performance (1=several times a year, 0=less frequently). The responses to the 14 items were added and ranged from 2.5 to 14 with a mean of 10.18.

Parental School Engagement. The variable that quantifies the extent to which parents were positively engaged in their child's school is based on a 7-item scale. The primary caregiver was asked to answer the following questions about whether and how often they had participated in following activities in the current school year: volunteered in the classroom,

school office or library; had an informal conversation with the child's teacher; made a presentation to the child's class; observed (his/her) classroom; attended a school event in which the child participated such as a play, sporting event or concert; attended a school event in which the child did not participate; attended a meeting of the PTA or other such organization. An additional four items that asked questions about the parent's participation in activities at the child's school were not included because they could be indicative of problems the child is having (e.g. met with school counselor). The following values were assigned: 1=parent had not participated in the activity in the current school year, 2=parent had participated once, 3=parent had participated more than once. Summing the values, the parent's school engagement ranged between 7 and 21. The mean for this item was 12.17 with a standard deviation of 3.63. The reliability of this item as measured by Cronbach's alpha is .76.

Maternal Warmth. The warmth of the primary caregiver (almost always the mother) was assessed by asking six questions pertaining to the amount of time in the last month that the primary caregiver did the following: hugged or showed physical affection to their child; told child that they loved them; spent time with the child doing one of their favorite activities; joked or played with the child; talked with them about things that they are especially interested in; told the child they appreciated something they did. The responses to the questions are: 1=Not in the last month, 2=1 or 2 times in past month, 3=about once a week, 4=several times a week, 5=everyday. If the response to the question was 4 or 5, a value of 1 was added to the maternal warmth scale. Thus the maternal warmth scale ranges from 0 to 6 with a mean of 5.15. Reliability for this item was .80 (Cronbach's alpha).

Maternal Depression. Depression was measured by maternal scores on a short (10-item) psychological distress scale developed by Ronald Kessler from the Composite International Diagnostic Interview (CIDI) of the World Health Organization (Kessler & Mroczek, 1994). "During the past 30 days, how often did you feel tired out for no good reason? Feel nervous? feel depressed?" Responses ranged from 1=all of the time to 5=none of the time. The items were reverse coded so that 0=none and 4=all of the time and items were summed. Scores ranged from 0 to 33, with a mean of 15.46 and a standard deviation of 4.62. Reliability for this item as measured by Cronbach's alpha is .91.

Quality of the Neighborhood. The variable which measures the quality of the neighborhood in which the child lives is based on a single question which is asked of the primary caregiver: How would you rate your neighborhood as a place to raise children? The responses range from 1=excellent to 5=very poor. We reverse-coded this item. This item

provides an overall measure of the safety of the neighborhood, activity outlets for kids, and the quality of the school system.

## Methodology

*Cognitive and Behavior Outcomes*

Ordinary least squares regression was first used to examine the relationship between income, welfare receipt, maternal work history and family structure and each cognitive and behavioral outcome. In model 1 we control for demographic characteristics in place at the time of the birth of child and current demographic characteristics of the mother and child. In model 2 we add three parenting variables, the cognitive scale from the HOME, warmth, and school engagement, available for all children. By examining the coefficients on income, welfare receipt, maternal work history, mobility, and family structure, we can see whether these parenting variables mediate any of the effects of these variables on achievement and behavior. Maternal depression and quality of the neighborhood were added in model 3 because they were only available for those children whose primary caregiver had completed a household questionnaire. Because the sample in model 3 is smaller and may differ from the full sample, we include regression coefficients for two samples: the total sample and the sample with a completed primary caregiver household questionnaire.

***Chronic Health Problems***

We used logistic regression to model the association between income, welfare receipt, maternal work history, and family structure and transitions on whether the child had any

chronic health problems (1=yes, 0=no). The introduction of covariates into the model was identical to that of the cognitive and behavior outcomes models.

### *School Outcomes*

Logistic regression was used in the models for held back in school because it was dichotomous. The covariates and models were identical to the cognitive, behavior, and health models except that an additional model was added to the analysis. After controlling for all other covariates, a model that controlled for the child's cognitive achievement (their passage comprehension score), total behavior problems (both internalizing and externalizing), and whether they had a chronic health problem was added. The purpose of this final model is to examine the extent to which each of these assessments contributed to the child being held back in school.

## Results

### Means of all Variables

There are salient differences between income groups in many of the factors that would be expected to affect a child's achievement, health, and behavior (Table 1). For example, moderate or high-income families were much more stable than families with low income, both in terms of moving frequency and in family structure. As would be expected, mothers in moderate or high-income families consistently worked more and had more education and higher passage comprehension scores than mothers in low-income families. In general, moderate to high-income mothers showed more warmth toward their children and were less depressed than mothers in persistently low-income families. Children from

moderate or high-income families also had parents who were more engaged in their schooling, had more cognitively stimulating home environments, and lived in higher quality neighborhoods. Although passage comprehension scores were lower for children in families who ever experienced low income, and behavior problems were more frequent in persistently low-income families than for those in moderate or high-income families, there were no discernible differences in chronic health problems by income group. Income differences in grade retention were large. Nearly 21% of children from middle-childhood low-income families who were low-income in middle childhood and 13 percent of those persistently low income were held back in school compared with only 3% of children in moderate to high-income families. Although children in early low-income families had test scores that were significantly lower than those of moderate and high income families, only 5.8 percent of these children were held back in school.

