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Childhood Home Environment: Evidence from the NLSY**

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Evaluating the Impact of Mothers' Self-esteem on Early Childhood Home Environment: Evidence from the NLSY

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Abstract:

Estimating causal effects of parental characteristics on determinants of child outcomes is complicated due to endogeneity problems. Utilizing matched mother-child data from National Longitudinal Surveys of Youth, this paper integrates an orthogonalization technique to 2SLS-IV regressions. The key findings indicate that a rise in mothers' self-esteem improves children's home environment conditions that promote cognitive and emotional developments, with larger effects observed among mothers in socio-economically disadvantaged families. The magnitude of these effects are either higher than or comparable to the effects of mothers' education and cognitive ability. Additionally, we find that a rise in mothers' self-esteem improves children's reading abilities.

Key Words: Childhood development; Home environment, Mothers' self-esteem; Instrumental variables; Orthogonalization.

JEL classification: C26, J13, J24

Compliance with ethical standards:

We hereby declare that this analysis was not funded by any public or private entity. We also declare that this study does not involve any conflict of interest.

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1. Introduction

In 1966, James Coleman and his colleagues emphasized the role of family in childhood development. Over half a century later, now it is well established that a healthy home environment driven by parental inputs is a necessary precondition for a child's physical and mental growth (Payne et al. 1994; Benasich & Brooks-Gunn 1996; Baharudin & Luster 1998; Strauss & Knight 1999; Evans 2004; Melhuish et al. 2008; Bernal & Keane 2011; De Haan 2011; Bharadwaj, Eberhard & Neilson 2018; Tracey & Polachek 2018). However, there is limited research on identifying effective mechanisms to improve children's home environment. We contribute to the current childhood development literature by evaluating the importance of mothers' self-esteem in shaping children's home environment during early childhood years. Our results show that mothers with higher self-esteem provide better family-level inputs that contribute to their children's cognitive and emotional development.

It is well known that a supportive home environment during early childhood has beneficial effects on children's future health and human capital outcomes.¹ In this context, Lehmann, Nuevo-Chiquero, & Vidal-Fernandez's (2016) study indicates that variations in quality of child-family interactions in terms of cognitive stimulation during early childhood years affect children's cognitive outcomes. Yet, plight of many American families has been deteriorating over the years. Heckman & Masterov (2007) observe that the proportion of American children born into or living in non-traditional families has increased since 1970. More recent statistical trends on American families suggest that about 39 percent of all children reside in single-parent

¹ See Barnett (1995); Vellutino et al. (1996); Heckman (2000); Phillips & Shonkoff (2000); Anderson et al. (2003); Cunha et al. (2006); Heckman & Masterov (2007); Cunha & Heckman (2007, 2010); Burger (2010); Heckman et al. (2012).

or no-parent families, and about one-fifth of all children live in poverty². These proportions are even higher among demographic minorities³.

Promoting mothers' self-esteem can be an effective way to improve children's home environment. Self-esteem is an important non-cognitive attribute. Individuals with higher self-esteem tend to experience positive life outcomes such as emotional satisfaction, psychological stability, success, and happiness (Fox 2000; Neiss et al. 2002; Baumeister et al. 2003; Cheng & Furnham 2003^{a,b}). Individuals with lower levels of self-esteem, on the other hand, suffer from multiple emotional and behavioral problems including anxiety, depression, aggression, delinquency, and antisocial behavior (Leary et al. 1995; Baumeister et al. 2000; Donnellan et al. 2005; Trzesniewski et al. 2006). Further, Borghans et al. (2008) discuss that personality traits (including self-esteem) are important predictors of socio-economic outcomes (income and cognitive measures). Therefore, not surprisingly the way mothers value themselves can influence their child-rearing activities as well. For example, self-competent mothers tend to engage in constructive childcare activities⁴. Mothers with high self-esteem demonstrate authoritative parenting styles⁵. Characterized by high levels of supervision, acceptance, and allowance of psychological autonomy, authoritative parenting is positively associated with children's academic progress, life satisfaction, happiness, and congenial behavior⁶. In addition to this direct effect, women with higher self-esteem tend to stay in stable marriages, thereby increasing their children's likelihood of growing up in traditional families.⁷

² Estimates obtained from Livingston (2014) and National Center for Children in Poverty (NCCP). See http://www.nccp.org/publications/pub_1170.html; Retrieved on February 26, 2017.

