Published in final edited form as:

Child Dev. 2014 March ; 85(2): 405–411. doi:10.1111/cdev.12129.

The Role of Planning Skills in the Income-Achievement Gap

Stephen R. Crook¹ and Gary W. Evans^{1,2}

¹Department of Human Development, Cornell University

²Department of Design & Environmental Analysis, Cornell University

Abstract

The pervasive income-achievement gap has been attributed in part to deficiencies in executive functioning. The development of executive functioning is related to children's planning ability, an aspect of development that has received little attention. Longitudinal data from the NICHD Study of Early Child Care show that early childhood poverty (1 and 24 months) is significantly related to fifth grade, math and reading achievement ($n = 1,009$). The ability to plan in grade 3, indexed by the Tower of Hanoi task, mediates the income-achievement gap in math and to a lesser extent in reading. IQ was incorporated as a statistical control throughout.

The income-achievement gap is a major contributor to rising economic and social strains in our nation. Economic disparities are created in part because children from low-income households manifest reduced academic achievement leading to lower incomes when they become adults. Income-related gaps in achievement emerge as early as kindergarten and continue through high school (Bradley & Corwyn, 2002; Duncan & Brooks-Gunn, 1997; Duncan, 2012; Heckman, 2006; Sirin, 2005). Family income also influences the likelihood of staying in school (Duncan, 2012; Laird, Cataldi, Kewal, Ramani, & Chapman, 2008). It is important to identify explanations for the pervasive income-achievement gap in order to better understand how these disparities arise and eventually to design effective interventions to break the linkages between childhood deprivation and poor academic outcomes. The current study tests whether planning ability can help account for the income-achievement gap, utilizing a large, national data set.

Numerous potential mediators of the income-achievement gap have been studied. Two pathways that have received the most attention are parental investments and parental sensitivity. Parent to child speech in low-income households is of lower complexity and quantity compared to wealthier households (Hart & Risley, 1995; Hoff, 2006) and partially accounts for delayed language acquisition in lower-SES toddlers (Hoff, 2003). Furthermore, the home environments of economically disadvantaged children have significantly fewer cognitively stimulating items compared to the homes of more affluent children (Bradley & Corwyn, 2002; Evans, 2004). In a nationally representative sample, for example, low-income homes did not have as many developmentally appropriate learning tools, including books and toys, compared to middle and upper income households from birth through adolescence (Bradley, Corwyn, McAdoo, & Garcia-Coll, 2001). Low-income children are also not read to as often, watch TV more frequently, and typically have minimal access to computers and books (Evans, 2004). Similarly, numerous investigators have found that economic deprivation leads to elevated parental harshness and less parental responsiveness (Conger & Donnellan, 2007; Grant et al., 2003) with adverse consequences for early socioemotional and cognitive development.

Poverty and Planning Ability

In addition to parental investment and sensitivity, another potential pathway linking early childhood deprivation to reduced achievement is deficits in executive functioning. Executive functioning (EF) which includes planning, working memory, inhibitory control and attention regulation, is adversely influenced by early experiences of deprivation and chronic stress (Blair, 2010; Blair & Raver, 2012; Evans & Kim, 2013). Prospective memory, a critical component of time management and goal maintenance is also affected by early experiences (Smith et al., 2010). We briefly review work on SES and EF among children and then discuss why childhood poverty could interfere with the developmental of planning skills.

In samples of 5–7 years olds as well as 12 year-old children, Noble and Farah found that lower-SES children performed significantly poorer than their middle-SES counterparts on various indices of inhibitory control (e.g. Go/no-go task) (Farah et al., 2006; Noble, McCandliss, & Farah, 2007; Noble, Norman & Farah, 2007). Furthermore, in a sample of 8–12 year olds, family SES was found to predict differences in working memory, flexibility, and inhibitory control (Sarsour et al., 2011). Finally, in two different samples of elementary and middle school children, respectively, the income-achievement gap was mediated by self-regulatory ability (Evans & Rosenbaum, 2008). Both analyses were prospective showing that the relation between early childhood poverty and subsequent deficits in academic achievement were mediated by intervening performance on the Mischel delay of gratification paradigm.