(Table 1 about here)

There were also notable differences in some characteristics among the low-income groups. For example, in those families that were low income during the child's early years but were not low income in middle childhood, the percent of months in which the child's mother was working rose from 43 percent when the child was 0-5 years old to 73 percent by the time the child was 6-12 year of age. The increase was not nearly as dramatic for the other low-income groups. This dramatic rise in maternal work may partly explain the rise in income for this group. In addition, while a large proportion of persistently low-income children were consistently in a one-parent family (31 percent), early low-income and middle-low income children experienced numerous transitions in family structure, which may have contributed to the change in incomes for these groups.

**Passage Comprehension**

Table 2 shows the results of regressing scores on the passage comprehension test on the child's family economic history, welfare receipt, maternal work history and family structure/transitions while controlling for various demographic variables.

(Table 2 about here)

*Family Economic History*

Results for passage comprehension (Table 2) reveal a strong and persistent association with low-income during the child's middle years only. By the final model, a child whose family was low-income during the child's middle years only scored about 5 points lower on the passage comprehension test than a child whose family was never low-income. Five points is one-third of a standard deviation, a substantial effect size. The coefficients for persistent low-income were smaller and only significant in the earlier models before the parenting variables were introduced. Differences in parenting explain about 17% of the effects of persistent low income but explain only 4% of the effects of middle childhood low income. The coefficients for low income during the child's early years were also negative but never significant.

*Welfare Receipt*

The coefficients for welfare receipt in the child's early and middle years were never significant in the models.

*Maternal Work History*

Maternal work during the early years of the child's life was associated with lower scores on the passage comprehension test. The coefficients are small, however, amounting to about a 5 point lower score for a child whose mother worked every year compared with those whose mothers never worked. This translates to an effect size of about .30. In contrast, a child whose mother worked all of the middle years of a child's life scored 3 points higher on the passage comprehension test than a child whose mother did not work at all. This coefficient was only significant in the main sample; the coefficient was the same but standard errors were larger in the subsample with completed household questionnaires.

*Residential Mobility*

Frequent moves when the child was 0-5 years old resulted in significantly lower test scores in the total sample, but not for the smaller sample. In the full sample, children whose families moved every year when the child was 0-5 years old scored about 5-6 points lower on the passage comprehension test than children whose families never moved during this time. There were no significant results on test scores for frequent moving when the child was 6-12 years old.

*Family Structure and Transitions*

The coefficients for early and late family structure transitions were negative in the early models, indicating lower test scores, but then turned positive upon the addition of the parenting variables in the later models. The coefficients were never significant in any of the models. It is interesting to note that children who were consistently in one-parent families

their entire childhoods did not score differently on the achievement tests from children who were consistently in two-parent families, once other variables are controlled.

*Parenting Characteristics*

Cognitive stimulation was associated with higher test scores on the passage comprehension test, but only for the larger sample. Parental school engagement and maternal warmth were not significantly associated with the passage comprehension test score. Nor was maternal depression significantly associated with passage comprehension test scores

In terms of parenting variables acting as mediators, the coefficients for the low-income variables were reduced in size but not eliminated upon the addition of the parenting variables in model 2. The strongest mediation was for persistent low income: a 17% reduction in the coefficient for the total sample. The coefficients for maternal work history were not significantly changed by the addition of the parenting variables. The association between family structure/transitions and the score on the cognitive achievement test was never significant.

*Quality of the Neighborhood*

The coefficient for the quality of the neighborhood was positive but not significant. However, adding the neighborhood variable did reduce the coefficient of low income in middle childhood from 5.29 to 4.95, a drop of 6%. It also reduced significance to a marginal level. Thus neighborhood mediated some of the effect of income in middle childhood on achievement.

**Control Variables**

The effects of control variables on passage comprehension scores were as anticipated (not shown). Males and children from larger families had lower scores. Children of mothers with higher test scores had higher test scores themselves. Finally, maternal education was not associated with children's scores on passage comprehension with controls for the mother's own test scores and all the other variables in the model. There was nothing surprising in the effects of controls in this or in the other analyses (not shown).

**Behavior Outcomes**

Table 3 shows the results of regressing total behavior problems (either internalizing or externalizing) on family economic history, welfare receipt, maternal work history, and family structure and transitions. Demographic controls were held constant throughout all models.

(Table 3 about here)

*Family Economic History*

There was a consistent association between low income during the child's early years, whether persistent or not, and the child having a behavior problem. A child in a low-income family during their early years scored 3.3 points higher (37% of a standard deviation) on the behavior scale than a child whose family was never low income (model 3). Likewise, a child in a persistently low-income family scored 2.51 points higher on the total behavior problem scale. The coefficient for low income during the middle childhood years only was positive in the last two models, but small and never statistically significant.

*Welfare Receipt*

In the total sample, a higher proportion of months spent on AFDC during middle childhood was associated with a greater frequency of behavior problems at the $p<.10$ level (Model 2). The effect was substantial. An increase of 50 percent in the proportion of months on AFDC was associated with an increase of about 6 points on the total behavior problems scale, almost 1 standard deviation. In the sample with a completed primary caregiver household questionnaire, however, the coefficient was much smaller and not significant. Thus, in the full sample there was an association of welfare receipt in middle childhood with greater behavior problems.

*Maternal Work History*

There was a persistent, albeit small, association between extensive maternal work during the child's early years and increased behavior problems. In all models, a child whose mother worked all of the child's early years scored 3 points higher on the behavior problems scale than a child whose mother never worked. Maternal work during the child's middle childhood years was negatively associated with behavior problems in the total sample, but was never significant for the smaller sample. Since the coefficients for the two samples are similar, it could be that there were simply not enough cases in the smaller sample for precise estimation.