³ As of 2015, NCCP reports that proportion of children living in low-income/poor families exceed 60 percent for African-Americans, Hispanics, and American Indians. See http://www.nccp.org/publications/pub_1170.html; Retrieved on February 26, 2017.

⁴ See Menaghan & Parcel (1991); Aunola et al. (1999); Herz & Gullone (1999); Cheng & Furnham, (2004).

⁵ See Aunola et al. (1999); Herz & Gullone (1999) for details.

⁶ See Steinberg et al. (1989, 1992); Suldo & Huebner (2004); Milevsky et al. (2007) for details.

⁷ Research shows that women with higher self-esteem tend to share a healthy relationship with their spouse (Furnham & Cheng 2000; Baumeister et al. 2003).

Enhancing mothers' self-esteem to improve home environment conditions is a practicable policy option. A large number of studies acknowledge that early childhood interventions (e.g. family-level interventions etc.) are effective policy tools to reduce children's ability gaps across socio-economic groups.⁸ However, adoption of such interventions is often complex. Apart from costs of implementation and identification of appropriate target population, designing early childhood policies requires policymakers to be cautious of possibilities that family-level interventions may often interfere with the sanctity of a family (Heckman 2011). In this context, any intervention that improves mothers' self-esteem can be a viable policy option as it is less likely to provoke much social scrutiny. Moreover, in the past, social measures to improve women's self-esteem (commonly measured by Rosenberg self-esteem scale) have been used as an effective strategy to address discrimination against women in labor market as well as in family relationships (Hackett 1981; Cruikshank 1993; Campbell et al. 1995; Baumeister et al. 2003; Johnson & Ferraro 2000; Groves 2005)⁹. Given the historical evidence on socio-economic viability of programs to enhance people's self-esteem (Gagnon et al. 1997; Sweet & Applebaum 2004; Howard & Brooks-Gunn 2009), the current study analyzes whether adoption of measures to improve mothers' self-esteem can be considered as an alternative policy option to promote children's home environment conditions. Appropriateness of such interventions however relies on mothers' self-esteem having a positive and causal influence on children's home environment. However, in practice, identification of this causal link faces several empirical challenges.

⁸ For example, the projected benefit of a dollar invested in Perry Pre-school Project participants is estimated to be 5.7 dollars (in estimated benefits) through the age of 27 and 8.7 dollars for the remainder of the participants' lives (Heckman 2000).

⁹ An example of a large-scale self-esteem promoting program is the California Task Force to Promote Self-esteem and Personal and Social Responsibility Records (1986-1990). See details in <http://pdf.oac.cdlib.org/pdf/csa/selfesteem.pdf>; Retrieved on August 9, 2017.

The first threat to identification of the causal impact of mothers' self-esteem using ordinary least squares (OLS) regressions arises from the possible omission of relevant variables that are correlated with mothers' self-esteem (such as unobserved abilities, motivation, etc.). The second major challenge arises from the risk of reverse causality, as unfavorable home conditions can adversely affect mothers' self-esteem (Elliott 1996; Nosek et al. 2003). So far, the studies that evaluate relationship between mothers' self-esteem and child outcomes may suffer from these identification issues. Even though the existing studies find that mothers' self-esteem is positively associated with children's home environment¹⁰ and their psychological well-being, it is possible that the estimates from these studies are biased and inconsistent.