One key component of EF that has received little attention in the income-achievement gap literature is planning. Brody and colleagues, in a sample of low-income, rural African American families showed that income (Brody, Stoneman, & Flor, 1996) as well as perceived financial strain (Brody & Flor, 1997) were each negatively associated with both parental and teacher ratings of children's self-control abilities on a standard index that included some questions about planning (e.g., "plans ahead before acting"). Hughes and colleagues (2010) employed structural equation modeling to form a latent measurement model of EF at ages 4 and 6 that included an index of planning. This EF composite was significantly lower among young children from lower income families at both ages.

Summary

We build upon prior studies of underlying mechanisms to explain the income-achievement gap by investigating the ability to plan. We examine the hypothesis that the well documented income-achievement gap will be mediated, to some extent, by planning skills assessed by a standard behavioral protocol, the Tower of Hanoi task. Planning skills predict academic achievement among elementary school children (Dembo & Eaton, 2000; Montague & Bos, 1986; Pape & Wang, 2001). We expect early childhood poverty to interfere with the development of good planning skills for several reasons. Low-income households experience substantially greater chaos in their daily lives including more residential instability and school changes, greater family turmoil and turnover, more crowded and noisy households, and fewer structured routines and rituals (Evans, 2004; Evans, Eckenrode, & Marcynyszyn, 2010). Low-income parents themselves may also be less successful at planning because of their own higher burden of stress (Bradley & Corwyn, 2002; Conger & Donnellan, 2007; Grant et al., 2003; McLoyd, 1998). More chaotic households coupled with more overburdened parents could both interfere with the development of good planning skills among young children.

Method

Participants

Study participants were from four phases of the NICHD Study of Early Child Care and Youth Development (SECCYD) that began in 1991 (Griffin & Friedman, 2007). Data was collected on families from ten designated hospitals at different sites across the United States to enroll a diverse sample of families and their children. Phase I (1991–1994) of the study enrolled 1,364 families with healthy, full-term newborns. A conditionally random sampling plan was used to select a pool of participants that included mothers who planned to attend work or school full time (60%) or part time (20%) and mothers who were to stay at home with their children for the first year (20%). The recruited families were representative of the demographic diversity of the designated sites. Exclusionary criteria included mothers who were younger than 18 when the child was born, families who planned to vacate the area in the next three years, children with clear disabilities at birth, and mothers who were not fluent in English (Friedman & Haywood, 1994). In Phase IV (2005–2007) 1,009 children remained in the study.

The mean income-to-needs ratio of 1,364 children at 1 month and 24 months of age was calculated for each child. Income-to-needs is computed by dividing total household income by the poverty threshold determined by the U.S. Federal Government for the appropriate family size. An income-to-needs ratio of 1 is the US poverty line. For those families below the poverty line, the mean income-to-needs ratio was .36 and for those families above the threshold, the mean was 3.75.

Procedure

Tower of Hanoi—Planning was measured with the Tower of Hanoi (ToH) procedure (Scholnick & Friedman, 1993) in phase III (Grade 3). The ToH is the most widely used task to study planning in children (McCormack & Atance, 2011; Scholnick & Friedman, 1993). It assesses the ability to organize a specific sequence of moves, requiring future-oriented planning and is considered a subcomponent of EF (Miyake et al., 2000). The TOH is sensitive to age differences in normal children (Welsh, 1991) and differentiates cognitively disabled children from normal controls (Welsh, Pennington, Ozonoff, Rouse, & McCabe, 1990). Furthermore, the TOH is novel to most children and not related to a particular knowledge base.

The task calls for the child to plan and develop a sequence of moves that will convert an original configuration of rings into a goal state. The ToH has three vertical pegs with three rings of different diameters around them. In the task, the rings are presented to the child in a certain configuration and the goal is to move the rings among the pegs to create a tower on a certain peg with the rings ordered by size with the smallest ring on top. There are three primary rules: (1) smaller rings cannot be placed under larger rings; (2) only move one ring at a time; and (3) a ring may only be in the person's hand or on a peg (Welsh, 1991). The tower must be constructed in the fewest number of moves. Figure 1 shows a completed TOH puzzle. A move is when the child takes a ring off of a peg and places on another peg or back on the same peg. Data on the number of moves made and the number of trials, which is the number of times the ring configuration is restarted, are added together to compute a planning score. A total planning score was calculated by summing across seven separate TOH trials.

