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Income and Child Development

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Abstract

We examine how income is associated with the home environments and the cognitive and behavioral development of pre-school children, using data from a birth cohort study of children born at the end of the 20th century. Lower-income 3-year-old children are more likely than wealthier children to live in homes with inadequate physical environments and to have mothers who are more likely to be stressed, depressed, harsh and unresponsive. Additionally, low income children have lower PPVT scores, more mother-reported aggressive, withdrawn, and anxious behavior problems, and also more interviewer-reported problems with behavior, than more affluent children. A key policy question is whether increases in the incomes of poor families would result in improvements in children's outcomes, at least in part through improvements in the home environment. This question is difficult to answer using observational data. However, we argue that, even under the most generous interpretation of the associations we estimate, large income transfer programs would have relatively small effects on children's cognitive and behavioral outcomes.

I. Introduction

Children from less well-off families are at greater risk than wealthier children for poor cognitive, behavioral and health outcomes. If these associations between children's outcomes and the economic status of their families reflect causal relationships—so that the poorer outcomes of less wealthy children can be attributed to their low incomes—they have implications for the intergenerational transmission of poverty. Children who have worse cognitive, behavioral and health outcomes may be more likely to obtain less education and have lower earnings as adults, and to go on to rear their children in poorer environments. This line of reasoning suggests that policies and programs that improve outcomes for low-income children may break—or at least dampen—the links between poverty across generations.

In this paper, we examine the routes through which income may influence children's cognitive and behavioral development, taking advantage of data from the Fragile Families and Child Wellbeing (FF) study, a birth cohort study of children born at the end of the 20th century in 20 U.S. cities. The FF study over-sampled children who were born to unmarried parents. For this

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reason, the sample is both racially and ethnically diverse, and includes large numbers of children from low-income families. The FF study collected a wide array of data during the first three years of the children's lives. The study interviewed children's parents at the time of the birth, and then followed up with telephone interviews with both parents when the children were one year and three years old. At three years, families were also asked to participate in an in-home assessment. The in-home module was designed to assess multiple domains of parenting, material aspects of the home environment, mother-child interactions, and the child's language ability and behavior, using both a questionnaire and a set of interviewer observations. Taken together, these data provide unusually detailed information on child developmental outcomes as well as factors that are likely to influence those outcomes.

We first document the associations between family income and measures of the home environment—defined to include parenting behaviors and characteristics, as well as material aspects of the home environment—and measure of children's cognitive and behavioral outcomes. We estimate simple models that include few regressors other than income, and models that include a broad set of controls for factors that are correlated with income and may influence outcomes. We also estimate IV models that attempt to account for measurement error in income, as well as models that permit the associations between income and the outcomes we study to vary across lower and higher income groups. Overall, we find that most measures of the home environment, and all child outcomes, have significant associations with family income.

Our second task is to examine how measures of the home environment are related to children's outcomes, with a specific focus on whether measures of the home environment mediate the relationship between income and measures of child development. We find that a large fraction of the association between income and children's outcomes can be accounted for by measures of the home environment. The results are consistent with the hypothesis that low incomes influence children's developmental outcomes in large part through their effects on multiple aspects of the child's home environment. However, as will be discussed below, they are also consistent with an alternative interpretation that implies that income has little or no causal effect on child outcomes.

Finally, we provide some illustrative calculations of the effects of different poverty alleviation programs on the developmental outcomes between children from low-income relative to more affluent families. These calculations require a causal interpretation of the associations between income and children's outcomes, and there are numerous reasons to think that these estimates are biased. Our approach is to take the most generous (i.e. largest) estimates of the "effects" of income on child development, assume they are causal, and examine how generous income transfer programs would influence children's outcomes. We conclude that, although large transfers would go some way to reducing income-related disparities in the child outcomes considered, these effects are modest.

II. Background

A large number of papers investigate the associations between families' economic resources and children's development. Recent examples include Blau (1999), Shea (2000), Maurin (2002), Auginbaugh and Gittleman (2003), and Taylor, Dearing, and McCartney (2004).¹ A broad conclusion of this work is that there are clear associations between family income and measures of children's intellectual and behavioral development. Most studies indicate that

¹See also books by Mayer (1997) and Duncan and Brooks-Gunn (1997). A related literature examines the effects of maternal employment on young children's development, for example, Waldfogel, Han, and Brooks-Gunn (2002); Brooks-Gunn, Han, and Waldfogel (2002); and Ruhm (2004).

these associations are largest in early childhood (see e.g. Duncan and Brooks-Gunn, 1997; and Morris et al, 2004) and are larger for children in low-income or less-educated families than for children in more advantaged families (see e.g. Shea 2000, Smith, Brooks-Gunn, and Klebanov 1997; Dearing, McCartney, and Taylor 2001; and Maurin 2002) These findings suggest that we might expect to find larger effects of income on child development than have been found in previous literature, because our sample consists of young children who are primarily from low-income families.

Although there is widespread agreement that income and child outcomes are associated, the interpretations of associations and their implications for policy have been debated. A critical issue is whether the estimated effects of income on children's outcomes are biased. There are two types of problems that are likely to lead to biased estimates. One is measurement error in income. If the measurement of income is noisy, then classic attenuation bias will bias the coefficient on income toward zero. A similar result will occur if children's outcomes depend on "permanent" rather than transitory income. A common finding from previous research is that the estimated effects of income on children's outcomes are larger when income is averaged over multiple years (see, for example, Korenman, Miller, and Sjaastad, 1995; Mayer, 1997; Blau, 1999). This is consistent with the idea that there is measurement error in income—which is reduced via averaging—or that permanent rather than transitory income is the key determinant of children's outcomes. In this paper, we address this potential problem averaging family income over the three years of our data. The fact that the children in this sample are only age 3, and that we have up to three data points on income over the three years (at birth, 1 year post-birth, and 3 years post-birth) gives us confidence that we have a fairly accurate measure of family's economic resources during the child's lifetime to date. In addition, we experiment with an instrumental variables method designed to account for measurement error bias (but not other sources of bias) in our estimates.

A second important source of bias is unobserved heterogeneity. In particular, if relevant child or family characteristics that are positively correlated with both income and child outcomes are not observed, the effects of income will be biased upwards in models that omit those characteristics. The endogeneity problem is widely recognized (see, for instance, Mayer, 1997) and the existing literature contains several different strategies for handling it, including the use of instrumental variables (IV) techniques, fixed effects models, and controlling for family characteristics that are correlated with income and could influence children's outcomes. Each of these strategies has disadvantages. IV procedures require finding good instruments, which is especially difficult if permanent rather than transitory income is what matters for children's outcomes. For example, Shea (2000) uses information on parents' union status, industry, and job losses as instruments; if these identify short-term variations in income but not differences in permanent income across children, IV estimates of effects of income may well be too small. Similarly, fixed effects models, such as those estimated by Blau (1999), are well-suited to identifying the effects of short-run changes in family income on children's outcomes but less well-suited to capturing long-run changes.² We follow the approach of controlling for an extensive set of family background characteristics, including maternal cognitive ability, to reduce problems associated with unobserved heterogeneity. This approach is sensible, given that the FF data contain a rich set of family background characteristics measured over the children's lives. Even so, there are still good reasons to think the estimates may still be biased, and our policy calculations are necessarily speculative.

²In addition, a small number of studies have used data on adopted children in an attempt to separate the effects of income from the effects of heredity. A study of a small sample adopted twins by Scarr and Weinberg (1978) found no correlation between the income of the adopting family and children's educational outcomes; however, a more recent study by Duyme et al. (1999) found a strong correlation between the adoptive family's income and child IQ post-adoption. There are also a small number of studies that have used data from experiments (Morris and Gennetian 2003; Morris, et al., 2004) or natural experiments (Costello et al., 2003) and find positive associations between exogenous increases in income and improvements in child outcomes.

A key issue for policy purposes is whether the size of the associations between income and child outcomes is “large” or “small”. That is, assuming estimates of the effect of income on child outcomes are unbiased, how much does income matter? Results from a variety of data sources, including the National Longitudinal Survey of Youth (NLSY) (for the United States) and 1958 National Child Development Study (NCDS) (for Britain) have tended to indicate that the estimated effects of income are “small” relative to those of family characteristics other than income. For example, Aughinbaugh and Gittleman (2003) find that a \$10,000 increase in income is associated with a much smaller gain in test scores than would be produced by having a maternal grandfather who worked in the highest occupational class rather than the lowest.³ This comparison, while interesting, does not provide information on the most cost-effective ways to improve child outcomes, and a better metric may be to compare cash transfers to other programs. Taylor, Dearing and McCartney (2004) compare the effects of income transfers relative to those of equally expensive Head Start programs, and find that cash transfers compare favorably to Head Start.⁴ We take the approach of estimating how two generous transfer programs—including a \$2400 transfer per child to low and moderate income families, and a transfer designed to bring all poor families up to the poverty line—could be expected to affect children’s outcomes.

A final question that has to do both with the interpretation of income effects, and their implications for policy, is the route by which income affects child outcomes. Much of the literature on pre-school children stresses the role of the home environment, broadly defined to include what parents provide for their children as well as how parents interact with their children (Bornstein, 2002; Magnuson and Duncan, 2002; Brooks-Gunn and Markman, 2005). The recent literature on income and child development hypothesizes that low incomes affect child development through two major routes. First, children who are low-income may live in physical environments that offer less stimulation and fewer resources for learning. Their parents may be less able to purchase games and toys that promote learning, to live in places that are safe for outdoor play, or to provide their children with high-quality childcare. Second, poverty may affect the quality of parenting children receive. Developmental psychologists define quality of parenting in terms of its sensitivity and responsiveness to the child (Shonkoff and Phillips, 2000). Low-income parents may be more depressed or stressed; as a consequence, they may be harsher with their children and less responsive to their needs.

Although, in theory, a broad set of aspects of the home environment may affect child development, few data sets contain detailed measures of parenting quality and materials aspects of the home environment. The strategy taken by most studies has been to construct a handful of indexes that measure different domains of the home environment—for example, cognitive stimulation and emotional support—and examine whether the inclusion of these indexes in models reduces or eliminates the association between income and child outcomes. These studies also often examine whether some indexes of the home environment matter more for children’s outcomes than others.⁵ In general, researchers have concluded that measures of the home environment account for a large portion of the association between children’s outcomes

³Other authors have found larger effects. See, most recently, Dahl and Lochner (2005) whose estimates using a fixed effects instrumental variables strategy suggest that increasing income by \$1,000 raises math test scores by 2% and reading test scores by 3.6% of a standard deviation. See also Maurin (2002) who, in French data, finds that the effects of parental poverty on a child being held back in elementary schools are larger than the effects of other characteristics such as the child’s age or gender.

⁴Dearing, McCartney, and Taylor (2001), in a similar vein, compare the effect of income to maternal education and find that the effect of income is about two-thirds as large. Both studies use the NICHD Study of Early Child Care (NICHD-SECC).

⁵For example, Aughinbaugh and Gittleman (2003) use two measures from the HOME scale—one for cognitive stimulation and another for emotional support. Taylor, Dearing and McCartney (2004) use the overall HOME score and measures of maternal verbal intelligence and maternal depression. Guo and Harris (2000), using the NLSY, conduct analyses that break the HOME items into three groups—the child’s physical environment; “parenting style”, which is similar to Aughinbaugh and Gittleman’s measure of emotional support; and cognitive stimulation, and conduct analyses using structural equation modeling. Gershoff et al. (2005) also use structural equation modeling in their study of income and material hardship and child outcomes.

and income, and that cognitive stimulation has a larger impact on children's scores on language and achievement tests than does emotional support (Guo and Harris, 2000; Yeung, Linver and Brooks-Gunn, 2002; Auhinbach and Gittleman, 2003). The Fragile Families data are ideal for examining these issues, since they contain detailed measures of the child's environment, including physical characteristics, maternal characteristics, and parent-child interactions.