*Residential Mobility*

Frequent moves during the child's early years were associated with more behavior problems. The score on the behavior problems scale was 4 points higher for those children

who experienced a residential move every year when they were 0-5 years old compared with children who never moved during this time period, an effect size of about 0.15. There were no significant effects of frequent moving when the child was 6-12 years old on their behavior problems.

*Family Structure and Transitions*

Children who experienced a family transition in their early and middle childhood years or in their middle childhood years only were significantly more likely to exhibit behavior problems than children in a stable two-parent family. The coefficients for these two variables were significant only for the larger sample.

*Parenting Characteristics*

Maternal warmth was strongly and consistently associated with fewer behavior problems. In the final model (Model 3), the coefficient was 1.05, $p < .01$. The effect size is about 0.8 of a standard deviation, a substantial effect. Maternal depression was significantly positively associated with behavior problems but the coefficient was not large (.04 of a standard deviation).

The addition of the parenting variables to the model changed the coefficients for the low-income variables very little (model 2). This suggests that parenting characteristics did not mediate the effects of low income for children's behavior problems. Income retained a strong effect. The coefficients for welfare receipt and maternal work history remained virtually unchanged after adding the parenting variables. The coefficient for the effect of a

family transition during the child's middle years only became smaller by 8% and nonsignificant when parenting variables were added (model 2).

*Quality of the Neighborhood*

The quality of the neighborhood was negatively associated with problem behavior (coefficient = -1.53, P<.01.). The addition of this variable along with maternal depression reduced the coefficient for persistent low income by 25%, but the latter was still significant. The remaining coefficients were changed very little by the addition of this variable. This suggests that quality of the neighborhood along with maternal depression mediated some of the effect of persistent low income on children's behavior problems.

**Chronic Health Problems**

Table 4 contains the results of regressing whether the child had a chronic health problem on income, welfare receipt, maternal work history, and family structure and transitions.

(Table 4 about here)

While all of the coefficients were positive, there was never a significant effect of low income on chronic health problems in children. Likewise, there was never a significant effect of welfare receipt, maternal work, or family structure and transitions on chronic health problems. Frequent moves during the child's middle years, 6-12 years old, were associated with more chronic health problems as was increased maternal depression. The quality of the neighborhood in which the child lives was not significantly related to their health.

**Grade Retention**

Table 5 contains the results of the logistic regression models for whether the child was ever held back in school.

(Table 5 about here)

*Family Economic History*

Low income during the child's middle childhood years only and persistently low income across both early and middle childhood periods were associated with a significantly higher rate of being held back in school. The coefficients for middle childhood low-income only were significant across all models, while the coefficient for persistent low income became nonsignificant when child assessments were added to the final model.

*Welfare Receipt*

A child whose family received welfare for more months during their early years was less likely to be held back in school, while the reverse was true for a child whose family received welfare more during the middle years. The effect of early welfare receipt in reducing grade retention was similar in size across the models but became significant when the child assessments were added to the final model (model 4).

*Maternal Work History*

There were small effects for maternal work history that persisted until parenting variables were added to the smaller sample. Maternal work during the child's middle childhood years was negatively associated with being held back in school.

*Family Structure and Transitions*

There are no significant associations between family structure and transitions and being held back a grade in school.

*Parenting Characteristics and Quality of the Neighborhood*

Cognitive stimulation and maternal warmth were significant predictors of not being held back in school but only for the larger sample in model 2. When maternal depression and quality of the neighborhood were added, none of the parenting variables was significant but quality of the neighborhood was negatively associated with grade retention (model 3). When child assessments were added to the final model, the coefficient for quality of the neighborhood was no longer significant.

Adding the parenting variables to the models did not change the coefficients for the income, welfare receipt, maternal work history, or family structure and transitions variables.

*Child Assessments*

Both behavior problems, reading achievement, and chronic health problems were all associated with being held back. Greater child's behavior problems increased the likelihood of being held back in school and a higher passage comprehension score reduced this likelihood. Chronic health problems were significantly associated with being held back in the total sample (model 4), but they were not in the smaller subsample. Translating these into effect sizes, we see that the effect of behavior problems was smaller than that of passage score for the total sample (0.27 versus 0.50 for the total sample) but similar to that of passage

score for the subsample (.23 versus 0.23 for subsample). The effect size for chronic health problems was the largest of the three: 2.5 for the total sample and 2.1 for the subsample. This suggests that behavior and health are at least as important to grade retention as is the score on a test of reading achievement.

The achievement and behavioral assessments mediated many of the findings for the variables previously introduced. The child assessments diminished the effects of middle childhood low income on being held back and eliminated it for persistent low income. Persistent low income was shown earlier to be associated with greater behavior problems, which caused problems in school and led to grade retention. In addition, middle childhood low income only was associated with lower reading scores, which, in turn were linked to being retained in grade. (Chronic conditions did not mediate any income effect because it was not linked to family income.) Even so, there was still a significant remaining effect of declining income on being retained in grade; we were unable to explain all of the income effect. The significant coefficient for the quality of the neighborhood was reduced when the assessments were added, indicating that neighborhood effects worked through behavior problems and passage score.

## Discussion and Conclusions

This paper has examined the association between income over the child's lifetime and cognitive test scores, behavior problems, chronic conditions, and being retained in grade in elementary school.