Wechsler Abbreviated Scale of Intelligence (WASI)—The current study uses the WASI Full Scale IQ at Grade 4 as a statistical control. The WASI is a widely-used, short and reliable estimate of overall cognitive ability to operationalize IQ. The test consists of four subtests that each measures a particular aspect of cognitive functioning including

nonverbal and verbal reasoning, processing of visual information, and verbal understanding. The four subtests are used to determine the Full Scale IQ which is comprised of the Verbal IQ and Performance IQ (Wechsler Abbreviated Scale of Intelligence, 1999).

Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R)—The WJ-R is a broad, comprehensive set of separately administered tests. The current study operationalizes academic achievement using the WJ-R Broad Mathematics and Broad Reading scores at Grade 5. The reliability and validity of the WJ-R as a construct for academic achievement has been well established (Campbell & Ramey, 1994). The Broad Reading score is calculated by combining the scores on Letter-Word Identification and Passage Comprehension. The Letter-Word Identification task includes symbolic learning where one must match a pictographic symbol of a word to a picture of the actual object. The task also measures the participant's ability to identify isolated words and letters. Passage Comprehension requires the participant to point to a picture represented by a passage in a multiple choice format. The task also measures the participant's ability to state an appropriate word in the context of a passage (Woodcock & Johnson, 1989). The Broad Mathematics score is comprised of the Calculation and Applied Problems scores. The Calculation task measures the participant's skill in performing mathematical calculations. The calculations include whole numbers, fractions, and decimals and the operations of addition, subtraction, division and multiplication as well as geometric and logarithmic problems. The Applied Problems test determines the participant's skill in evaluating and solving word-problems in mathematics. This task emphasizes the importance of recognizing appropriate procedures.

Results

Correlation and Structural Equation modeling were used to analyze how early childhood poverty is associated with later academic achievement. Income-to-needs was calculated as the mean at ages 1 month and 24 months. The child's planning skills were measured by the Tower of Hanoi (ToH) task at grade 3. IQ at grade 4 was used as a statistical control. Descriptive statistics as well as the zero-order correlation matrix are displayed in Table 1. Table 1 demonstrates that the mean income-to-needs ratio at 1 and 24 months of age is positively associated with the Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R) broad math and broad reading scores at grade 5. Children from higher income households have higher scores on broad math and broad reading scores. Income-to-needs is also positively associated with the ToH planning score (grade 3) and IQ as measured by the Wechsler Abbreviated Scale of Intelligence (WASI).

We predicted that the child's planning score on the Tower of Hanoi task would mediate, at least in part, the relation between early childhood poverty and the Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R), with IQ included as a statistical control. In order to test the mediational hypothesis, path analyses were conducted using the full information maximum likelihood (FIML) estimation method in STATA 12 (2011). This method enables us to obtain estimates in the presence of missing data using the full sample of children.

The full path model for mathematic scores at grade 5 is depicted in Figure 2. As indicated, higher income levels predicted better planning ability ($\beta = .58, p < .001$), and this in turn was associated with lower levels of mathematical ability ($\beta = .47, p < .001$). The overall indirect effect was highly significant, for mathematics $\beta = .27, p < .001$, indicating that the prospective effects of early childhood income on the development of mathematical skills in late elementary school are mediated by planning skills. Similar but weaker results were found for the development of reading skills at grade 5 (see Figure 3) with higher income

levels predicting better planning ability ($\beta = .57, p < .001$), but this in turn was only marginally associated with reading ability ($\beta = .15, p < .07$). The overall indirect effect was marginally significant for reading ability, $\beta = .09, p < .08$, suggesting that at least a portion of the influence of early childhood income on subsequent reading abilities are explained by planning skills.

Discussion

A vast array of research has documented an income-achievement gap (Bradley & Corwyn, 2002; Duncan, 2012; Duncan & Brooks-Gunn, 1997; Heckman, 2006; Sirin, 2005). Some studies also suggest that childhood poverty can lead to diminished EF causing deficits in skills such as working memory and inhibitory control (Blair, 2010; Blair & Raver, 2012; Evans & Kim, 2013; Raver, 2004). The current study hypothesized that the income-achievement gap could be explained in part by the ability to plan, an aspect of EF that has received little attention in the childhood poverty literature. We found in an ethnically diverse sample drawn from across the United States that the income-to-needs ratio of households measured when children were infants predicted children's reading and math outcomes at grade 5 and that this relation was mediated by planning skills assessed in grade 3. All analyses included a statistical control for IQ. The latter is important since many income-achievement gap analyses have not incorporated IQ.