III. Data

Our data are drawn from an in-home module of the *Fragile Families and Child Wellbeing Study* (FF). FF is a longitudinal birth cohort study that began in 1998 with a baseline sample of 4,898 births in 20 U.S. cities. The children's mothers were enrolled in the study while still in the hospital after giving birth, with response rates of over 80 percent. (A complete description of the sample and design is in Reichman, et al., 2001). The survey contains an over-sample of non-marital births. As a consequence, children in the sample are more likely to be poor, to have absent fathers, and to have mothers with lower levels of education than children in a nationally representative sample. The sample is also racially diverse: 47% of the mothers originally sampled identified themselves as non-Hispanic African American and 27% as Hispanic.

Families were surveyed at the time of the child's birth and by telephone when the children were one year and three years old. After the age three interview, families were asked to participate in an in-home assessment in which children and their mothers were administered the Peabody Picture Vocabulary Test-Revised (PPVT-R) (a test of receptive vocabulary), mothers were asked about their parenting behaviors, and interviewers assessed the behaviors of mothers and children, as well as their interactions with each other. The main sample used for this study consists of data on 1,699 children whose families participated in the in-home study and for whom we had complete information on all variables used the analyses.⁶

The analyses described below use information on family income, a set of family background characteristics, a set of measures of the home environment, and a set of child outcomes. Our primary income measure is "long-term" income, which is equal to the average of income over the baseline survey (i.e. just following the child's birth), the 12-month survey, and the 36-month survey.⁷ The fact that the children in this sample are only age 3, and that we have up to three data points on income over the three years gives us confidence that we have a fairly accurate measure of family's economic resources during the child's lifetime to date. The regression models shown below use the logarithm of income averaged over all survey waves. We prefer to use the logarithm of average income rather the average logarithm of income, because we avoid losing families who report no income in one or two of the three years.

⁶4,231 families completed the core telephone interview at age 3. Of these 3,355 completed some portion of the "in-home" assessment and 2,179 completed the portions of the in-home assessment that included child observations. An additional 480 observations were excluded due to missing values for at least one of the control variables used in the analyses. There are several reasons why child observations are not available for some families. In the majority of cases, families completed the survey portion of the "in-home" assessment over the telephone because home visits could not be completed—either because the family refused or had moved to a location where they could not be interviewed in person. In a smaller number of cases, an in-home survey was conducted but the child was not available to be assessed. Appendix Table 1 shows means for basic socioeconomic variables measured at baseline and at the age 3 core interview for increasingly restricted samples. These results indicate that, overall, the observable characteristics of the final sample used are quite similar to those of the baseline and core age 3 samples. The families that participate in the in-home survey have slightly lower incomes on average at age 3 than those who completed the age 3 core interview. Those that have child observations are more likely to be black, and to have lower incomes, and are less likely to be married to the child's father at age 3 than those who participated in the in-home survey but do not have child observations. Note that our sample sizes vary slightly for different analyses due to missing values for the various child outcomes. In addition, the sample sizes are slightly larger when we use the "long run" measure of income, since this measure is available for more observations.

⁷For the cases in which income is missing for one or two waves of the survey, we compute "long-run" income as the average over the available measures. This will introduce some measurement error into long-run income. However, only 155 observations had missing income information in one wave, and only 6 had missing income information in two waves. All income values are deflated to 1999 dollars before averaging.

The family background variables (which we refer to below as “extended SES controls”) include measures of the total number of family members, and the number of members who are ages 0 to 5, 6 to 11, and 12 to 17; indicators for the mother’s race and ethnicity (coded as non-Hispanic white, non-Hispanic African-American, Hispanic, and “other”); indicators for the mother’s level of education (coded as less than a high school degree, a high school degree, or post-high school education); indicators for family structure at age three (coded as mother living with and married to the child’s biological father, cohabiting with the child’s biological father, married to or living with a new partner, or neither cohabiting nor married); and the mother’s score on the PPVT. We also included an indicator for whether or not the mother took the Spanish version of the PPVT (the TVIP), which serves as measure of whether the mother’s primary language is Spanish rather than English.⁸

We use a set of 17 measures of the quality of the home environment, which can be loosely grouped into measures of parenting behavior including parent-child interactions, measures of maternal mental health, and measures of the child’s physical environment. Details for each measure are in the Appendix. We use six measures of parenting behavior and parent-child interactions. Four of these—whether the mother is harsh, unresponsive, has poor verbal skills, and was difficult to interview—are interviewer-assessed.⁹ The measures of poor verbal skills and whether the mother was difficult to interview are not based on mother-child interactions. However, because they measure how articulate the mother is, they may provide information on how much verbal stimulation the child receives. The other two parenting behavior measures are binary measures based on maternal reports. The first is an indicator for whether the mother said she would physically punish the child if the child had a tantrum in a public place, and the second is based on the “child neglect” subscale from the Conflict Tactics Scales, which asks mothers if they engaged in specific neglectful activities such as leaving the child unattended, or if drug or alcohol problems interfered with the care of the child. Because few mothers admitted to these behaviors, this variable was coded as a binary indicator of whether any of the neglectful behaviors occurred in the past year.

The three measures of maternal mental health include maternal depressive symptoms, maternal anxiety, and maternal stress. The eight measure of the child’s physical environment include a measure of lack of materials for cognitive stimulation; measures of whether the interviewer noted problems with the child’s block, home exterior, and home interior; a measure of whether the interviewer noted specific safety problems in the child’s home; a measure of “home disorganization”, a measure of hours of TV the child views per week, and a food insecurity scale. It should be stressed that this classification of measures of the home environment into “parenting”, “maternal mental health” and “physical environment” is crude, and there are clearly places in which these categories overlap. For example, the measure of food insecurity could reflect financial deprivation, but could also reflect the parent’s degree of organization and the priority she places on food for children relative to other types of expenditures. High levels of TV viewing could indicate that the parent is less engaged with her child or concerned with her child’s development, but could also be the consequence of unsafe neighborhoods that limit a child’s outdoor activities.

We do not include in our measure of the home environment information about out-of-home child care, as our focus is on parenting and other aspects of the home. However, we have information on whether a child was attending child care at the time of the age 3 assessment, as well as whether that child care arrangement was home-based or center-based. While we do

⁸The Fragile Families sample included only births to mothers whose primary language was English or Spanish.

⁹The interviewers made these observations in the child’s home, and so they could not have been blind to the child’s socioeconomic status. For this reason, it is possible that their perceptions of parenting and parent-child interactions were colored by the socioeconomic status of the family. To the extent that interviewers are more critical of the parenting behaviors of low-SES mothers, our findings could be biased toward larger associations between low income and poor parenting.

not include these controls in our main models, we do include them in supplemental models as robustness checks.

We examine how income and the home environment measures are associated with five measures of children's outcomes. Language ability is measured by the child's age-standardized score on the PPVT.¹⁰ The PPVT is a widely-used measure of receptive vocabulary that measures the size and range of words that the respondent understands. PPVT scores in early childhood have been shown to be correlated with literacy outcomes in young adulthood (Baydar, Brooks-Gunn and Furstenberg, 1993). Furthermore, earlier work has found that other measures of cognitive ability, such as the Stanford-Binet and the Wechsler PreSchool and Primary Scale of Intelligence, have associations with income that are similar to that of the PPVT (Smith et al, 1997).

We use four measures of the child's behavior problems. Three are subscales based on items from the Achenbach Child Behavior Checklist. These include measures of whether the child is withdrawn, aggressive, and anxious. One potential shortcoming of these measures is that they are based on maternal report. It is possible that maternal characteristics that influence parenting—such as depression or stress—could color how mothers answer questions about child behaviors. For this reason, we also use a measure of how the interviewer rated the child's behavior during the interview, with an emphasis on how persistent and cooperative the child was when completing the PPVT and other assessments conducted in the home. This measure is crude, but displays significant associations with subscales for withdrawn and aggressive behaviors that are based on maternal reports.¹¹

The seventeen proxy variables for the quality of home environment and the six child outcome variables are measured in very different ways: some are binary variables, some are scales with a limited number of discrete outcomes, and others can take a wide range of values. In our regression analyses, we standardize all proxies by subtracting the sample mean and dividing by the standard deviation. This standardization assists in the interpretation of results.

IV. An Empirical Framework

As discussed above, the developmental literature posits that family income affects child development through its effects on aspects of the home environment, broadly defined. Let Z^j denote the j^{th} measure (out of a total of 17) of the child's home environment, Y^k denote the k^{th} child outcome, $\ln(y)$ denote the logarithm of family income, and X denote a set of household and child characteristics, to be defined below, that may affect both child outcomes and the home environment. The model can be expressed as:

$$\begin{aligned}
 Y^k = & \alpha^k + \alpha_x^k X + \alpha_y^k \ln(y) \\
 & + \sum_{j=1}^J \alpha_j^k Z^j \\
 & + \varepsilon^k, k=1 \dots K.
 \end{aligned}
 \tag{1}$$

¹⁰Seventy-eight children whose spoke primarily Spanish took the TVIP, and age-standardized scores for these children were used.

¹¹A regression of the interviewer-rated behavior problems on the three Achenbach subscales indicates that a 1-standard deviation increase in the Achenbach measure of withdrawn behavior is associated with a significant increase in the interviewer-rated scale of 0.16 standard deviation; a 1-standard deviation increase in the measure for aggressiveness is associated with an increase in the interviewer-rated scale of 0.07 standard deviations.

$$Z^j = \beta^j + \beta_x^j X + \beta_y^j \ln(y) + v^j, j=1 \dots K. \quad (2)$$

Equation (1) can be interpreted as a “production function” for the child outcomes. We have included the logarithm of income in the equation, to capture the idea that there may be unmeasured aspects of the home environment that are affected by income and which influence children’s outcomes. Equation (2) expresses the relationship between each of the measures of the home environment and income, conditional on the variables in X . Equations (1) and (2) can be combined to yield a set of equations that relate child outcomes directly to income:

$$Y^k = \lambda^k + \lambda_x^k X + \lambda_y^k \ln(y) + e^k, k=1 \dots K. \quad (3)$$

We start by estimating (2) and (3), using two different sets of variables for X . In our most simple models, X includes a set of indicators for the child’s sex, the child’s age (in months), and a set of indicators for the city of birth. The city of birth indicators may capture differences in home environments common to children within cities, and will also capture price differences across cities.

Although these estimates provide information on the associations between income and measures of children’s environments, it is possible that the coefficients on income instead reflect other socioeconomic factors which may be associated with the outcomes of interest and correlated with family income. We therefore estimate models in which X includes (in addition to sex, age, and city) a set of “extended SES controls” which include maternal education, the mother’s race and ethnicity, indicators for mother’s educational attainment, number of children in the household, total number of household members, indicators for family structure, the mother’s PPVT score, and an indicator for whether the mother took the PPVT in Spanish. The mother’s language ability may be a particularly important determinant of the child’s language ability, both for genetic and environmental reasons, and is also likely to be correlated with income. Although the inclusion of the extended controls could, in theory, lead to an increase or decrease in estimates of β_y^j and λ_y^k we expect that income is positively correlated with socioeconomic factors that are beneficial for the child’s environment and outcomes, and the inclusion of the extended SES controls will reduce estimates of β_y^j and λ_y^k in absolute value.