Cognitive achievement. Regarding cognitive development, the results support both the stress and resource theories, but not the critical period theory. Results did not show

income during the preschool years to be more important than later income for cognitive achievement, as had been suggested by other research (Duncan, et al., 1998) based upon the critical period theory. Instead, this research found either that low income during all of childhood or low income only during the middle childhood years was most strongly predictive of lower achievement. It makes sense that current rather than past low income would affect children's current achievement. If the stress of low income is what is important, children are likely to be affected most during the period during which they experience low income and low resources. Stress theory predicts current conditions to be more important. Other research (Moore, et al., 2002) has shown that a decline in family well-being has more significant effects on child achievement and behavior than either stable or improving financial conditions. Given that the income variables were created to be exhaustive and mutually exclusive, low income during early childhood only implies that family income has improved by middle childhood. The results show, contrary to the critical period hypothesis, that children in families whose income improves do as well on achievement in middle childhood as those in families that were never low income. Declining income is of much greater hazard for children's achievement than low income in preschool years that has improved by middle childhood or even persistently low income. The coefficient for persistently low income is large and negatively related to child achievement before mediators are included, but smaller than the coefficient for low income only in middle childhood.

Behavior Problems. Support for the critical period hypothesis was provided only for behavior problems. Low income during the preschool years only or persistent low income were associated with increased behavior problems, a finding that has not been consistently found in other research. However, it makes some sense that early and persistent conditions

would have long-term effects on behavior. Income-occasioned behavior problems may be more difficult to reverse than achievement-related problems. The analysis found family structure to influence behavior problems but not as strongly as other research has shown. Instead, this paper found evidence that geographic mobility is a significant factor contributing to behavior problems, particularly, extensive mobility during the first five years of life. This provides additional evidence for the importance of stability during early childhood to child socioemotional well-being.

Mediators. The results also support research on mediators. Maternal depression, warmth, and the quality of the neighborhood were important mediators of the effect of income on behavior. The results suggest that reducing maternal depression, increasing warmth, and improving neighborhood environments of low income families would help reduce the effect of low income on children's behavior problems. These factors mediated some of the effect of persistent low income on children's behavior problems whereas they did not influence the association between low income in early childhood and children's behavior problems.

Cognitive stimulation mediated some of the effect of income on achievement. Increasing cognitive stimulation in the home reduced the effect of persistent low income on achievement. School engagement was never associated with child achievement in this analysis. Perhaps it is too strongly associated with variables such as parental education to have an independent effect. Neighborhood quality did not mediate any of the effect of income on child test score.

Grade retention. Low income in middle childhood and persistent low income both increased children's grade retention, before mediators were included. Including cognitive

stimulation, warmth, and neighborhood reduced the impact of persistent low income but not the effect of current (and declining) low income. Including achievement and behavior problems, which were shown to be directly affected by income, slightly reduced the effect of current low income. Thus some of the effect of income on grade retention works through lowering achievement and increasing behavior problems.

Low income presents a formidable barrier to school success, as measured by grade retention. Income retains significant direct effects on grade retention even after mediating factors are included. For those with comparable levels of income, welfare receipt during the child's early years was associated with being held back less often, although the reverse was true for the later years. This suggests that welfare can be helpful to increase resources for families with young children and reduce the chance of repeating a grade later on; however, the stigma effect may predominate for older children.

An encouraging finding was that for those children in families whose incomes improved over their childhoods to the point where they were no longer low income, their cognitive achievement and grade retention were not significantly different from children whose families were never low income. However, they still had increased behavior problems compared with never-low-income children. On the reverse side, those children whose family income deteriorated over their childhoods—from above low income to below—appeared to be more adversely effected in terms of cognitive achievement and grade retention than even children from families that were always low income. This finding persisted even after mediators were included, which suggests that there are other pathways in which the loss of family income hurts child's school performance beyond parenting, parent mental health, and neighborhood.

Current educational research focuses heavily on cognitive achievement as the path to school success. This analysis shows that poor socioemotional adjustment, as measured by behavior problems, and health, here measured by chronic conditions, can be just as important a barrier to school success as cognitive achievement. A focus on cognitive achievement alone will not help children succeed.

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**Conceptual Model for the Effects of Low income/Welfare Receipt/Maternal Work History/Family Structure and Transitions/Residential Mobility on School Progress in Middle Childhood**