There are many components involved in the ability to plan in a goal-oriented manner; a child must be able to form a representation of the problem, formulate a strategy and execute it, focus on a goal, and self-monitor progress towards the specific goal (McCormack & Atance 2011; Scholnick & Friedman, 1993). All of these abilities are involved in the ability to succeed academically. The tool set of being able to plan and execute is essential to continued academic success in many fields.

There are limitations of this study that warrant comment. The NICHD national data set supports the mediational pathway, however, it should be noted that this is a correlational study. Stronger causal conclusions could be made if goal setting and planning could be strengthened by an intervention. However, the longitudinal design of the NICHD national data set enabled use of a prospective, longitudinal research design which, when coupled with a statistical control for IQ, provides plausible evidence for the model posited herein. Recently, Spears (2011) showed in a true experiment that manipulations of resource availability in adults caused diminished inhibitory control and motivation, additional elements of EF.

Another limitation of the present study is that there are other measures of EF (e.g., working memory, cognitive control) that have previously been shown to relate to SES. Although the TOH is widely used to assess planning in children and adults, many have noted that this task likely incorporates multiple aspects of EF including attentional control and working memory as well as planning (Scholnick & Friedman, 1993; McCormack & Atance, 2011; Miyake et al., 2000). In a recent neural imaging study with adults, Crescentini et al. (2012) demonstrated that the TOH selectively recruited the dorsal lateral prefrontal cortex, an area of the brain involved in planning. Nonetheless, the extent to which any one or a particular combination of subcomponent of EF operate as a critical and independent underlying mediator of the income-achievement gap, remains as an important question for future work.

Another valuable extension of this study would be to examine characteristics of children's early environments such as chaos as well as the planning skills of low-income parents themselves that could lead to the apparent income-planning skills link uncovered herein. Poverty likely impacts children's achievement through multiple paths (Duncan, 2012; Evans

& Kim, 2013). In addition to fewer parental investments (e.g., language, cognitive stimulation) and harsher, less responsive parenting, early experiences of deprivation may damage executive functioning, including the ability to plan. Low-income families are bombarded with numerous psychological and physical risk factors that are seemingly uncontrollable. These stressors include chaotic living environments, relentless financial pressure, familial disorder and instability, and social isolation (Ackerman & Brown, 2010; Evans, 2004). These circumstances could lead to an inability to focus on everyday tasks necessary for the development of planning skills.

Acknowledgments

The data for this study are from the Study of Early Child Care Research Network supported by NICHD through a cooperative agreement that calls for scientific collaboration between the grantees and the NICHD staff. Partial support for this article came from the W.T. Grant Foundation, the John D. and Catherine T. Mac Arthur Foundation Network on Socioeconomic Status and Health, and the National Institute on Minority Health and Health Disparities, 5RC2MD00467. We thank Stephen Hamilton for critical feedback on earlier drafts of this manuscript.

References

- Ackerman, BP.; Brown, ED. Physical and psychosocial turmoil in the home and cognitive development. In: Evans, GW.; Wachs, TD., editors. *Chaos and children's development: Levels of analysis and mechanisms*. Washington, DC: American Psychological Association; 2010. p. 35-48.
- Blair C. Stress and the development of self-regulation in context. *Child Development Perspectives*. 2010; 4:181-188.10.1111/j.1750-8606.2010.00145.x [PubMed: 21779305]
- Blair C, Raver CC. Child development in the context of adversity. *American Psychologist*. 67:309-318. (2 10.1037/a0027493. 012). 10.1037/a0027493 [PubMed: 22390355]
- Bradley RH, Corwyn R. Socioeconomic status and child development. *Annual Review of Psychology*. 2002; 53:371-399.10.1146/annurev.psych.53.100901.135233
- Bradley RH, Corwyn RF, McAdoo HP, Garcia-Coll C. The home environments of children in the United States. Part I: variations by age, ethnicity, and poverty status. *Child Development*. 2001; 72:1844-1867.10.1111/1467-8624.t01-1-00382 [PubMed: 11768149]
- Brody GH, Flor DL. Maternal psychological functioning, family processes, and child Adjustment in rural, single-parent, African American families. *Developmental Psychology*. 1997; 33:1000-1011.10.1037/0012-1649.33.6.1000 [PubMed: 9383622]
- Brody GH, Stoneman Z, Flor DL. Parental religiosity, family processes, and youth Competence in rural, two-parent African American families. *Developmental Psychology*. 1996; 32:696-706.10.1037/0012-1649.32.4.696
- Campbell F, Ramey C. Effects of early intervention on intellectual and academic achievement: A follow-up of children from low income families. *Child Development*. 1994; 65:684-698.10.1111/j.1467-8624.1994.tb00777 [PubMed: 8013248]
- Conger RD, Donnellan MB. An interactionist perspective on the socioeconomic context of human development. *Annual Review of Psychology*. 2007; 58:175-199.10.1146/annurev.psych.58.110405.085551
- Crescentini C, Seyed-Allaei S, Vallesi A, Shallice T. Two networks involved in producing and realizing plans. *Neuropsychologia*. 2012; 50:1521-1535.10.1016/j.neuropsychologia.2012.03.005 [PubMed: 22433287]
- Dembo MH, Eaton MJ. Self-regulation of academic learning in middle-level schools. *The Elementary School Journal*. 2000; 100:473-490.10.1086/499651
- Duncan GJ. Give us our daily breadth. *Child Development*. 2012; 83:6-15.10.1111/j.1467-8624.2011.01679.x [PubMed: 22277003]
- Duncan, GJ.; Brooks-Gunn, J., editors. *Consequences of growing up poor*. New York: Russell Sage; 1997.
- Evans GW. The environment of childhood poverty. *American Psychologist*. 2004; 59:77-92.10.1037/0003-066X.59.2.77 [PubMed: 14992634]