As discussed above, estimates of β_y^j and λ_y^k may be biased toward zero because of measurement error. We experiment with an instrumental variables strategy that is designed to deal with measurement error. Specifically, we instrument $\ln(y)$ with maternal reports of components of income at age 36 months, including her earnings, “under the table” income, business income, income from illegal activities, formal and informal child support, income from TANF and other public sources, and “other” income. We also include the number of household members who are income earners in the list of instruments. These variables are assessed in a different section of the interview than is total family income, and there is no attempt to make sure that the components of income “add up” to the total. Under the assumptions that the instruments are not themselves correlated with the error term in (2), and that the errors in the subcomponents of income and the number of income earners reported are uncorrelated with any measurement error in income, the IV estimates will purge β_y^j and λ_y^k of bias due to measurement error.¹² These assumptions are strong, and perhaps implausible. However, the IV estimates provide a useful cross-check on the OLS estimates.

Finally, we present estimates of (1), in which measures of the home environment are assumed to mediate the relationship between income and the child outcomes. We are particularly interested in whether measures of the child's home environment collectively have large effects on children's outcomes, and whether their inclusion reduces the estimates of α_y . Under the assumption that income affects child development only through its effects on the home environment, estimates of α_y from (1) should be zero; this hypothesis is tested. We are less concerned with the individual parameters α_j^k that quantify the relationship between the different measures of the home environment and each of the child outcomes. Indeed, these parameter estimates are difficult to interpret because many of the measures of the home environment measure similar things. For example, maternal depression, anxiety, and stress may provide similar information on maternal mental health; maternal harshness observed by the interviewer and the mother's report of whether she would physically punish the child in response to a tantrum are also similar. Because these variables are correlated and overlap conceptually, the coefficients on individual items are likely to be imprecisely estimated. However, we can assess the importance of subsets of measures of the home environment by examining their collective marginal contribution to the R-squared statistics of our models.

VI. Results

Nonparametric results

We begin by showing simple descriptive evidence on how measures of the home environment and children's outcomes differ across income groups. We classify children into three groups: those with family incomes (averaged over three periods) that are less than the poverty line (42% of the sample), between 1 and 2 times the poverty line (29% of the sample), and more than twice the poverty line (29% of the sample). For each group of children, we computed the empirical cumulative distribution functions for each of the proxies of the home environment (except for the two measures that take binary values) and the child outcomes. The results shown in Figure 1 and 2 are based on unstandardized measures of these variables, so the x -axis measures the raw score or value of the measure, and the y -axis measures the fraction of children with values at or below each value. For all measures except the child's PPVT score, higher values represent more problematic outcomes; more highly-placed cumulative distributions indicate that larger fractions of children have low ("better") scores. For the PPVT, where higher scores are better, this pattern is reversed.

The graphs shown in Figure 1 indicate that, for all proxy measures of the home environment, lower-income children are more likely to have higher ("worse") scores than wealthier children. For example, for the measure of lack of maternal responsiveness, about 70% of mothers with income more than twice the poverty line received a "perfect" score of 0, in contrast to 60% of mothers with incomes between 1 and 2 times the poverty line, and 50% of mothers with incomes below the poverty line. The pattern of increasingly worse distributions of outcomes for poorer groups of children appears for measures of the home environment that are closely tied to material circumstances, such as lack of materials for cognitive stimulation and problems with the block, the home exterior, and the home interior. They also appear for all measures of parenting behaviors and maternal mental health.

The two binary measures of parenting we use are also related to income. Of mothers living below the poverty line, 13.6 percent of mothers reported neglectful behavior and 30.4 percent reported they would use physical punishment in response to a public temper tantrum; the

¹²We also experimented with using income at 36 months of age in the second stage equation, and instrumenting using income at baseline and 12 months. This specification makes sense if income in each period equals permanent income plus an error term, and the error terms are uncorrelated across periods. We discuss these results below.

corresponding numbers for mothers living above twice the poverty line are 7.8 percent and 19.2 percent, respectively.

Similar patterns are presented for child outcomes in Figure 2. The PPVT provides a useful example. The PPVT is normed so that, in a nationally representative population, the mean score should equal 100. The average score in our sample of predominantly low-income children is 86.7. Fully 87.3 percent of children living below the poverty line received a score less than 100, in contrast to 61.7 percent of children with family incomes more than twice the poverty line. The four measures of child behavior problems exhibit similar patterns.

Measuring associations between income, children's environments and child outcomes

To quantify the relationship between family income and each of the proxies for the child's home environment, we estimated equation (2), first with adjustments only for the child's sex, age and city of residence, and then with added controls for the extended SES measures. We also estimated the second of these models using instrumental variables to account for measurement error in income. The coefficients on the logarithm of income (β_{y^j}) are graphed in Figure 3, along with 10% confidence intervals (based on robust standard errors). The measures of the home environment are ordered by the size of the coefficient on the logarithm of income from the first set of estimates, with the smaller number of controls. All measures of the child's environment were standardized (i.e. converted to z-scores) prior to estimation, so effects can be interpreted in terms of standard deviation units. The logarithm of family income is not standardized, and has a mean of 9.94 and a standard deviation of 0.89.

The results generally indicate that income has larger associations with material aspects of the home environment than with measures of the mother's behavior and mental health. The two measures with the largest associations with income are lack of materials for cognitive stimulation (coefficient equal to -0.36) and problems with the block (coefficient equal to -0.35). These coefficients indicate that a one-standard deviation increase in income is associated with a decline of about 30 percent of a standard deviation in the indices for lack of materials for stimulation and problems with the block. Food insecurity also has a large negative association with income. Conversely, the four measures with the smallest coefficients—safety problems in the home, maternal anxiety, neglectful behavior and maternal depression—all measure aspects of maternal behavior and mental health. There are some exceptions to this general ordering. For example, the associations between income and measures of maternal stress, home disorganization, and whether mother was “difficult to interview” are larger than the associations between income and problems with home interior and exterior.

As expected, adjustment for the set of extended SES controls reduces the coefficients on family income. However, even with these controls added, the coefficients are significantly different from zero for all but four measures of the home environment (safety problems in the home, maternal anxiety, neglectful behavior, and the mother's lack of verbal skills). The point estimates lie between -0.21 and zero, indicating that with other controls included, the association between income and any one measure of the home environment is fairly modest. The IV results that adjust for measurement error do little to increase the size of these coefficients. The first stage equations indicate that the instruments are collectively significantly related to income (with an F-statistics on the instruments of 36.88), and the second-stage IV estimates are not imprecisely estimated. However, the average over the 17 IV coefficients is only -0.14 , in contrast to -0.11 for OLS. The IV estimates imply that a one standard deviation increase in income is associated with (on average) an improvement in measures of the home environment of 12 percent of a standard deviation. We also experimented with using income at 36 months of age in the second stage equation, and instrumenting with income at baseline and 12 months. This specification makes sense if income in each period equals permanent income plus an error term, and the error terms are uncorrelated across periods. In all but two

cases, the resulting coefficients on income were approximately equal to or smaller (in absolute value) than the IV estimates shown in Figure 3.

Estimates of equation (3), for each of the five child outcomes, are graphed in Figure 4. Income is significantly associated with each of the outcomes. The OLS estimates without extended controls are comparable to those found in other literature. For instance, Aughinbaugh and Gittleman (2003) report a coefficient of 0.23 in a model estimating the effect of current income on the PPVT without extended SES controls, compared to our estimate of 0.30. The larger size of the coefficient we find may be due to the fact that we used income averaged over three periods. In fact, if we use current (36 month) income, the coefficient is reduced to 0.21. As expected, the inclusion of extended SES controls results in a substantial decline in the absolute values of the parameter estimates. The IV estimates are, for all but one outcome measure, larger than the OLS estimates with extended controls, but not significantly so. For all but one outcome measures (aggressive behavior), the simplest OLS regressions provide the largest associations with income. These estimates imply that a one-standard deviation increase in income is associated with an increase of slightly more than a quarter of a standard deviation in the PPVT score, and with similar improvements in maternal reports of withdrawn and aggressive behavior.

As noted above, much of the earlier literature on this topic has found that associations between income and child outcomes are largest for children from poor families. If so, then the associations discussed above may understate those for the poorest children. For policy purposes, it is important to understand if there are nonlinear associations between income and child outcomes. If there are, and if these associations represent causal influences of income, then income transfers from wealthier to poorer children have the potential to produce large gains in child outcomes to those who are poor and relatively small costs to those who are wealthy.

To investigate this hypothesis, we estimated variants of (3) that permitted the association between income and each of the child outcomes to vary according to whether the family income level is below the poverty line, between one times and two times the poverty line, or more than twice the poverty line. The results (shown in Table 1) are not supportive of the hypothesis that associations of children's outcomes and income are larger at lower income levels. For the PPVT, the associations are actually largest for the wealthiest children and, when extended SES controls are included, the association between income and the PPVT score is not significantly different from zero for the poorest children. For the behavior outcomes, the associations are sometimes larger (in absolute value) for the poorest children, but in these cases it is impossible to reject the hypothesis that the income associations are identical across the three groups of children. Estimates of models that included a quadratic in income (rather than a spline) yielded similar results, and did models that were estimated separately across the three groups. These results do not support the idea that the development of poor children will benefit more than others from income transfers.

Measuring associations between children's outcomes and measures of the home environment

The results discussed above indicate that, across many dimensions, lower-income children live in lower-quality home environments than higher-income children. As discussed above, it has been hypothesized that low income adversely affects child outcomes through its effect on the home environment. To examine this hypothesis, we present estimates of equations (1) for each of our five child outcome measures.

Results are in Table 2. The first panel shows estimates of the coefficient on income when the measures of the home environment are excluded. These coefficients are identical to those

graphed in Figure 4 (with the “extended controls” included). Panel 2 adds the measures of the home environment. The general conclusion from this set of results is that, when the measures of the home environment are included in the models, the estimates of the associations between income and the child outcomes become much smaller in absolute value and, for all but one outcome (withdrawn behavior) are no longer significantly different from zero. Estimates of IV models to account for measurement error in income (not shown) do not alter this conclusion. Thus, for all but one outcome, the hypothesis that the home environment variables fully mediate the relationship between income and children’s outcomes cannot be rejected.

The measures of the home environment are jointly significant in all models, and often individually significant. Several general patterns emerge. The first is that measures of parenting but not measures of the physical environment seem to matter most for the child’s PPVT. Maternal responsivity takes the largest coefficient in the model for the child’s PPVT, followed by the measure of whether the mother was difficult to interview. The latter reflects the mother’s verbal and communication skills, as assessed by the interviewer. Lack of materials for cognitive stimulation and hours of TV per week are not significantly associated with the PPVT score. Our results are not consistent with earlier research that concludes that cognitive stimulation is more important than emotional support for children’s intellectual development.¹³

A second general pattern is that behavior problems also have large associations with parenting measures. Maternal harshness and responsivity and the measure of whether the mother was difficult to interview have large associations with interview-assessed child behavior problems. One concern is that these correlations reflect the specific circumstances of the interview: for instance, observed maternal harshness and lack of responsivity could have been the result of poor child behavior that occurred during the interview. However, harshness and responsivity are also significantly associated with measure of aggressive behavior that is based on maternal report, indicating that the circumstances of the interview are not solely responsible for this result. Maternal stress (but neither maternal depression nor anxiety) is strongly associated with the three maternal reports of behavior problems. However, it should be kept in mind that stress could color how mother’s report on their children’s behavior. The fact that stress is not associated with the interviewer’s rating of behavior problems suggests this may be the case. Consistent with the results for the PPVT, measures of the physical environment do not have large associations with behavioral outcomes.