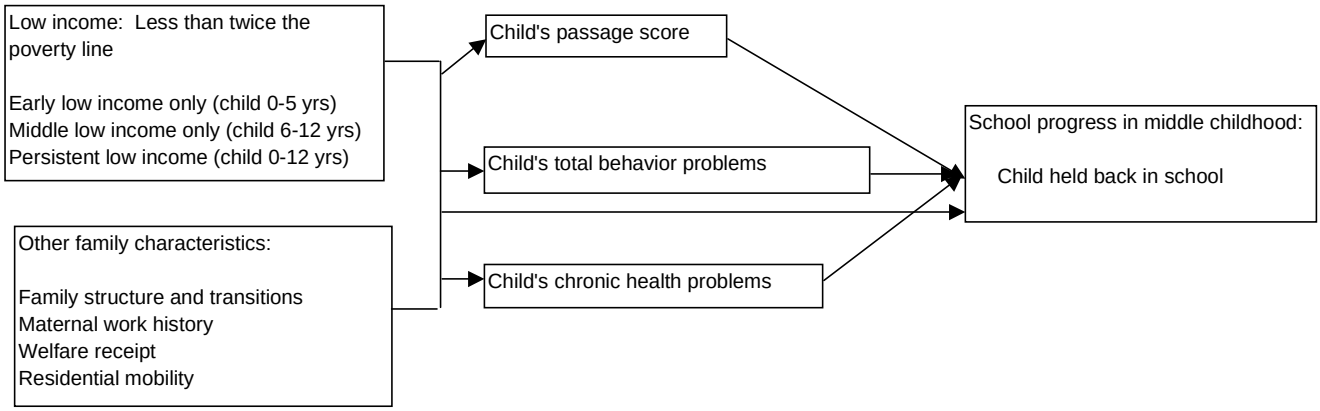

**Table 1. Means and Standard Deviations of Variables in the Analyses**

| | Total Sample | | Early low income A | | Middle low income B | | Persistent low income C | | Moderate or high income D | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **Mean** | **St dev** | **Mean** | **St dev** | **Mean** | **St dev** | **Mean** | **St dev** | **Mean** | **St dev** |
| **Family economic history** | | | | | | | | | | |
| Avg family income/needs-child's age 0-5 only | 3.20 | 2.53 | 1.43 (AB,AD) | 0.43 | 2.85 (AB,BC,BD) | 1.01 | 1.05 (BC,CD) | 0.42 | 4.27 (AD,BD,CD) | 2.82 |
| Avg family income.needs-child's age 6-12 only | 3.47 | 3.50 | 2.78 (AC,AD) | 0.91 | 1.48 (BD) | 0.37 | 1.03 (AC,CD) | 0.43 | 4.72 (AD,BD,CD) | 4.24 |
| **Welfare receipt** | | | | | | | | | | |
| % months on AFDC-child's age 0-5 only | 2.15 | 8.00 | 1.46 (AC) | 3.37 | 2.16 (BC) | 8.04 | 7.99 (AC,BC,CD) | 11.96 | 0.05 (CD) | 0.79 |
| % months on AFDC-child's age 6-12 only | 1.20 | 5.79 | 0.35 (AC) | 3.01 | 1.48 (BC) | 7.38 | 4.44 (AC,BC,CD) | 8.71 | 0.05 (CD) | 1.04 |
| **Work history** | | | | | | | | | | |
| % years mother working-child's age 0-5 only | 56.24 | 36.43 | 43.31 (AD) | 32.20 | 51.77 (BC,BD) | 35.21 | 37.35 (BC,CD) | 27.44 | 65.47 (AD,BD,CD) | 38.17 |
| % years mother working-child's age 6-12 only | 65.17 | 39.28 | 72.91 (AB,AC) | 34.53 | 54.44 (AB,AD) | 41.89 | 49.58 (AC,CD) | 32.82 | 71.36 (BD,CD) | 41.07 |
| **Residential mobility** | | | | | | | | | | |
| % years family moved-child's age 0-5 only | 24.84 | 25.99 | 28.00 (AC,AD) | 28.53 | 27.96 (BC,BD) | 30.19 | 38.71 (AC,BC,CD) | 24.15 | 18.87 (AD,BD,CD) | 23.48 |
| % years family moved-child's age 6-12 only | 15.74 | 21.85 | 16.11 (AC) | 20.00 | 16.87 (BC) | 25.06 | 25.06 (AC,BC,CD) | 23.61 | 12.07 (CD) | 19.08 |
| **Family structure and transitions** | | | | | | | | | | |
| In two parent family | 0.63 | 0.49 | 0.58 (AB,AC,AD) | 0.50 | 0.37 (AB,BC,BD) | 0.52 | 0.21 (AC,BC,CD) | 0.35 | 0.83 (AD,BD,CD) | 0.42 |
| In single parent family | 0.09 | 0.28 | 0.11 (AC,AD) | 0.31 | 0.04 (BC) | 0.22 | 0.31 (AC,BC,CD) | 0.39 | 0.00 (AD,CD) | 0.07 |
| Early and late transitions (child 0-12) | 0.06 | 0.25 | 0.07 | 0.26 | 0.13 (BD) | 0.36 | 0.13 (CD) | 0.29 | 0.03 (BD,CD) | 0.18 |
| Early transition (child 0-5) only | 0.09 | 0.30 | 0.17 (AD) | 0.39 | 0.14 | 0.37 | 0.17 (CD) | 0.32 | 0.05 (AD,CD) | 0.24 |
| Late transition (child 6-12) only | 0.13 | 0.34 | 0.07 (AB) | 0.26 | 0.32 (AB,BC,BD) | 0.50 | 0.18 (BC,CD) | 0.32 | 0.09 (BD,CD) | 0.32 |
| **Demographic life course variables** | | | | | | | | | | |
| Child is White | 0.76 | 0.44 | 0.74 (AC,AD) | 0.45 | 0.79 (BC) | 0.44 | 0.39 (AC,BC,CD) | 0.41 | 0.90 (AD,CD) | 0.34 |
| Child is African American | 0.20 | 0.41 | 0.18 (AC) | 0.39 | 0.16 (BC) | 0.39 | 0.55 (AC,BC,CD) | 0.42 | 0.08 (CD) | 0.30 |
| Child is Hispanic | 0.03 | 0.16 | 0.07 (AB,AD) | 0.26 | 0.00 (AB) | 0.00 | 0.06 (CD) | 0.20 | 0.01 (AD,CD) | 0.12 |