A commonly known solution to the above identification problem is the use of instrumental variables (IV). We follow a similar empirical strategy in this paper. We match mothers' information from the original cohort in the National Longitudinal Surveys of Youth 1979 (NLSY79) with their biological children's data from the National Longitudinal Survey of Child and Young Adult (NLS-CYA). The NLSY79 documents respondents' self-esteem scores for three survey years only (1980, 1987, and 2006). Since the ongoing biennial surveys of NLS-CYA commenced in 1986, we use self-esteem scores reported in 1987 (*SE87*) and in 2006 (*SE06*) surveys (NLSY79) to construct measures of mothers' self-esteem. We adopt an interpolation method by which we allow our key explanatory variable to account for time variations in individuals' self-esteem. Because self-esteem is a rank order-preserving trait, self-esteem scores reported in 1980 survey of NLSY79 (*SE80*) is expected to be correlated with any subsequent self-esteem measures, thereby making it a potential source of information to construct valid instruments for future self-esteem (Drago 2011; Tang and Baker 2016). Moreover, validity of *SE80* as an instrumental variable for future self-esteem scores relies largely on the assumption that the unobserved shocks that affect home environment in 1986 or

¹⁰ See Menaghan & Parcel (1991); Garrett et al. (1994); Surkan et al. (2008) for details.

later are uncorrelated with *SE80*. Conceivably relying on this conjecture, two recent empirical studies have used 1980's self-esteem scores as an instrument for self-esteem scores reported in future survey years in the NLSY79 (Drago 2011 for *SE87*; Tang & Baker 2016 for *SE06*).¹¹ However, estimation of exactly identified models, as performed in the aforementioned studies, restricts researchers' to provide statistical evidence in support of exclusion restriction and hence the causal interpretation of the IV estimates. For example, De Araujo & Lagos (2013) discuss some of the potential empirical concerns with Drago's (2011) empirical approach. As noted earlier, self-esteem (a personality trait) can be endogenously determined by unobserved characteristics (such as motivational attitude) that can also affect home environment (Ryan et al. 1994; Bansal et al. 2006; Muola 2010). Serial correlation across these unobserved influences over time shall confute the excludability assumption of *SE80* as an IV for future self-esteem scores (*SE87* or *SE06*).

To circumvent this issue, we adopt a novel approach, which allows us to verify the validity of our instrumental variables (IV) by conducting Sargan-Hansen overidentification test for excludability. In particular, we decompose *SE80* into two components using Gram-Schmidt orthogonalization technique (Golub & Van Loan 1996), which are further employed in our analysis as instruments. The availability of more than one instrument allows us to test for the joint validity of these instruments using the Sargan-Hansen test. As will be shown later, we find no statistically significant evidence of violation of the excludability assumption in our primary analysis.

We assess the impact of mothers' self-esteem on children's home environment via OLS as well two-stage least squares (2-SLS) regressions. The NLS-CYA incorporates measures of

¹¹ Instrumental variable estimation in Drago's (2011) study is motivated from the possibility that self-esteem scores in NLSY79 are likely to suffer from attenuation bias. Tang & Baker (2016) use instrumental variable regressions (using 1980's self-esteem scores as an instrument) to perform empirical test for endogeneity in 2006 self-esteem measures. Tang & Baker (2016) further finds that controlling for relevant individual-specific information can reduce endogeneity in self-esteem scores.

children's home environment quality by Home Observation Measurement of the Environment-Short Form scores (HOME-SF). The HOME-SF score is estimated based on survey responses on child-family interactions and can be further classified into cognitive stimulation scores and emotional support scores in NLS-CYA. The 2-SLS results suggest that mothers with higher self-esteem are able to provide significantly better home environment to their children. In particular, a one-standard deviation increase in mothers' self-esteem is related to 0.1-standard deviation increase in HOME-SF as well as cognitive stimulation scores and 0.4-standard deviation increase in emotional support score for children belonging to 0-2 year age group (infants). Further, for children aged 3-5 (preschoolers), we find that a one-standard deviation increase in mothers' self-esteem score is related to a 0.1-standard deviation increase in each of the three home environment scores. Estimation of standardized regressions indicates that effects of mothers' self-esteem are largely comparable to potential effects of important cognitive traits (measured by mothers' schooling and aptitude scores). The statistically insignificant Sargan-Hansen statistic values estimated from the 2-SLS regressions provide empirical support to the causal interpretation of our IV-regression estimates of interest.