Because there are a large number of measures of the home environment which are correlated with each other, the individual coefficients on the measures of the home environment are difficult to interpret. To assess the importance of different aspects of the home environment, we classify the measures of the home environment into groups and compare their marginal contributions to the R-squared of the models. Specifically, we group measures of the home environment in parenting measures, maternal mental health measures, and measures of the physical environment. The parenting measures include the measures of the mother’s responsivity, verbal skills, response to a tantrum, and harshness; the indicators of whether there were safety problems in the home or a report of neglectful behavior, and whether the mother as difficult to interview. The maternal mental health measures include the measures of depression, anxiety and stress. The physical environment variables include the measure of materials for cognitive stimulation; hours of TV per week; home disorganization; problems with the home exterior, home interior and block; and food insecurity. The marginal contributions of each of these sets of variables and the set of extended SES controls are

¹³This is not due to the addition of the large number of proxies. We estimated models in which the only proxies included were lack of maternal responsivity and lack of materials for cognitive stimulation, both based on the HOME score and similar to the measures used in Aughinbaugh and Gittleman (2003). These results show a coefficient on income of 0.153, a coefficient on lack of responsivity of -0.19, and a coefficient on lack of materials for cognitive stimulation of -0.11. The hypothesis that these latter two coefficients were equal was rejected at the 5% level.

computed by estimating variants of the model in Panel 2 of Table 2 which sequentially omit each set of variables (but including all others), and then calculating the percentage increase in the R-squared when the set of variables is reintroduced to the model.

The results of these calculations, shown in Table 3, are consistent with the previous discussion of individual coefficients. For the PPVT score, the set of variables with the largest marginal contributions to the R-square are the extended SES controls (which include the mother's PPVT score and measures of her education level) and the parenting measures. Maternal mental health and the measures of the physical environment explain very little of the variance in the PPVT. The results for the behavior problems vary across the four measures. The parenting variables have relatively large contributions to the R-squared for interviewer-assessed behavior problems and maternal-reported aggressive behavior. Maternal mental health measures collectively explain a large share of the variance in the mother-assessed behavior indexes, suggesting either that maternal mental health has adverse effects on child behavior, or that maternal mental health results in adverse maternal reports of child behavior. The measures of the physical environment never have a marginal contribution to the R-square of more than 5 percentage points.

Extensions

We estimated variants of the models discussed above, to address several concerns about two sources of bias in our results. The first concern is interviewer bias: some interviewers may tend to rate mothers, children, and the home environment negatively, and others not, producing biased estimates of the relationships between measures of parenting and interviewer-assessed child outcomes. Accordingly, we re-estimated our models including interviewer-city fixed effects.¹⁴ The results are shown in the first panel of Table 4. Including interviewer-city fixed effects has little effect on the coefficients on income. The marginal contributions of each set of coefficients to the R-squares are smaller, because the overall R-squares of the equations increase when interviewer-city fixed effects are included. However, the relative contributions of the sets of variables are unaffected.

A second challenge is reporting bias on the part of mothers. As noted above, mothers who tend to rate themselves as depressed, anxious, or stressed may also tend to rate their children as aggressive, withdrawn, and anxious. (A related issue is that mothers of aggressive, withdrawn, and anxious children may become more depressed, stressed, or anxious themselves). To assess the sensitivity of our results to this potential reporting bias, we re-estimated our models using only interviewer-assessed proxies and dropping all of the proxies reported by the mother (i.e. depression, stress, anxiety, neglect, physical response to tantrum, hours of TV per week, and food insecurity).¹⁵ As shown in Panel 2 of Table 4, dropping the mother-reported proxies does not change the results in models for the PPVT or interviewer-assessed behavior problems, but does lead to somewhat larger coefficients on income in the three mother-reported behavior problem models. Excluding these variables produces an increase in the relative contribution of the interviewer-assessed parenting measures to the R-square for child aggression, and increases in the relative contributions of the extended SES controls for withdrawn and anxious behaviors. Nevertheless, the overall pattern of results holds up: controlling for home environment as well as extended SES controls explains most of the effects of income.

¹⁴Although most interviewers worked in only one city, some interviewers conducted interviews in more than one city.

¹⁵The measure of "Lack of materials for stimulation" is based both maternal reports and interviewer observations of items such as books and toys that children have available to them. We did not exclude this measure here.

Interpretations and policy simulations

One interpretation of the results in Tables 2 through 4 is that the mediation model—in which income influences the home environment, which in turn affects children’s outcomes—is correct. If so, the “reduced form” income coefficients from equation (3) (graphed in Figure 4) reflect both any direct effect of income on children’s outcomes as well as the effects that operate through the home environment. Under this interpretation, these coefficients are the appropriate ones to use when assessing the effects of transfer programs on children’s outcomes.

There are, however, several reasons why this line of reasoning warrants skepticism. The first is that decline in the coefficient on income when the measures of the home environment are introduced could reflect the effects of measurement error in income—so that attenuation bias is increased when variables that are correlated with actual income are introduced. Although our results are similar when we used IV strategies to account for measurement error, it is still possible that measurement error is a problem. The second, and more substantive, issue is that aspects of the home environment, especially maternal characteristics, may influence income, rather than the reverse. An alternative model which is also consistent with our results is that maternal characteristics—lack of sensitivity, harshness, mental health, etc.—that result in poor child outcomes also result in lower income levels, because they impact mothers’ labor market productivity and possibly reduce the ability of mothers to attract higher-income partners. In this case, the appropriate coefficients to use for the purpose of assessing the effects of policy are those in Panel 2 and Table 2, since these show the associations of income with children’s outcomes net of the effects of the home environment. These coefficients are quite small, implying very small effects of transfer programs. Finally, it should be noted that the hypotheses that income affects maternal characteristics, and that maternal characteristics affect income, are not mutually exclusive. The truth may lie somewhere in the middle.

Our strategy is to treat the largest estimates shown in Figure 2—the OLS results with no extended SES controls—as upper bounds on the effects of income on child outcomes, and conduct simulations of the effects that various income transfer programs would have on PPVT scores and other outcomes for children. We are interested in the change in mean outcomes for children, and also in the change in gaps between children in our three income groups: family income below poverty, income between 100 and 200% of poverty, and income over 200% of poverty. Although the issue of causality is not resolved, our calculations provide some indication of how changes in income might influence the levels of and distributions of outcomes, given the most generous interpretation of our results.

We begin with a baseline case (in which family incomes are not altered) and then model the effects of two different scenarios. The first scenario (which we refer to as “Case 1”) involves raising the income of anyone below poverty up to the poverty line, which entails an average transfer of \$9,129 per family to families with incomes below the poverty line in our sample. This scenario should improve outcomes for those in poverty, both in absolute terms and relative to higher-income children, but will not change outcomes for anyone with income above the poverty line. The second scenario (“Case 2”), based on a proposal by Duncan and Magnuson (2003), is an income transfer that provides \$2,400 per child (or \$3,600 if the child is under age 1), for up to two children, in families with annual incomes below \$60,000. In our sample, this scenario provides an average transfer of \$4,159 per family to those below the poverty line, an average of \$3,703 per family to those with incomes between 100 and 200 percent of poverty, and an average of \$2,060 per family to those with incomes above 200 percent of poverty. This scenario benefits children in poverty and near poverty, and even has some effect on children in families with incomes more than twice the poverty line. Although the second policy is less generous to the poorest children than the first, both of these transfer programs are large both in terms of their effects on the incomes of poor and near-poor families, and in terms of their budgetary cost if implemented.

Results are in Table 5. The first column shows actual means of each outcome (in standard deviation units) by income group. The poorest group of children has a mean PPVT score that is 0.229 of a standard deviation less than the grand mean, and the wealthiest group has a mean score that is 0.302 of a standard deviation greater than the grand mean, for an average gap of 0.55 of a standard deviation. The differences across the poorest and wealthiest groups are somewhat smaller for interviewer-assessed behavior problems and aggressive behavior, and are similar for withdrawn and anxious behavior.

The results of Case 1 indicate that bringing all poor children up to the poverty line is predicted to increase their average PPVT score by one fifth of a standard deviation. Recall that our results that permitted the income coefficients to vary across income groups (shown in Table 1) imply that, if anything, the associations of income with the PPVT are smaller for poorest children than for wealthier children, so that these estimates are if anything too large. The results for the behavioral indexes imply that the program would improve the withdrawn and anxious behavior indexes by slightly more than one fifth of a standard deviation, and improve the indexes of behavior problems and aggressive behavior by about one tenth of a standard deviation. Case 2, which provides less generous transfers, but to a wider range of children, has smaller predicted effects for poor children—for example, the PPVT score increases by about a tenth of a standard deviation for children in the poorest group. In addition, it has modest predicted effects, of less than a tenth of a standard deviation, on those in the second-poorest group. Overall, our conclusion is that the effects of these very generous transfer programs are quite small, especially given that they are based on estimates of income effects that are likely to overstate the causal effect on income on children's outcomes.

V. Conclusions

Forty years after the War on Poverty, one in four American children is born into poverty,¹⁶ and a substantial share of children are being reared in poverty, or near poverty. These children are at risk of worse outcomes in childhood and in adulthood, including raising their children in poverty. Understanding how low income affects child outcomes is thus important for the current generation as well as future generations.

In this paper, we took advantage of a rich new dataset, the Fragile Families and Child Wellbeing Study, which provides a wealth of information on the family characteristics and home environments of a large and diverse sample of low-income children, born in 20 U.S. cities at the close of the 1990s and followed from birth to age 3. Consistent with prior research, we found that low-income children have lower PPVT scores, more mother-reported aggressive, withdrawn, and anxious behavior problems, and also more interviewer-reported problems with behavior than more affluent children. Examining an extensive set of 17 measures of the home environment, we found that low-income children fared worse across all of these measures. For most outcomes, these differences in home environment were sufficient to explain the link between low income and poorer child outcomes. For the remainder, home environment plus extended controls for family characteristics fully explained the link between low income and poorer child outcomes (the only exception here was withdrawn behavior, where a small significant effect of income remained).

These findings are consistent with the theory that home environment, broadly defined, matters a lot in explaining the poorer outcomes of children from low-income families. This finding makes sense given that the children in this study are only 3 years old. Older children from low-income families face a myriad of challenges in their communities, including poor schools, but

¹⁶Estimate from the Early Childhood Longitudinal Survey-Birth Cohort, for children born in 2000-2001 (see Flanagan and West, 2004).

for infants and toddlers, the major sources of influence are in the home. Although some of the children in our sample were enrolled in out-of-home child care, adding controls for child care did not change our results. Our results indicate that, if measured well enough, the home environment can fully explain the difference in outcomes between low-income and higher-income children.