- Evans, GW.; Eckenrode, J.; Marcynyszyn, LA. Poverty and chaos. In: Evans, GW.; Wachs, TD., editors. *Chaos and its influence on children's development: An ecological perspective*. Washington, DC: American Psychological Association; 2010. p. 225-238.
- Evans GW, Kim P. Childhood poverty, chronic stress, self-regulation and coping. *Child Development Perspectives*. (in press). 10.1111/cdep.12013
- Evans GW, Rosenbaum J. Self-regulation and the income-achievement gap. *Early Childhood Research Quarterly*. 2008; 23:504–514.10.1016/j.ecresq.2008.07.002
- Farah MJ, Shera DM, Savage JH, Betancourt L, Giannetta JM, Brodsky NL, Malmud EK, Hurt H. Childhood poverty: Specific associations with neurocognitive development. *Brain Research*. 2006; 1110:166–174.10.1016/j.brainres.2006.06.072 [PubMed: 16879809]
- Friedman, SL.; Haywood, SC. NICHD Early Child Care Research Network. *Child care and child development: The NICHD Study of Early Child Care*. New York: Academic Press; 1994. p. 377-396.
- Grant KE, Compas BE, Stuhlmacher AF, Thurm AE, McMahon SD, Halpert JA. Stressors and child and adolescent psychopathology: Moving from markers to mechanisms of risk. *Psychological Bulletin*. 2003; 129:447–466.10.1037/0033-2909.129.3.447 [PubMed: 12784938]
- Griffin, JA.; Friedman, SL. NICHD Study of Early Childcare and Youth Development. National Institute of Health; 2007.
- Hart, B.; Risley, TR. *Meaningful differences in the everyday experiences of young American Children*. Baltimore: Paul H. Brooks; 1995.
- Heckman JJ. Skill formation and the economics of investing in disadvantaged children. *Science*. 2006; 30:1900–1902.10.1126/science.1128898 [PubMed: 16809525]
- Hoff E. The specificity of environmental influence: Socioeconomic status affects early vocabulary via maternal speech. *Child Development*. 2003; 74:1368–1378.10.1111/1467-8624.00612 [PubMed: 14552403]
- Hoff E. How social contexts support and shape language development. *Developmental Review*. 2006; 26:55–88.10.1016/j.dr.2005.11.002
- Hughes C, Ensor R, Wilson A, Graham A. Tracking executive function across the transition to school: A latent variable approach. *Developmental Neuropsychology*. 2010; 35:20–36.10.1080/87565640903325691 [PubMed: 20390590]
- Laird, J.; Cataldi, EF.; Ramani, S.; Chapman, C. Dropout and completion rates in the United States: 2006. National Center for Education Statistics, Institute of Educational Sciences. U.S. Department of Education; 2008.
- McCormack T, Atance CM. Planning in young children: A review and synthesis. *Developmental Review*. 2011; 31:1–31.10.1016/j.dr.2011.02.002
- McLoyd VC. Socioeconomic disadvantage and child development. *American Psychologist*. 1998; 53:185–204.10.1037//0003-066X.53.2.185 [PubMed: 9491747]
- Miyake A, Friedman NP, Emerson MJ, Witzki AH, Howerter A. The unity and diversity of executive functions and their contribution to “frontal lobe” tasks: a latent variable analysis. *Cognitive Psychology*. 2000; 41:49–100.10.1006/cogp.1999.0734 [PubMed: 10945922]
- Montague M, Bos CS. The effect of cognitive strategy training on verbal math problem solving performance of learning disabled adolescents. *Journal of Learning Disabilities*. 1986; 19:1–9.10.1177/002221948601900107
- Noble KG, McCandliss BD, Farah MJ. Socioeconomic gradients predict individual differences in neurocognitive abilities. *Developmental Science*. 2007; 10:464–480.10.1111/j.1467-7687.2007.00600.x [PubMed: 17552936]
- Noble KG, Norman NF, Farah MJ. Neurocognitive correlates of socioeconomic status in kindergarten children. *Developmental Science*. 2005; 8:74–87. [PubMed: 15647068]
- Pape SJ, Wang C. Middle school children's strategic behavior: Classification and relation to academic achievement and mathematical problem solving. *International Science*. 2001; 31:419–449.10.1023/A:1025710707285
- Raver CC. Placing emotional self-regulation in sociocultural and socioeconomic contexts. *Child Development*. 2004; 75:346–353.10.1111/j.1467-8624.2004.00676.x [PubMed: 15056189]