Repeating the analysis across various education and income groups provides useful insights into important policy implications of our analysis. In particular, we find that mothers' self-esteem has large positive effects on children's home environment qualities (especially for preschoolers) for less educated mothers, mothers belonging to poor families, and African-American mothers. These policy-relevant findings are useful in identifying the target group where interventions to improve mothers' self-esteem can be more effective. Our regression estimates are robust to the inclusion of multiple sensitivity checks (discussed in the paper).

2. Data and descriptive information

2.1 The National Longitudinal Surveys

The dataset used in this analysis is prepared by linking mothers from the original cohort of the NLSY79 with their biological children from the NLS-CYA. The NLSY79 includes a nationally representative sample of 12,686 individuals who were born between 1957 and 1964. Based on responses from the children and their mothers, the biennial NLS-CYA documents a wide range of child-level information including data on health, education, family interactions, and demographic characteristics. Based on the survey years of NLS-CYA, our study period is comprised of even-numbered years starting from 1986 through 2012. The unit of observation is child-mother-year. As the NLS-CYA does not incorporate a random sample of child population, we apply child sample weights provided by the NLS-CYA for all calculations and estimations.

We utilize three NLS-CYA measures of home environment quality as dependent variables in our analysis. The HOME-SF raw score is a broad measure of children's home environment quality, which is constructed (by NLS-CYA) from a wide range of survey variables including information on child-family interactions and household characteristics (Bradley and Caldwell, 1984). In general, HOME-SF raw score can be viewed as a composite measure of maternal and family-level inputs that determine children's home environment. It is important to note, that the survey variables used to estimate the HOME-SF raw scores vary by children's age groups (see Appendix Table A.1 and Table A.2).¹² As the primary focus of our study is on early childhood years, we consider two separate child samples of infants and preschoolers for our main analysis. Additionally, depending on the functionality of the survey information, NLS-CYA further classifies the HOME-SF raw score into cognitive stimulation and emotional support scores.

¹² The NLS-CYA reports separate HOME-SF raw scores for children belonging to age groups: 0-2 years, 3-5 years, 6-9 years, 10 years and above. The age-specific information used to construct the HOME-SF raw score restrict the scores' comparability across different child age groups.

Additionally, we supplement our analysis by analyzing whether mothers' self-esteem is related to children's cognitive measures during later childhood years. Considering sample of children aged 6-14, we utilize their standardized scores in Peabody Individual Achievement Tests (PIAT) as cognitive indicators. In particular, we use children's PIAT scores in mathematics, reading recognition, and reading comprehension as dependent variables.

Individuals' self-esteem scores reported in the NLSY79 are calculated based on a 10-item questionnaire designed by Rosenberg (1965) (see Appendix Table A.3). To ensure comparability of self-esteem scores across time, we utilize the Item Response Theory (IRT) scores of mothers' self-esteem (MSE) to construct our key explanatory variable for regression analyses. A practical concern with NLSY79 data is that the self-esteem scores are reported for only three survey years (1980, 1987 and 2006). Given our study period, we try to maximize the number of observations for our analysis (to allow for smaller confidence intervals of regression estimates) using mothers' self-esteem scores in 1987 and 2006 (MSE_{87} and MSE_{06}). This is achieved by performing interpolation. For NLS-CYA years between 1988 and 2006 (both years inclusive), we use MSE_{87} and MSE_{06} to compute study year-specific measures of mothers' self-esteem given by:

$$MSE_{year} = \frac{(2006 - Year)}{19} MSE_{87} + \frac{(Year - 1987)}{19} MSE_{06} \quad (1)$$

where MSE_{year} is the interpolated measure of mothers' self-esteem. As in equation (1), MSE_{87} and MSE_{06} are weighted by the relative time gap between a survey year (of interest) and years 2006 and 1987, respectively. This allows the computed measure of mothers' self-esteem to be regulated by a survey year's proximity to the self-esteem score-reporting years. For the years prior to 1987 (only 1986), we use MSE_{87} and for years following 2006 (i.e. 2008, 2010, and

2012), we use and *MSE06* as measures of mothers' self-esteem.¹³ Based on Trzesniewski et al.'s (2003) study, interpolation of self-esteem scores (as represented by equation (1)) to replace missing information may generate an imperfect measure of self-esteem, which is likely to be identified with measurement errors. To address this concern, we limit our sample size to survey years, which are adjacent to the self-esteem score-reporting years (1986, 1988, 2004, 2006, and 2008) and consider only the reported measures of mothers' self-esteem scores as the key explanatory variable. This allows us to compare estimated regression coefficients from the main analysis with the estimates obtained from the limited sample analysis (discussed later in the paper).