These results are consistent with several quite different interpretations of the role of income in children's development. One interpretation is that income fosters better home environments, which in turn produce better child outcomes. Another interpretation is that income has no causal association with children's outcomes—and that the factors that produce better home environments and child outcomes also result in higher income levels. It is difficult to distinguish between these models with non-experimental data. However, even when the results are interpreted as showing causal effects of income on children's outcomes, the effect sizes are disappointingly small. Raising incomes for families in poverty to bring them up to the poverty line—which involves an average transfer of over \$9,000 per family per year—yields at most a one fifth of a standard deviation increase in PPVT scores and an 11 to 23 percent of a standard deviation decrease in behavior problems. Such changes would represent a meaningful improvement in children's outcomes but on their own would not be sufficient to close existing gaps between low- and higher-income children.

To get a sense of how large or small these effects are, it is useful to compare them with those of other programs, such as early child care, that may influence children's cognitive development and behavior. Like Taylor, Dearing, and McCartney (2004), we find that the effects of income we estimate are comparable to what would be gained through an intervention such as Early Head Start. Taylor, Dearing, and McCartney (2004) find that raising family incomes by \$13,000 per year would improve children's cognitive scores by 15 percent of a standard deviation and reduce behavior problems by 20 percent of a standard deviation, which compares favorably to the impact of Early Head Start, which costs about \$14,000 and raises cognitive scores by 12 to 15 percent of a standard deviation and reduces behavior problems by 10 to 11 percent of a standard deviation. If we use our estimates to project the effect of a \$14,000 per year increase in income for poor families, we find roughly comparable effects. However, as stressed above, it is very likely that the income effects on which these calculations are based are too large. If so—and assuming that the effects of high quality early childcare programs are not similarly overstated—then investments in these programs will yield a better return, in terms of the set of children's outcomes we examine here, than income transfer programs.

This comparison between income transfer programs and early childcare programs is not definitive, and other factors should come into play when making policy decisions. For one, both types of programs may produce benefits that extend beyond children's cognitive development—as measured by the PPVT—and behavior problems. For example, income transfer programs could also produce improvements in children's health and safety. Early childcare programs could permit mothers to work, thereby increasing the economic status of their families. In addition, it is not necessary that one type of program has to be chosen over another. It is possible that income transfer programs and high-quality childcare could build on each other to produce large benefits to low-income children.

Appendix

Construction of Measures of the Home Environment and Child Outcomes

A. Measures of the home environment

All items are coded so that higher numbers correspond to more problematic outcomes.

1. Unresponsive (Interviewer-assessed, 0-6 points; reverse coded): based on the Home Observation for Measurement of the Environment (HOME) (see Bradley, 1993; Caldwell and Bradley, 1984). The development and psychometric properties of this subscale is described in Fuligni, Han, and Brooks-Gunn (2004) and Leventhal, Martin, and Brooks-Gunn (2004). This subscale is also sometimes referred to as measuring “lack of responsivity.” One point was assigned for each affirmative response. The number of affirmative responses was then summed to create a score for the scale. This number was then reverse coded to represent the total number of unresponsive behaviors displayed by the mother (0-6).
 - T1. Parent spontaneously vocalized to child twice.
 - T2. Parent responded verbally to child’s vocalizations.
 - T3. Parent told child the name of an object or person during visit.
 - T7. Parent spontaneously praised child at least twice.
 - T8. Parent’s voice conveys positive feelings toward child.
 - T9. Parent caressed or kissed child at least once.
2. Harsh (Interviewer-assessed; 0-5 points; reverse coded): based on the Home Observation for Measurement of the Environment (HOME) (see Bradley, 1993; Caldwell and Bradley, 1984). The development and psychometric properties of this subscale is described in Fuligni, Han, and Brooks-Gunn (2004) and Leventhal, Martin, and Brooks-Gunn (2004). This subscale is sometimes referred to as measuring “punitiveness.” One point was assigned for each affirmative response. The number of affirmative responses was then summed to create a score for the scale. This number was then reverse coded to represent the total number of harsh behaviors displayed by the mother (0-5).
 - T10. Parent did not shout at child (e.g. did not raise voice above level required by distance between mother and child).
 - T11. Parent did not express annoyance with or hostility toward child.
 - T12. Parent neither slapped nor spanked child during the visit.
 - T13. Parent did not scold or criticize child during visit.
 - T14. Parent did not interfere or restrict child more than 3 times. (Does not include protecting child from harm.)
3. Lack of Maternal Verbal/Social Skills (Interviewer-assessed; 0-3 points; reverse coded): based on the Home Observation for Measurement of the Environment (HOME) (see Bradley, 1993; Caldwell and Bradley, 1984). The development and psychometric properties of this subscale is described in Fuligni, Han, and Brooks-Gunn (2004) and Leventhal, Martin, and Brooks-Gunn (2004). One point was assigned for each affirmative response. The number of affirmative responses was then summed to create a score for the scale. This number was then reverse coded to represent the total number of poor verbal/social skills displayed by the mother (0-3).
 - T4. Parent’s speech was distinct and audible.
 - T5. Parent initiated verbal exchanges with visitor.
 - T6. Parent conversed freely and easily.
4. Maternal depression (Mother-assessed; 0-8 points): from Composite International Diagnostic Interview-Short Form (CIDI-SF) (Nelson, et al., 1998). One point was

assigned for each affirmative response. Scores on each item were then summed to create a total score (0-8).

J12. During the past 12 months, has there ever been a time when you felt sad, blue, or depressed for two or more weeks in a row?

J14. During the past 12 months, has there ever been a time lasting two weeks or more when you lost interest in most things like hobbies, work, or activities that usually give you pleasure?

J15A. Thinking about those same two weeks, did you feel more tired out or low on energy than is usual for you?

J15B. Did you gain or lose 10 pounds without trying?

J15C. Did you have more trouble falling asleep than you usually do during those two weeks?

J15D. During those two weeks, did you have a lot more trouble concentrating than usual?

J15E. People sometimes feel down on themselves, no good, or worthless. During that two week period, did you feel this way?

J15F. Did you think a lot about death--either your own, someone else's, or death in general during those two weeks?

5. Maternal stress (Mother-assessed; 0-44 points): based on 11 items adapted from a measure used in the Early Head Start Study. For each item, individuals were assigned a score of 0 if they responded that they "strongly disagree," 1 for "disagree," 2 for "not sure," 3 for "agree," and 4 for "strongly agree." Scores on each item were then summed to create a total score (0-44).

G1a. You often have the feeling that you cannot handle things very well?

G1b. You find yourself giving up more of your life to meet your child(ren)'s needs than you ever expected

G1c. You feel trapped by your responsibilities as a parent?

G1d. Since having (CHILD) you have been unable to do new and different things?

G1e. Since having (CHILD) you feel that you are almost never able to do things that you like to do?

G1f. There are quite a few things that bother you about your life?

G1g. Having (CHILD) has caused more problems than you expected in your relationship with men?

G1h. You feel alone and without friends?

G1j. You are less interested in people than you used to be?

G1k. You enjoy things less than you used to?

G1l. You are unhappy with the last purchase of clothing you made for yourself?

6. Maternal anxiety (Mother-assessed; 0-13 points): from Composite International Diagnostic Interview-Short Form (CIDI-SF) (Nelson, et al., 1998). One point was assigned for an affirmative response to J16 and/or J16a; J18c and/or J18e; J18d, J19, and/or J19a; and all other items. Points were then summed to create a total score (0-13).

J16. During the past 12 months, did you ever have a period lasting one month or longer when most of the time you felt worried, tense, or anxious?

J16a. People differ a lot in how much they worry about things. Did you have a time in the past 12 months when you worried a lot more than most people would in your situation?

J17. Worry/tension/anxiety lasted 6 months or more.

J18a. During (that/this) period (was/is) your worry stronger than in other people?

J18b. (Did/do) you worry most days?

J18c. (Did/do) you worry about one particular thing, such as your job security or the failing health of a loved one or more than one thing? (affirmative response = more than one thing).

J18d. (Did/do) you find it difficult to stop worrying?

J18e. (Did/do) you have different worries on your mind at the same time?

J19. How often (was/is) the worry so strong you (couldn't/can't) put it out of your mind no matter how hard you (try/tried)? (Was/is) this... (affirmative response = often).

J19a. How often (did/do) you find it difficult to control your worry? (affirmative response = often).

J20a. When you (were/are) worried or anxious, (were/are) you also restless?

J20b. When you (were/are) worried or anxious, (were/are) you also keyed up or on edge?

J20c. When you (were/are) worried or anxious, (were/are) you also easily tired?

J20d. When you (were/are) worried or anxious, (did/do) you also have difficulty keeping your mind on what you were doing?

J20e. When you (were/are) worried or anxious, (were/are) you also more irritable than usual?

J20f. When you (were/are) worried or anxious, (did/do) you also have tense, sore, or aching muscles?

J20g. When you (were/are) worried or anxious, (did/do) you also having trouble falling asleep or staying asleep?

7. Difficult to Interview (Interviewer-assessed; 0-12 points; reverse coded): Each item was scored on a 0 to 3 point scale ranging from "poor" to "excellent" (for item V5, the scale ranged from "very uncooperative" to "very cooperative"). Scores on each item were then summed to create a total score. This number was then reverse coded to represent the total number of difficult behaviors displayed by the mother (0-12).

V2. Respondent's attention to interviewer was...

V3. Respondent's understanding of the questions was...

V4. Respondent's ability to articulate answers was...

V5. Respondent's cooperation throughout most of the interview was...

8. Child neglect (Mother-assessed; 0-125 points): neglect scale from Conflicts Tactics Scale. For each item, individuals were assigned a score of 0 if they responded "this has never happened" or "yes, but not in the past year" for a particular item. They were

assigned a score of 1 if they reported that the event occurred once in the past year; 2 for twice; 4 for 3-5 times; 8 for 6-10 times; 15 for 11-20 times; and 25 for more than 20 times in the past year. Scores on each item were then summed to compute a total yearly frequency score (0-125).

J15. Had to leave your child home alone, even when you thought some adult should be with him/her

J16. Were so caught up with your own problems that you were not able to show or tell your child that you loved him/her

J17. Were not able to make sure your child got the food he/she needed

J18. Were not able to make sure your child got to a doctor or hospital when he/she needed it

J19. Were so drunk or high that you had a problem taking care of your child

9. Physical response to tantrum (Mother-assessed; 0-1 points): Mothers were asked to state how they would respond if their child had a tantrum in a grocery store. After giving one response, they were asked what they would do if the first strategy did not work. "Physical response to tantrum" is coded as 1 if the mother indicated that she would use a punitive physical response including spanking, slapping, hitting or pinching as either the first or second strategy. Responses such as holding or picking up the child were not coded as "physical responses"; neither were any verbal responses, including those that were punitive (i.e. yelling at or verbally threatening).

10. Lack of materials for stimulation (Mother-assessed; 0-11 points; reverse coded): based on the Home Observation for Measurement of the Environment (HOME) (see Bradley, 1993; Caldwell and Bradley, 1984). The development and psychometric properties of this subscale is described in Fuligni, Han, and Brooks-Gunn (2004) and Leventhal, Martin, and Brooks-Gunn (2004). One point was assigned for each affirmative response (i.e., at least one of each type of toy/item in the household). The number of affirmative responses was then summed to create a score. This figure was then reverse coded so to represent the total lack of language stimulating/literacy supporting characteristics of the household/mother (0-11).

C8. About how many books written for adults do you have in the house?

C1B. About how many, if any, toys that let (CHILD) work (his/her) muscles does (he/she) have?

C1A. About how many, if any, push or pull toys does (CHILD) have?

C1H. About how many, if any, toys with wheels that (he/she) can ride on does (he/she) have?

T15. Parent provided toys for child during the visit

C1E. About how many, if any, cuddly, soft or role-playing toys like dolls or teddy bears does (he/she) have?