| Child is Other Race (white omitted) | 0.01 | 0.12 | 0.02 | 0.12 | 0.05 (BC,BD) | 0.24 | 0.01 (BC) | 0.06 | 0.01 (BD) | 0.12 |
| Mother's age at child's birth | 28.49 | 6.60 | 27.00 | 4.97 | 26.79 (BD) | 5.51 | 28.07 | 7.37 | 29.04 (BD) | 6.34 |
| Number of children in family at child's birth | 1.40 | 1.20 | 1.53 (AC,AD) | 1.20 | 1.29 (BC) | 1.23 | 2.12 (AC,BC,CD) | 1.16 | 1.11 (AD,CD) | 1.07 |
| Missing information for number of children | 0.01 | 0.10 | 0.00 | 0.00 | 0.02 | 0.16 | 0.01 | 0.10 | 0.01 | 0.10 |
| Child was a low birthweight infant | 0.07 | 0.26 | 0.11 | 0.32 | 0.02 | 0.16 | 0.10 | 0.25 | 0.06 | 0.27 |
| Child is male | 0.50 | 0.51 | 0.50 | 0.51 | 0.42 | 0.53 | 0.52 | 0.43 | 0.50 | 0.55 |
| Mom's passage score | 32.23 | 4.90 | 31.98 (AC,AD) | 4.23 | 30.91 (BC,BD) | 4.87 | 28.10 (AC,BC,CD) | 4.35 | 33.97 (AD,BD,CD) | 4.06 |
| **Demographic current variables** | | | | | | | | | | |
| Mother's education - less than high school | 0.09 | 0.29 | 0.09 (AC) | 0.29 | 0.08 (BC) | 0.29 | 0.31 (AC,BC,CD) | 0.39 | 0.01 (CD) | 0.10 |
| Mother's education-High school | 0.36 | 0.49 | 0.48 (AD) | 0.51 | 0.55 (BD) | 0.54 | 0.47 (CD) | 0.42 | 0.27 (AD,BD,CD) | 0.50 |
| Mother's education - Some college | 0.31 | 0.47 | 0.36 (AC) | 0.49 | 0.37 (BC) | 0.52 | 0.15 (AC,BC,CD) | 0.31 | 0.35 (CD) | 0.53 |
| Mother's education-College | 0.25 | 0.44 | 0.08 (AD) | 0.27 | 0.00 (BD) | 0.00 | 0.07 (CD) | 0.22 | 0.36 (AD,BD,CD) | 0.53 |
| Age of child (years) | 9.76 | 1.86 | 9.98 | 1.77 | 9.63 | 2.16 | 9.47 (CD) | 1.70 | 9.85 (CD) | 1.92 |
| Number of children in family | 2.49 | 1.00 | 2.34 (AC) | 0.93 | 2.55 (BC) | 0.87 | 2.96 (AC,BC,CD) | 1.08 | 2.33 (CD) | 0.89 |
| **Parenting variables** | | | | | | | | | | |
| Cognitive stimulation | 10.19 | 1.86 | 9.94 (AC,AD) | 1.88 | 9.87 (BC,BD) | 1.35 | 9.00 (AC,BC,CD) | 1.64 | 10.70 (AD,BD,CD) | 1.78 |
| Parent's school engagement | 12.48 | 3.72 | 11.36 (AD) | 3.53 | 12.00 | 4.22 | 11.25 (CD) | 2.79 | 13.13 (AD,CD) | 4.00 |
| Maternal warmth | 5.08 | 1.33 | 5.12 | 1.28 | 5.31 (BC) | 1.03 | 4.70 (BC,CD) | 1.32 | 5.18 (CD) | 1.36 |
| Maternal depression[1] | 15.71 | 4.62 | 16.03 | 3.96 | 15.18 | 4.07 | 17.02 (CD) | 4.26 | 15.27 (CD) | 4.84 |
| **Outside influences variable** | | | | | | | | | | |
| Quality of the neighborhood[1] | 3.85 | 1.08 | 3.95 (AC) | 1.10 | 3.72 (BC,BD) | 1.10 | 3.16 (AC,BC,CD) | 0.95 | 4.09 (BD,CD) | 1.01 |
| **Dependent and mediating variables** | | | | | | | | | | |
| Passage comprehension score | 107.05 | 15.88 | 104.55 (AC,AD) | 17.71 | 103.25 (BC,BD) | 15.42 | 97.72 (AC,BC,CD) | 12.32 | 111.32 (AD,BD,CD) | 15.64 |
| Total behavior problems | 40.54 | 8.82 | 41.81 | 9.65 | 40.66 | 9.45 | 42.54 (CD) | 8.38 | 39.63 (CD) | 8.73 |
| Chronic health problems | 0.50 | 0.51 | 0.52 | 0.51 | 0.54 | 0.54 | 0.52 | 0.43 | 0.48 | 0.55 |
| Held back in school[2] | 0.07 | 0.26 | 0.05 (AD) | 0.24 | 0.19 (BD) | 0.42 | 0.12 (CD) | 0.28 | 0.04 (AD,BD,CD) | 0.21 |
| N | 977 | | 76 | | 68 | | 324 | | 509 | |