Further, to minimize omitted variable biases, we include a number of relevant child-, mother-, and family-specific characteristics. Child characteristics include binary indicators for sex, age, race, and ethnicity. Mother's aptitude and cognitive and non-cognitive abilities are captured by Armed Forces Qualification Test scores (AFQT), schooling, Pearlin mastery scores, and Rotter scale for locus of control. In addition, we control for indicators of mothers' health (measured by body mass index and self-assessed health indicators), age, and dichotomous indicator for being married. Finally, at the family-level, we control for family size (number of household members) and family's poverty status (binary indicator).

2.2 Descriptive statistics

Table 1 presents descriptive information of all the variables used in our analysis. We further classify the information by the respective analysis samples based on child age groups.¹⁴ Focusing on measures of home environment quality of infants, the sample average of HOME-SF (assessed on a maximum scale of 200), cognitive stimulation, and emotional support raw

¹³ The regression estimates do not vary if the study period is restricted to 1988-2006 only.

¹⁴ The descriptive statistics presented in Table 1 are based on the largest sample used in our study for each child age group.

scores are 140.0, 67.9 and 72.7, respectively. For preschoolers, the sample average of HOME-SF (assessed on a maximum scale of 300), cognitive stimulation, and emotional support raw scores are 204.7, 117.3, and 87.9, respectively. With respect to later childhood cognitive outcomes, the standardized PIAT scores in math, reading recognition, and reading comprehension are 102.4, 104.9, and 100.7, respectively.

Second, mothers' self-esteem (IRT scores) across reported years exhibit substantial variations. In particular, the IRT scores of self-esteem (across child age group samples) vary between 468.6 and 471.1 in 1980; 494.2 and 497.3 in 1987; and, 498.9 and 501.2 in 2006. Based on the sample of infants, the coefficient of variations in reported self-esteem scores in 1980, 1987, and 2006 are 0.17, 0.17 and 0.18, respectively. These estimates are comparable to coefficient of variation estimates in mothers' schooling (0.18).

< Insert Table 1 here >

Figure 1 provides a graphical representation of association between measures mothers' self-esteem (in percentiles) and children's home environment qualities. The figure indicates that *MSE* is positively associated with all three measures of home environment conditions regardless of children's age group. Further, in Figure 2, we plot children's later cognitive outcomes (measured in terms of standardized PIAT scores in math, reading recognition and reading comprehension) against mothers' self-esteem measures (in percentiles). The positive association indicates that mothers' self-esteem is likely to continue having beneficial impact on children's cognitive outcomes even during later years.

<Insert Figure 1 & 2 here >

3. Empirical Framework

Our goal is to understand the relationship between mothers' self-esteem and children's home environment quality. In this context, the ordinary least squares regression equation is represented by:

$$Y_{ijt} = \beta_0 + \beta_1 MSE_{jt} + C'_{ijt}\beta_2 + M'_{jt}\beta_3 + F'_{jt}\beta_3 + \varepsilon_{ijt} \quad (2)$$

where Y_{ijt} is child i 's (born to mother j) home environment score at time t . MSE_{jt} is the measure of mother's self-esteem at time t .¹⁵ The coefficient β_1 is the parameter of interest that captures the relationship between mother's self-esteem and child's home environment. C , M , and F represent vectors of child-, mother-, and family-specific characteristics, respectively. Finally, ε_{ijt} includes the overall effect of omitted variables as well as unpredictable shocks and measurement errors.

As previously noted, identification of β_1 from (2) faces some empirical challenges. First, omission of unobserved determinants of home environments that are correlated with mothers' self-esteem may produce biased and inconsistent OLS estimates. Second, in many instances mothers' non-cognitive traits are influenced by their home environment conditions. This reverse causality may also produce biased and inconsistent estimate of the effects. Finally, as discussed in the previous section, interpolated self-esteem scores are likely to measure mothers' self-esteem with some errors which may also produce biased and inconsistent estimate of the causal effects.