C2. Does child have a highchair, a booster, or a child-sized table and chair?

C1C. About how many, if any, toys that have pieces that fit together ... does (he/she) have?

C1D. About how many, if any, toys that can be put together in different ways... does (he/she) have?

C1G. About how many, if any, toys that let (him/her) make music, such as a rattle or toy that plays a musical jingle does (he/she) have?

C1F. About how many, if any, books do you have for (CHILD)?

- 11.** Problems with block (Interviewer-assessed; 0-15 points): Each item was scored on a 0 to 3 point scale with 0 representing no/very few problems in this area and 3 representing the considerable problems. Scores on each item were then summed to create a total score (0-15).

- P1. Garbage, litter, or broken glass in street, on sidewalks, or in yards?
- P2. How would you rate the general condition of most of the nearby buildings?
- P3. Is there graffiti on nearby buildings or walls of nearby buildings?
- P4. Are there vacant, abandoned, or boarded-up buildings nearby?
- P5. Are there abandoned vehicles nearby?

- 12.** Problems with home exterior (Interviewer-assessed; 0-9 points): Each item was scored 0 for no problems in this area and 1 for problems. Scores on each item were then summed to create a total score (0-9).

- P6_a. Does environment outside home have unlit entrance/stairway?
- P6_b. Does environment outside home have broken steps?
- P6_c. Does environment outside home have broken glass/toys?
- P6_d. Does environment outside home have large ditches?
- P6_e. Does environment outside home have alcohol/drug paraphernalia?
- P6_f. Does environment outside home have strewn garbage/litter?
- P7_a. Does the exterior of the building have -- peeling paint?
- P7_b. Does the exterior of the building have -- crumbling/damaged walls?
- P7_c. Does the exterior of the building have -- broken/cracked windows?

- 13.** Problems with home interior (Interviewer-assessed; 0-6 points): Each item was scored 0 for no problems in this area and 1 for problems. Scores on each item were then summed to create a total score (0-6).

- R1. Are there any broken windows or cracked windowpanes?
- R2. Is the wiring in the house concealed?
- R3. Does the housing unit contain open cracks/holes in walls/ceiling?
- R4. Does the housing unit contain holes in floor?
- R5. Does housing unit have broken plaster/peeling paint for >1 sq. ft.?
- R13. Is house overly noisy from noise outside of the house?

- 14.** Home disorganization (Interviewer-assessed; 0-5 points): Each item was scored 0 for no problems in this area and 1 for problems. Scores on each item were then summed to create a total score (0-5).

- R6. Is inside of home dark?
- R7. Is inside of home crowded?
- R8. Are all visible rooms of house/apt noticeably cluttered?

R9. Are all visible rooms of house/apt dirty/not reasonably cleaned?

R12. Is house/apartment overly noisy from noise in the house?

- 15.** Safety problems in the home (Interviewer-assessed; 0-11 points): If the interviewer responded negatively to R10 (Is environment inside the home unsafe for young children?) then a total score of 0 was assigned. If the interviewer responded affirmatively to R10 then each item in R10A was scored 0 for no problems in this area and 1 for problems. Scores on each item were then summed to create a total score (0-11).

R10. Is environment inside the home unsafe for young children?

R10A. Please check all hazardous conditions you observe:

- a. frayed electrical wires;
- b. mice or rats;
- c. broken glass;
- d. poisonous substances within reach of children;
- e. falling plaster;
- f. broken stairs;
- g. peeling paint;
- h. cleaning materials left out;
- i. flames and heat within reach of young children;
- j. weapons (guns or knives) within reach of children;
- k. other (specify)

- 16.** Food insecurity (Mother-assessed; 0-10 points): USDA scale. One point was assigned for each event that occurred. The number of events was then summed to create a 0-18 point scale score for the scale. This score was then re-coded to a 0-10 point continuous measure of food insecurity (see, Bickel, et al., 2000).

D1 A. Worried food would run out

D1 B. Food bought didn't last

D1 C. Couldn't afford to eat balanced meals

D1 D. Relied on few kinds of low-cost food to feed children

D1 E. Couldn't feed child(ren) balanced meals

D3. Child(ren) were not eating enough

D4. Adult(s) cut size of meals or skipped meals

D5. Adult(s) cut size or skipped meals, 3+ months

D6. Adult(s) ate less than felt he/she should

D7. Adult(s) hungry but didn't eat because couldn't afford

D8. Respondent lost weight

D10. Adult did not eat for whole day

D10 A. Adult did not eat for whole day, 3+ months

- D11. Cut size of child(ren)'s meals
- D12. Child(ren) skipped meal
- D12 A. Child(ren) skipped meal, 3+ months
- D13. Child(ren) hungry, but couldn't afford more food
- D14. Child(ren) did not eat for whole day

17. Hours of TV per week (Mother-assessed; 0-112 points): Mothers were asked how many hours the child spends watching TV on a typical weekday and weekend day. Daily hours were top-coded at 16. Weekday hours were then multiplied by 5 and weekend hours by 2. Weekday and weekend hours were then summed to create a total number of TV watching hours per week (0-112).

B. Child outcomes

1. Child's PPVT: This is the child's score on the Peabody Picture Vocabulary Test. Raw scores were normed according to the child's age (in months), using standard norming procedures.
2. Problems with Child's Behavior (Interviewer-assessed; 0-20 points; reverse coded where appropriate): Each item was scored on a 0 to 4 point scale. Scores on each item were then summed to create a total score (0-20). Items are coded such that higher scores are "worse."
 - U1. Did the child display positive emotions during the visit?
 - U2. Did the child display negative emotions during the visit?
 - U3. How persistent was the child when completing the PPVT/TVIP?
 - U4. How cooperative was the child when completing the PPVT/TVIP?
 - U5. How cooperative was the child while being weighed and measured?
3. Aggressive behavior (Mother-assessed; 0-16 points): This is the scale for aggressive behavior from the Achenbach Child Behavior Checklist. It is based on 8 items reported by the mother. For each item, individuals were assigned a score of 0 if they responded that the statement was "not true," 1 if they responded that the statement was "sometimes or somewhat true," or 2 if they responded that the statement was "very true or often true" of the focal child. Scores on each item were then summed to create a total score (0-16).
 - M5. He/She is defiant
 - M6. (His/Her) demands must be met immediately
 - M7. He/She is disobedient
 - M13. He/She doesn't seem to feel guilty after misbehaving
 - M14. He/She is easily frustrated
 - M18. He/She gets in many fights
 - M21. He/She hits others
 - M23. He/She has angry moods
 - M28. Punishment doesn't change (his/her) behavior
 - M30. He/She screams a lot

- M33. He/She is selfish or won't share
- M39. He/She is stubborn, sullen, or irritable
- M41. He/She has temper tantrums or hot temper
- M44. He/She is uncooperative
- M48. He/She wants a lot of attention

4. Withdrawn behavior (Mother-assessed; 0-16 points): This is the scale for withdrawn behavior from the Achenbach Child Behavior Checklist. It is based on 8 items reported by the mother. For each item, individuals were assigned a score of 0 if they responded that the statement was "not true," 1 if they responded that the statement was "sometimes or somewhat true," or 2 if they responded that the statement was "very true or often true" of the focal child. Scores on each item were then summed to create a total score (0-16).

- M2. He/She avoids looking others in the eye
- M3. He/She clings to adults or is too dependent
- M9. He/She doesn't answer when people talk to (him/her)
- M29. He/She refuses to play games
- M31. He/She seems unresponsive to affection
- M35. He/She shows little affection toward people
- M36. He/She shows little interest in things around (him/her)
- M50. He/She is withdrawn, doesn't get involved with others

5. Anxious behavior (Mother-assessed; 0-30 points): This is the scale for anxious behavior from the Achenbach Child Behavior Checklist. It is based on 15 items reported by the mother. For each item, individuals were assigned a score of 0 if they responded that the statement was "not true," 1 if they responded that the statement was "sometimes or somewhat true," or 2 if they responded that the statement was "very true or often true" of the focal child. Scores on each item were then summed to create a total score (0-30).

- M3. He/She clings to adults or is too dependent
- M16. (He/She) feelings are easily hurt
- M19. He/She gets too upset when separated from parents
- M22. He/She looks unhappy w out good reason
- M25. He/She has nervous movements, high strung, tense
- M32. He/She is self-conscious or easily embarrassed
- M42. He/She is too fearful or anxious
- M46. He/She is unhappy, sad, depressed.

Appendix Table 1

Samples Attrition Analysis

Sample:	A	B	C	D	E
Observations:	4,898	4,231	3,355	2,179	1,699

Sample:	A	B	C	D	E
Baseline measures					
Variable means:					
Mother has less than high school degree	0.347	0.330	0.338	0.352	0.335
Mother has high school degree	0.302	0.305	0.303	0.315	0.311
Mother has more than high school degree	0.350	0.360	0.358	0.332	0.354
Mother is white	0.208	0.216	0.215	0.182	0.197
Mother is black	0.472	0.478	0.486	0.545	0.528
Mother is Hispanic	0.272	0.260	0.257	0.232	0.236
Mother has other race/race unknown	0.048	0.048	0.043	0.041	0.039
Mother married to child's father	0.242	0.249	0.246	0.218	0.240
Mother cohabiting	0.364	0.362	0.365	0.372	0.369
Mother single	0.393	0.380	0.389	0.409	0.391
Measures from 36-month core survey					
Income at 36 months (1999 \$)		33210	32526	30254	31195
Mother married to child's father		0.317	0.312	0.282	0.302
Mother cohabiting with child's father		0.217	0.219	0.219	0.219
Mother cohabiting or married to new partner		0.096	0.096	0.100	0.094
Mother single		0.367	0.373	0.398	0.386

Note: Sample A consists of all births in the original Fragile Families sample. Sample B excludes those who did not complete the core survey at age 3. Sample C excludes those who were living apart from their mothers at the time of the Age 3 survey, or whose mothers did not take part in any of the components of the in-home survey. (Note that mothers who conducted the "in home" survey over the telephone are included in this sample.) Sample D excludes those for whom the child was not present for assessment at the time of the in-home study, or for whom the "in home" was conducted over the telephone. Sample E excludes those with missing data for any of the variables used in the analyses. Note that "income at 36 months" is missing for 316 of the Sample B cases, for 230 of the Sample C cases, and for 157 of the Sample D cases.