[1]Based on a smaller sample which completed the household questionnaire.

[2]Based on a total of 884 cases.

**Table 2. Regression of Child's Passage Comprehension Score on the Family Income History and Controls**

| Covariates | Model 1 | | Model 2 | | Model 3 |
|---|---|---|---|---|---|
| | Total sample | Sample with completed house-hold questionaire | Total sample | Sample with completed house-hold questionaire | Sample with completed house-hold questionaire |
| **Family economic history** | | | | | |
| Low income-child's age 0-5 only | -4.21 | -2.34 | -3.63 | -1.70 | -1.94 |
| Low income-child's age 6-12 only | -3.59 | -5.51 * | -3.05 | -5.29 * | -4.95 + |
| Low income-child's age 0-12 | -4.41 * | -4.32 + | -3.64 | -3.80 | -3.65 |
| **Welfare receipt** | | | | | |
| Percent of months on AFDC-child's age 0-5 only | 0.04 | 0.06 | 0.04 | 0.06 | 0.06 |
| Percent of months on AFDC-child's age 6-12 only | -0.10 | 0.01 | -0.11 | 0.02 | 0.05 |
| **Maternal work history** | | | | | |
| Percent of years mother is working-child's age 0-5 only | -0.05 * | -0.50 * | -0.05 * | -0.05 * | -0.05 * |
| Percent of years mother is working-child's age 6-12 only | 0.03 + | 0.03 | 0.03 + | 0.03 | 0.03 |
| **Residential mobility** | | | | | |
| Percent of years child's family moved-child's age 0-5 only | -0.06 + | -0.03 | -0.05 + | -0.03 | -0.03 |
| Percent of years child's family moved-child's age 6-12 only | 0.02 | 0.05 | 0.02 | 0.05 | 0.05 |
| **Family structure and transitions** | | | | | |
| In single parent family-child's age 0-12 | 1.91 | 2.33 | 1.98 | 2.63 | 2.66 |
| Early transition (child 0-5)/late transition (child 6-12) | -0.12 | 2.78 | -0.07 | 2.40 | 2.38 |
| Early transition only (child 0-5) | 0.99 | 3.55 | 1.10 | 3.56 | 3.83 |
| Late transition only (child 6-12) | -1.09 | -0.09 | -0.55 | 0.29 | 0.31 |
| **Parenting variables** | | | | | |
| Cognitive stimulation | | | 0.65 + | 0.46 | 0.45 |
| Parent's school engagement | | | 0.28 | 0.27 | 0.27 |
| Maternal warmth | | | -0.71 | -0.53 | -0.48 |
| Maternal depression | | | | | 0.18 |
| **Outside influences variable** | | | | | |
| Quality of the neighborhood | | | | | 1.00 |
| R-square | 0.27 | 0.31 | 0.28 | 0.32 | 0.33 |
| N | 977 | 750 | 977 | 750 | 750 |

*** p<.001 ** p<.01 * p<.05 + p<.10

Note: Demographic controls are parental race/ethnicity, age of mother at the child's birth, family size at the child's birth, family size at the time of interview, child's age and gender, whether the child was low birthweight, maternal education at the time of interview, and mother's passage comprehension score.

**Table 3. Regression of Child's Total Behavior Problems on the Family Income History and Controls**

| Covariates | Model 1 | | Model 2 | | Model 3 |
|---|---|---|---|---|---|
| | Total sample | Sample with completed household questionaire | Total sample | Sample with completed household questionaire | Sample with completed household questionaire |
| **Family economic history** | | | | | |
| Low income-child's age 0-5 only | 2.17 | 3.03 | 2.21 | 3.29 | 3.30 + |
| Low income-child's age 6-12 only | -0.69 | -0.37 | -0.48 | 0.05 | 0.04 |
| Low income-child's age 0-12 | 1.36 | 3.35 * | 1.39 | 3.37 * | 2.51 + |
| **Welfare receipt** | | | | | |
| Percent of months on AFDC-child's age 0-5 only | -0.01 | -0.02 | -0.02 | -0.04 | -0.05 |
| Percent of months on AFDC-child's age 6-12 only | 0.12 | 0.01 | 0.13 + | 0.03 | 0.01 |
| **Maternal work history** | | | | | |
| Percent of years mother is working-child's age 0-5 only | 0.03 * | 0.03 * | 0.03 * | 0.03 + | 0.03 + |
| Percent of years mother is working-child's age 6-12 only | -0.02 | -0.01 | -0.02 + | -0.01 | -0.01 |
| **Residential mobility** | | | | | |
| Percent of years child's family moved-child's age 0-5 only | 0.04 ** | 0.05 * | 0.04 ** | 0.04 * | 0.04 ** |
| Percent of years child's family moved-child's age 6-12 only | -0.02 | -0.01 | -0.01 | 0.00 | 0.00 |
| **Family structure and transitions** | | | | | |
| In single parent family-child's age 0-12 | -0.49 | -1.93 | -0.96 | -2.15 | -2.49 |
| Early transition (child 0-5)/late transition (child 6-12) | 3.92 + | 0.83 | 4.54 + | 1.30 | 0.62 |
| Early transition only (child 0-5) | 0.15 | 0.01 | 0.19 | 0.02 | -0.02 |
| Late transition only (child 6-12) | 2.37 + | 2.05 | 2.17 | 1.77 | 1.68 |
| **Parenting variables** | | | | | |
| Cognitive stimulation | | | 0.06 | 0.12 | 0.13 |
| Parent's school engagement | | | -0.17 | -0.10 | -0.03 |
| Maternal warmth | | | -0.86 ** | -1.21 *** | -1.05 ** |
| Maternal depression | | | | | 0.20 * |
| **Outside influences variable** | | | | | |
| Quality of the neighborhood | | | | | -1.53 *** |
| R-square | 0.09 | 0.09 | 0.11 | 0.12 | 0.16 |
| N | 977 | 750 | 977 | 750 | 750 |

*** p<.001 ** p<.01 * p<.05 + p<.10

Note: Demographic controls are parental race/ethnicity, age of mother at the child's birth, family size at the child's birth, family size at the time of interview, child's age and gender, whether the child was low birthweight, maternal education at the time of interview, and mother's passage comprehension score.