- Sarsour K, Sheridan M, Jutte D, Nuru-Jeter A, Hinsh S, Boyce WT. Family socioeconomic status and child executive functions: the roles of language, home environment, and single parenthood. *Journal of the International Neuropsychological Society*. 2011; 17:120–132.10.1017/S1355617710001335 [PubMed: 21073770]
- Scholnick EK, Freidman SL. Planning in context: Developmental and situational considerations. *International Journal of Behavioral Development*. 1993; 16:145–167.10.1177/016502549301600204
- Sirin SR. Socioeconomic status and academic achievement: a meta-analytic review of research. *Review of Educational Research*. 2005; 75:417–453.10.3102/00346543075003417
- Smith RE, Bayen UJ, Martin C. The cognitive processes underlying event-based prospective memory in school-age children and young adults: A formal model based study. *Developmental Psychology*. 2010; 46:230–244.10.1037/a0017100 [PubMed: 20053020]
- Spears D. Economic decision making in poverty depletes behavioral control. *The BE Journal of Economic Analysis and Policy*. 2011; 72:1–42.10.2202/1935-1682.2973
- Stata Corporation. STATA Release 12. College Station, TX: STATA Corporation Software; 2011.
- Weschler Abbreviated Scale of Intelligence. The Psychological Corporation. Harcourt, Brace & Company; San Antonio, TX: 1999.
- Welsh MC. Rule guided behavior and self-monitoring on the Tower of Hanoi disk-transfer task. *Cognitive Development*. 1991; 6:59–76.10.1016/0885-2014(91)90006-Y
- Welsh MC, Pennington BF, Ozonoff S, Rouse B, McCabe ERB. Neuropsychology of early-treated phenylketonuria: Specific executive function deficits. *Child Development*. 1990; 61:1697–1713.10.1111/j.1467-8624.1990.tb03560.x [PubMed: 2083493]
- Woodcock, RW.; Johnson, MB. Woodcock-Johnson Psycho-Educational Battery-Revised. Allen, TX: DLM; 1989.

Figure 1.
The Tower of Hanoi puzzle.

Figure 2. Path analysis of early childhood poverty (one and 24 months), planning (grade 3) and mathematical achievement (grade 5). Grade 4 IQ included as a covariate.

Figure 3. Path analysis of early childhood poverty (one and 24 months), planning (grade 3) and reading achievement (grade 5). Grade 4 IQ included as a covariate.

Table 1

Descriptive Statistics and Zero-Order Correlation Coefficients

Variables	Mean (SD)	2	3	4	5
1. Income-to-needs	3.07 (2.68)	.19**	.33**	.31**	.31**
2. TOH: total planning score	17.18 (7.69)		.30**	.33**	.25**
3. WASI full scale IQ	106.86 (14.44)			.66**	.67**
4. WJ-R broad math score	69.07 (26.95)				.64**
5. WJ-R broad reading score	65.21 (25.45)				

**
p < .01