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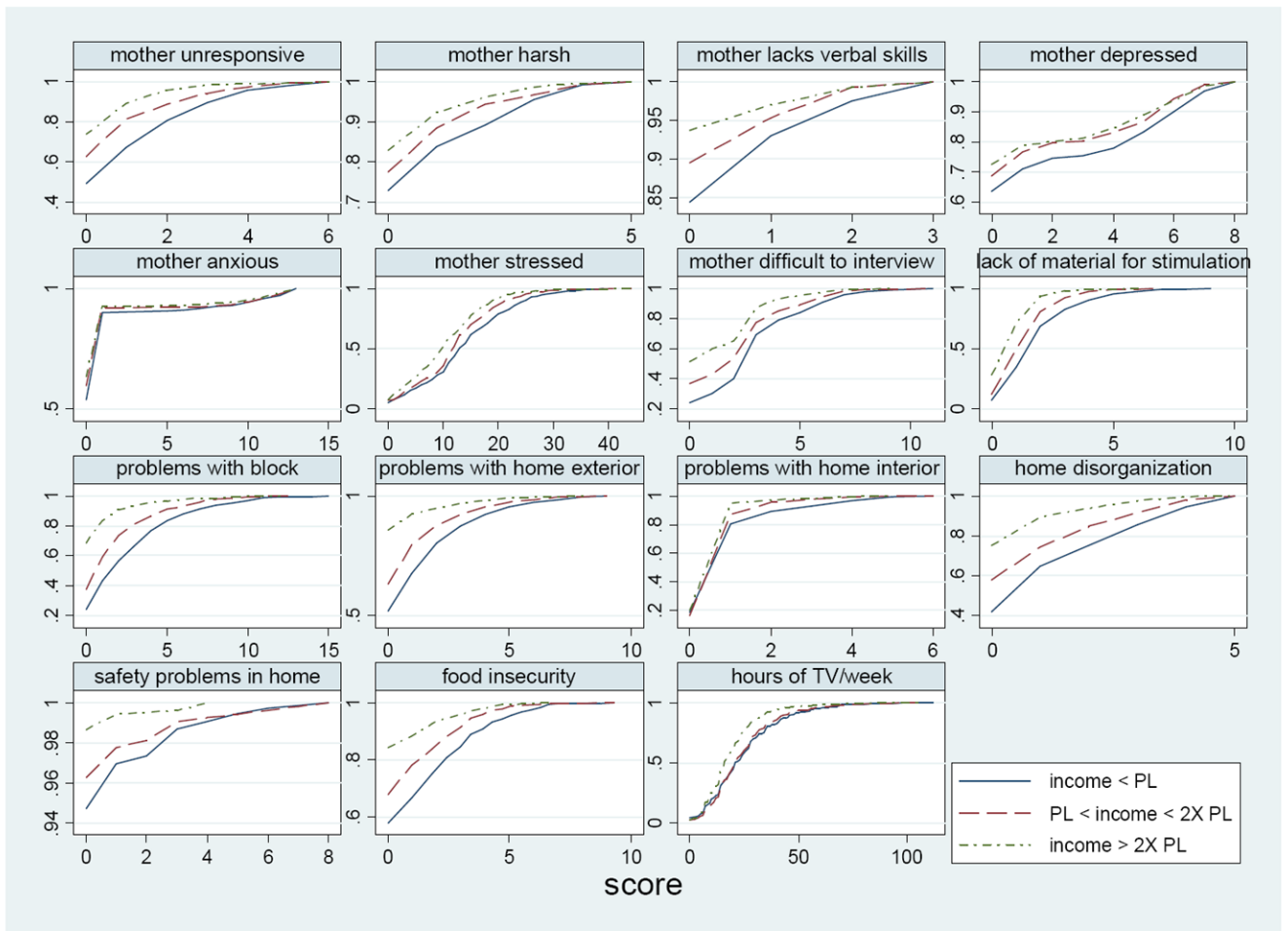