**Table 4. Regression of Child's Chronic Health Problems on the Family Income History and Controls**

| Covariates | Model 1 | | Model 2 | | Model 3 |
|---|---|---|---|---|---|
| | Total sample | Sample with completed household questionaire | Total sample | Sample with completed household questionaire | Sample with completed household questionaire |
| **Family economic history** | | | | | |
| Low income-child's age 0-5 only | 0.20 | 0.15 | 0.22 | 0.17 | 0.15 |
| Low income-child's age 6-12 only | 0.41 | 0.66 | 0.41 | 0.67 | 0.72 |
| Low income-child's age 0-12 | 0.15 | 0.29 | 0.15 | 0.32 | 0.23 |
| **Welfare receipt** | | | | | |
| Percent of months on AFDC-child's age 0-5 only | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Percent of months on AFDC-child's age 6-12 only | 0.00 | 0.02 | 0.00 | 0.02 | 0.02 |
| **Maternal work history** | | | | | |
| Percent of years mother is working-child's age 0-5 only | 0.00 | -0.01 | 0.00 | -0.01 | -0.01 |
| Percent of years mother is working-child's age 6-12 only | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Residential mobility** | | | | | |
| Percent of years child's family moved-child's age 0-5 only | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Percent of years child's family moved-child's age 6-12 only | 0.01 + | 0.02 ** | 0.01 | 0.02 ** | 0.02 ** |
| **Family structure and transitions** | | | | | |
| In single parent family-child's age 0-12 | -0.24 | -0.47 | -0.23 | -0.46 | -0.50 |
| Early transition (child 0-5)/late transition (child 6-12) | -0.08 | -0.02 | -0.08 | -0.04 | -0.12 |
| Early transition only (child 0-5) | -0.07 | -0.45 | -0.06 | -0.46 | -0.44 |
| Late transition only (child 6-12) | -0.20 | -0.12 | -0.20 | -0.09 | -0.11 |
| **Parenting variables** | | | | | |
| Cognitive stimulation | | | -0.04 | 0.05 | 0.05 |
| Parent's school engagement | | | 0.03 | 0.00 | 0.01 |
| Maternal warmth | | | 0.01 | 0.00 | 0.03 |
| Maternal depression | | | | | 0.05 + |
| **Outside influences variable** | | | | | |
| Quality of the neighborhood | | | | | -0.08 |
| R-square | 0.04 | 0.08 | 0.04 | 0.06 | 0.07 |
| N | 977 | 750 | 977 | 750 | 750 |

*** p<.001 ** p<.01 * p<.05 + p<.10

Note: Demographic controls are parental race/ethnicity, age of mother at the child's birth, family size at the child's birth, family size at the time of interview, child's age and gender, whether the child was low birthweight, maternal education at the time of interview, and mother's passage comprehension score.

**Table 5. Regression of Child's Grade Retention on the Family Income History and Controls**

| Covariates | Model 1 | | Model 2 | | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|---|---|
| | Total sample | Sample with completed household questionaire | Total sample | Sample with completed household questionaire | Sample with completed household questionaire | Total sample | Sample with completed household questionaire |
| **Family economic history** | | | | | | | |
| Low income-child's age 0-5 only | 0.23 | 0.69 | 0.29 | 0.94 | 0.96 | -0.25 | 0.89 |
| Low income-child's age 6-12 only | 1.59 ** | 1.92 ** | 1.72 ** | 1.91 * | 1.92 ** | 1.70 ** | 1.67 * |
| Low income-child's age 0-12 | 0.97 + | 1.47 * | 0.91 | 1.48 * | 1.34 * | 0.84 | 1.09 |
| **Welfare receipt** | | | | | | | |
| Percent of months on AFDC-child's age 0-5 only | -0.04 | -0.05 | -0.04 | -0.04 | -0.05 | -0.05 | -0.05 * |
| Percent of months on AFDC-child's age 6-12 only | 0.00 | 0.05 | 0.01 | 0.06 * | 0.06 + | 0.00 | 0.06 * |
| **Maternal work history** | | | | | | | |
| Percent of years mother is working-child's age 0-5 only | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 | 0.00 |
| Percent of years mother is working-child's age 6-12 only | -0.01 + | -0.01 + | -0.01 + | -0.01 | -0.01 | -0.01 | -0.01 |
| **Residential mobility** | | | | | | | |
| Percent of years child's family moved-child's age 0-5 only | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Percent of years child's family moved-child's age 6-12 only | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 |
| **Family structure and transitions** | | | | | | | |
| In single parent family-child's age 0-12 | 0.91 | 0.66 | 0.73 | 0.65 | 0.64 | 0.74 | 1.13 |
| Early transition (child 0-5)/late transition (child 6-12) | 0.54 | 0.44 | 0.89 | 0.63 | 0.41 | 0.25 | 0.20 |
| Early transition only (child 0-5) | 0.69 | 0.31 | 0.75 | 0.55 | 0.50 | 0.80 | 0.84 |
| Late transition only (child 6-12) | 0.38 | -0.29 | 0.30 | -0.30 | -0.34 | -0.18 | -0.61 |
| **Parenting variables** | | | | | | | |
| Cognitive stimulation | | | -0.25 * | -0.22 | -0.22 | -0.26 * | -0.22 |
| Parent's school engagement | | | 0.03 | 0.10 | 0.11 | 0.05 | 0.10 |
| Maternal warmth | | | -0.24 * | -0.27 + | -0.25 | -0.11 | -0.15 |
| Maternal depression | | | | | 0.00 | | -0.03 |
| **Outside influences variable** | | | | | | | |
| Quality of the neighborhood | | | | | -0.41 * | | -0.29 |
| **Child variables** | | | | | | | |
| Total behavior problems | | | | | | -0.07 *** | -0.06 ** |
| Passage score | | | | | | 0.13 ** | 0.06 + |
| Chronic health problems | | | | | | 0.65 + | 0.55 |
| R-square | 0.14 | 0.17 | 0.17 | 0.19 | 0.21 | 0.30 | 0.30 |
| N | 884 | 676 | 884 | 676 | 676 | 884 | 676 |

*** p<.001 ** p<.01 * p<.05 + p<.10

Note: Demographic controls are parental race/ethnicity, age of mother at the child's birth, family size at the child's birth, family size at the time of interview, child's age and gender, whether the child was low birthweight, maternal education at the time of interview, and mother's passage comprehension score.