Figure 1.
Cumulative distributions of measures of the home environment

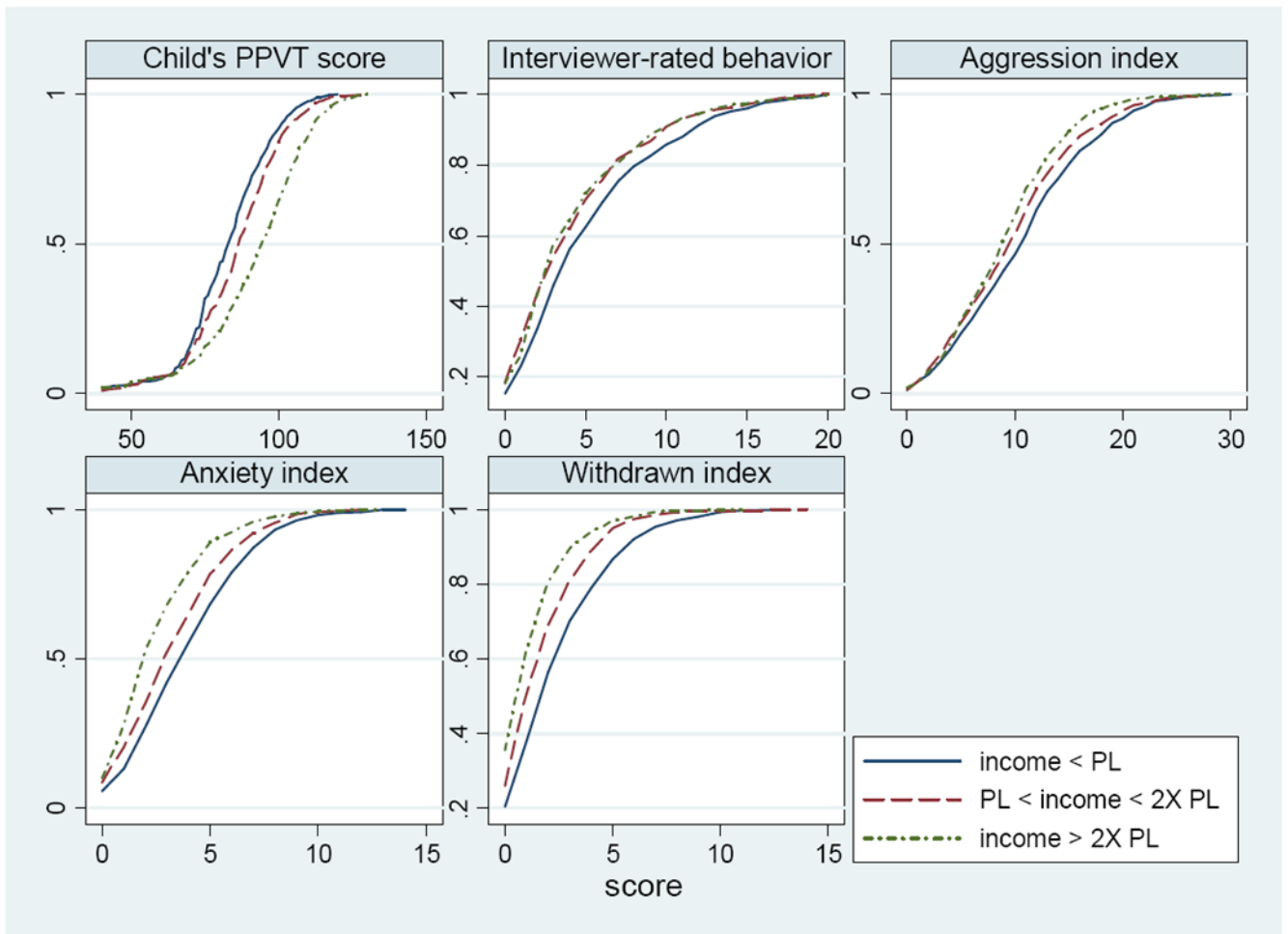


Figure 2.
Cumulative distributions of child outcomes

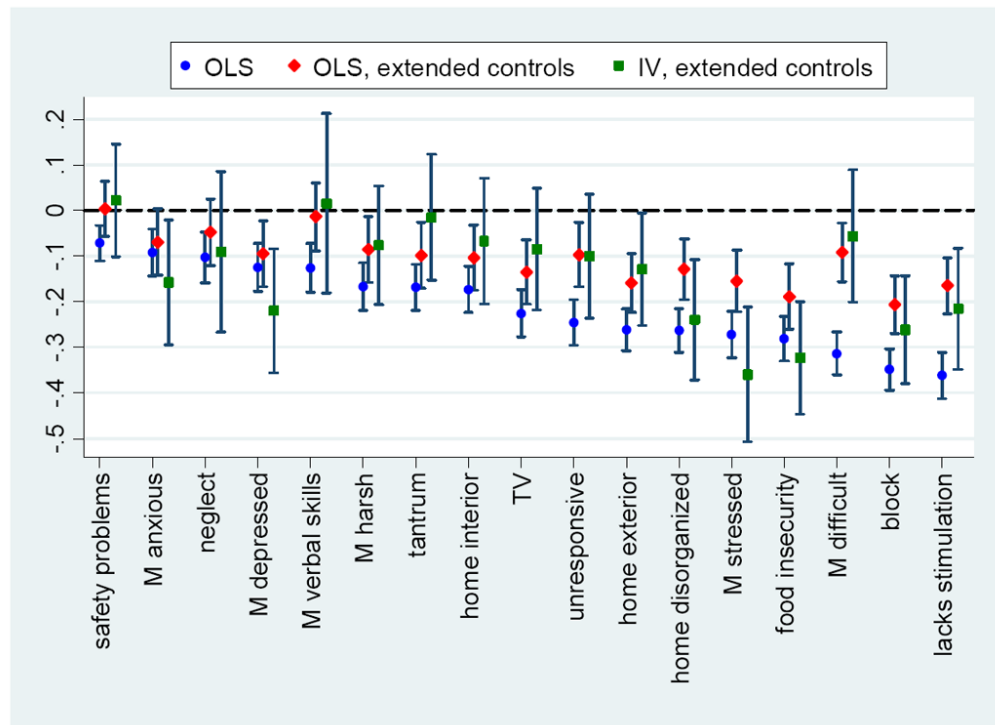


Figure 3.
Coefficients and confidence intervals for $\ln(y)$

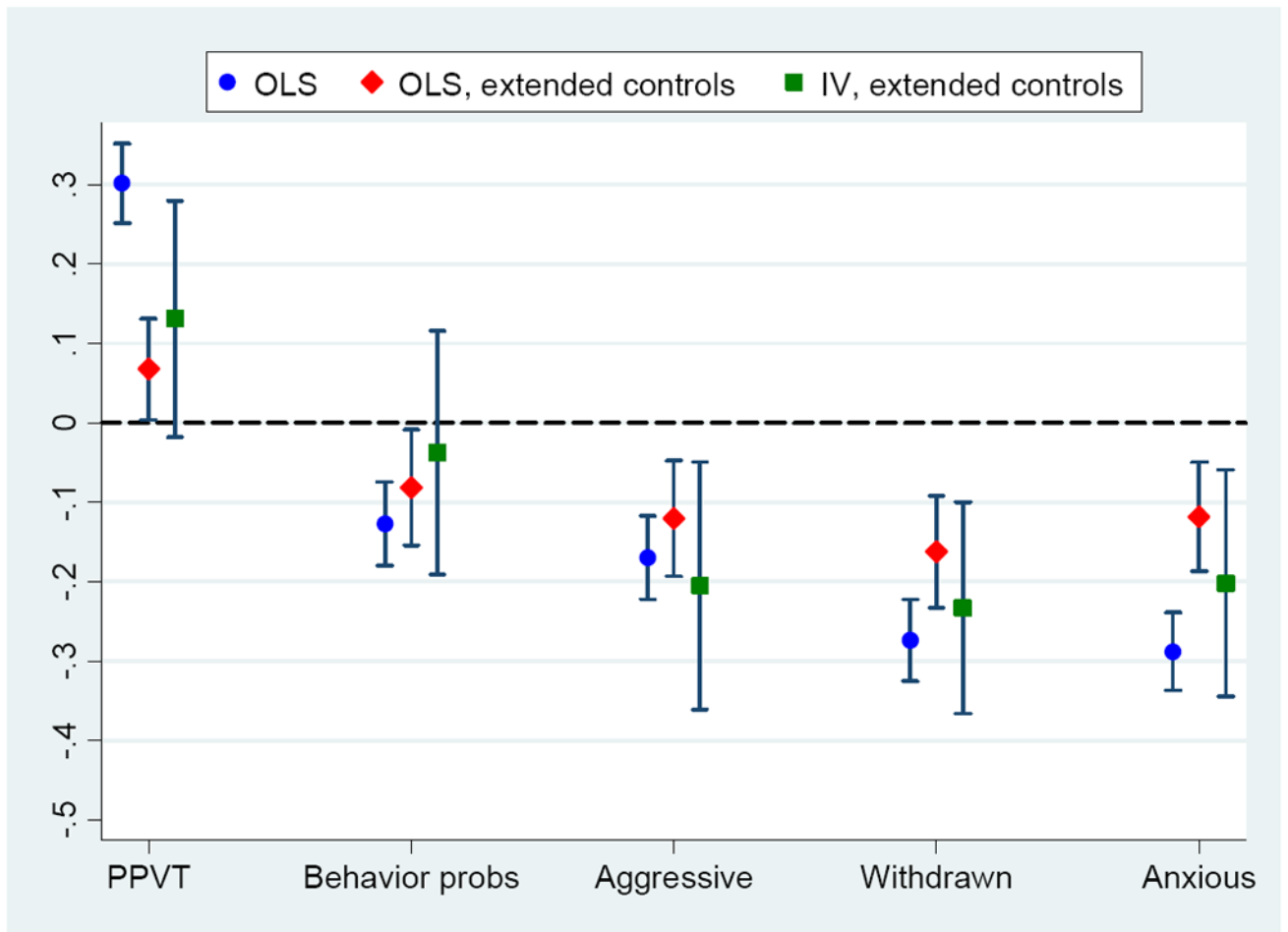


Figure 4.
Coefficients and confidence intervals for $\ln(y)$

Table 1

Associations between child outcomes and income, by income group

	Child's PPVT	Behavior problems	Aggressive behavior	Withdrawn behavior	Anxious Behavior
Panel 1: No extended SES controls					
ln(y), y < PL	0.130 (0.057)	-0.177 (0.065)	-0.173 (0.069)	-0.223 (0.071)	-0.160 (0.068)
ln(y), PL < y < 2x PL	0.006 (0.140)	0.026 (0.145)	-0.358 (0.148)	-0.225 (0.126)	-0.403 (0.144)
ln(y), y > PL	0.642 (0.093)	-0.058 (0.083)	-0.267 (0.084)	-0.168 (0.065)	-0.429 (0.076)
Test: coefficients equal across 3 income groups (F, p-value)	12.74 (0.000)	1.17 (0.312)	0.800 (0.449)	0.190 (0.824)	3.80 (0.023)
Panel 2: Extended SES controls					
ln(y), y < PL	0.054 (0.057)	-0.163 (0.070)	-0.144 (0.075)	-0.198 (0.737)	-0.115 (0.071)
ln(y), PL < y < 2x PL	-0.118 (0.153)	0.034 (0.164)	-0.348 (0.161)	-0.222 (0.146)	-0.329 (0.155)
ln(y), y > PL	0.348 (0.099)	0.008 (0.091)	-0.237 (0.093)	-0.073 (0.074)	-0.251 (0.082)
Test: coefficients equal across 3 income groups (F, p-value)	4.95 (0.007)	1.53 (0.218)	0.86 (0.424)	0.99 (0.371)	1.38 (0.251)
Observations	1762	1803	1814	1814	1814

Notes: Except where otherwise indicated, values in parentheses are robust standard errors. All models include city fixed effects, an indicator for the child's gender, and the child's age in months. The models shown in the columns marked "Extended SES controls" also include indicators for the mother's race, indicators for mother's educational attainment, number of children in the household, total number of household members, indicators for family structure, the mother's PPVT score, and an indicator for whether the mother took the PPVT in Spanish.

Table 2

Associations between child outcomes and income, with mediators

	Child's PPVT	Behavior problems	Aggressive behavior	Withdrawn behavior	Anxious Behavior
	Panel 1: No mediators				
ln(Y)	0.068 (0.032)	-0.082 (0.035)	0.121 (0.037)	-0.163 (0.036)	-0.118 (0.035)
	Panel 2: All mediators				
ln(Y)	0.020 (0.032)	-0.023 (0.035)	-0.036 (0.035)	-0.098 (0.035)	-0.052 (0.034)
Mother unresponsive	-0.105 (0.029)	0.132 (0.031)	0.059 (0.028)	0.047 (0.034)	0.022 (0.031)
Mother lacking verbal skills	-0.031 (0.028)	0.013 (0.030)	-0.054 (0.027)	-0.005 (0.032)	-0.072 (0.027)
Safety problems in home	-0.006 (0.030)	0.065 (0.025)	0.021 (0.027)	-0.023 (0.024)	0.011 (0.022)
Neglect scale	0.002 (0.023)	0.017 (0.021)	0.028 (0.024)	0.042 (0.026)	0.051 (0.025)
Physical response to tantrum?	0.014 (0.023)	-0.007 (0.023)	0.095 (0.024)	0.004 (0.024)	0.021 (0.024)
Mother harsh	-0.057 (0.025)	0.181 (0.025)	0.154 (0.026)	0.065 (0.028)	0.032 (0.025)
Mother difficult to interview	-0.077 (0.028)	0.188 (0.029)	-0.028 (0.029)	0.026 (0.029)	0.056 (0.030)
Mother depression index	-0.011 (0.024)	-0.014 (0.024)	0.037 (0.027)	-0.006 (0.026)	0.034 (0.026)
Mother anxiety index	-0.013 (0.024)	-0.004 (0.024)	0.009 (0.028)	-0.024 (0.027)	0.004 (0.027)
Mother stressed	-0.012 (0.026)	0.030 (0.025)	0.249 (0.028)	0.165 (0.028)	0.184 (0.027)
Lack of materials for stimulations	-0.038 (0.023)	0.008 (0.022)	0.034 (0.026)	0.074 (0.030)	0.050 (0.027)
Hours of TV per week	-0.007 (0.025)	0.010 (0.023)	0.037 (0.024)	0.049 (0.025)	0.018 (0.022)
Problems with home exterior	-0.010 (0.030)	-0.004 (0.031)	-0.013 (0.034)	0.011 (0.034)	-0.028 (0.035)
Problems with home interior	-0.008 (0.026)	0.018 (0.027)	-0.022 (0.027)	-0.049 (0.027)	-0.012 (0.028)
Home disorganized	0.004 (0.027)	0.040 (0.027)	-0.008 (0.027)	-0.007 (0.029)	0.027 (0.029)
Problems with block	-0.060 (0.029)	-0.010 (0.032)	0.014 (0.036)	0.027 (0.033)	0.051 (0.034)
Food insecurity	-0.015 (0.024)	0.015 (0.025)	0.037 (0.026)	0.032 (0.028)	0.004 (0.028)
Observations	1762	1803	1814	1814	1814

Notes: Except where otherwise indicated, values in parentheses are robust standard errors. All models include the extended SES controls noted in Table 1.

Table 3

Contributions of home environment variables to R²

	Child's PPVT	Behavior problems	Aggressive behavior	Withdrawn behavior	Anxious Behavior
Extended SES controls	0.214	0.027	0.023	0.086	0.110
Parenting measures	0.107	0.382	0.201	0.077	0.054
Mental health measures	0.006	0.003	0.256	0.115	0.136
Physical environment measures	0.019	0.007	0.020	0.046	0.020
Observations	1647	1685	1698	1698	1698

Notes: These results are based on regressions shown in Panel 2 of Table 2.

1. Extended SES controls include indicators for the mother's race, indicators for mother's educational attainment, number of children in the household, total number of household members, indicators for family structure, the mother's PPVT score, and an indicator for whether the mother took the PPVT in Spanish. (The child's age, gender and a set of city dummies are included in all regressions, but are not included in the list of extended SES controls.)
2. Parenting measures include "mother unresponsive", "mother lacking verbal skills", "safety problems in home", "neglect scale", "physical response to tantrum?", "mother harsh", and the measure of whether the mother was difficult to interview.
3. Mental health measures include the maternal depression index, the maternal anxiety index, and the maternal stress index.
4. The physical environment measures include "lack of materials for stimulations", "hours of TV per week", "problems with home exterior", "problems with home interior", "home disorganized", "problems with block", and the food insecurity index. The marginal contribution to the R-squared is measured by estimating the model without the set of variables indicated in the first column (including all other variables), and calculating the percentage increase in the R-squared when the set of variables is added to the model.

Table 4

Extensions

	Child's PPVT	Behavior problems	Aggressive behavior	Withdrawn behavior	Anxious Behavior
Panel 1: Interviewer effects included					
ln(y)	0.012 (0.033)	-0.018 (0.036)	-0.033 (0.036)	-0.096 (0.037)	-0.053 (0.035)
Marginal contribution to R-squared of::					
Extended SES controls	0.113	0.020	0.014	0.060	0.079
Parenting measures	0.058	0.224	0.131	0.053	0.034
Mental health measures	0.004	0.002	0.154	0.077	0.094
Physical environment measures	0.015	0.003	0.020	0.040	0.020
Panel 2: Parent-assessed measures of the home environment excluded					
ln(y)	0.026 (0.032)	-0.029 (0.034)	-0.089 (0.037)	-0.129 (0.037)	-0.084 (0.035)
Marginal contribution to R-squared of:					
Extended SES controls	0.221	0.026	0.059	0.143	0.175
Parenting measures	0.109	0.393	0.038	0.112	0.080
Physical environment measures	0.018	0.006	0.026	0.045	0.037
Observations	1762	1803	1814	1814	1814

Notes: Robust standard errors in parentheses. These results are based on regressions of child outcomes on the child's age, gender, interview fixed effects, and the sets of variables listed. In models with interviewer effects (Panel 1) the sets of variables are defined exactly as in Table 3. In Panel 2, all maternal reported measures of the home environment are excluded. The parenting measures include: "mother unresponsive", "mother lacking verbal skills", "safety problems in home", "mother harsh", and whether the mother was difficult to interview. The physical environment measures include "lack of materials for stimulations", "problems with home exterior", "problems with home interior", "home disorganized", and "problems with block". No maternal mental health measures are included. The marginal contribution to the R-squared is measured by estimating the model without the set of variables indicated in the first column (including all other variables), and calculating the percentage increase in the R-squared when the set of variables is added to the model.

Table 5

Means of child outcomes within groups, actual and with transfer programs

	Actual	Case 1: Income floor set to poverty line	Case 2: Transfer of \$2400 if y<\$60K
PPVT			
Group 1: y < PL	-0.244	-0.024	-0.124
Group 2: PL < y < 2x PL	0.042	0.042	0.085
Group 3: y > 2x PL	0.302	0.302	0.316
Behavior problems			
Group 1: y < PL	0.094	0.001	0.044
Group 2: PL < y < 2x PL	-0.011	-0.011	-0.030
Group 3: y > 2x PL	-0.124	-0.124	-0.130
Aggressive Behavior			
Group 1: y < PL	0.146	0.022	0.078
Group 2: PL < y < 2x PL	-0.029	-0.029	-0.053
Group 3: y > 2x PL	-0.179	-0.179	-0.187
Withdrawn behavior			
Group 1: y < PL	0.265	0.037	0.128
Group 2: PL < y < 2x PL	-0.042	-0.042	-0.081
Group 3: y > 2x PL	-0.297	-0.297	-0.310
Anxious behavior			
Group 1: y < PL	0.244	0.033	0.128
Group 2: PL < y < 2x PL	-0.040	-0.040	-0.081
Group 3: y > 2x PL	-0.307	-0.307	-0.321