3.1 Identification strategy

In order to separate the effect of mothers' self-esteem from other confounding influences, we adopt an augmented instrumental variable approach. The novelty of this approach is that it decomposes a potential instrumental variable into two instrumental variables, thereby allowing

¹⁵ See section 2.1.

us to perform a statistical test to verify the validity of the excludability assumption. In exactly identified models such statistical testing would not be possible.

Our procedure to generate these instruments rely on an important feature of the National Longitudinal Surveys. Self-esteem is a rank-preserving stable personality trait. Individuals who possess higher self-esteem in early life tend to exhibit higher self-esteem during later years as well. As the correlation coefficients in Table 2 indicate, our data supports this assertion. Since the main explanatory variable is constructed from *SE87* and *SE06*, it is expected that *SE80* would be correlated with our constructed self-esteem variable as well. This partially verifies the relevance criterion.

Table 2
Correlation between self-esteem scores

IRT scores	Self-esteem 1980	Self-esteem 1987	Self-esteem 2006
Self-esteem 1980	1.000	-	-
Self-esteem 1987	0.451	1.000	-
Self-esteem 2006	0.311	0.362	1.000

Note: The above table reports weighted (by child sample weights) Pearson correlation coefficients.

Further, self-esteem scores of 1980 are measured six years prior to the commencement of the NLSY-CYA (1986). Therefore, considering that future life events do not affect predetermined outcomes, 1980's self-esteem scores are likely to satisfy excludability assumption of an instrumental variable (see Wooldridge 2009; Drago 2011; Tang & Baker 2016). However, estimating IV regressions using predetermined values of an endogenous variable does not guarantee the validity of excludability assumption. For instance, if the regression errors are serially correlated, *SE80* may be correlated with the regression error terms in the later years. To alleviate this difficulty, Wooldridge (2009) recommends using distant lags of the endogenous variable rather than using values from the immediate past, which in our context varies from 6 to 32 years. Nonetheless, as discussed in the next section, instrumenting with lagged values of endogenous variables may still suffer from empirical concerns.

3.2 Decomposing SE80 into two components and testing for exclusion restrictions

The argument based on the long lag of *SE80* (relative to our study period) at best provides a partial support in favor of the exclusion restriction assumption. However, a statistical test of the assumption requires at least another instrument that is not easy to identify in the data. As an empirical solution, we decompose *SE80* into two components. Because these components jointly contain all information about *SE80* (previously utilized in the literature as an IV for future self-esteem measures), the Sargan-Hansen test of overidentifying restrictions can be used to statistically verify the joint validity of the instruments.

The first step of our decomposition procedure employs a modified Gram-Schmidt orthogonal transformation technique (Golub & Van Loan 1996)¹⁶ to estimate three orthogonal variables for the three NLSY79 self-esteem scores. This transformation requires the self-esteem measures to be linearly independent, which can be verified from Table 2. Given that the three self-esteem scores in NLSY79 are measured in years mutually distant from each other, it is likely that the measures are linearly independent due to unrelated time-varying shocks.

We begin with *SE06* such that the corresponding orthogonal vector z_{06} has similar information as *SE06*.

$$z_{06} \equiv SE06 \quad (3)$$

The second component, which is of the main interest to our study, requires the projection of *SE80* on *SE06* ($Proj_{z_{06}}(SE80)$) to be subtracted from *SE80*. This generates the orthogonal vector z_{80} as:

$$z_{80} = SE80 - Proj_{z_{06}}(SE80) = SE80 - \frac{\langle SE80, Z_{06} \rangle}{\|z_{06}\|^2} Z_{06} \quad (4)$$

¹⁶ This technique is often used in regressions that incorporate highly collinear variables as covariates. In orthogonalization of variables, the ordering of the variables (for which orthogonal variables are constructed) is important as each orthogonal variable removes the effect of preceding variable. See Sribney (1998).

Although not germane to our analysis, the final orthogonal vector z_{87} is estimated by:

$$z_{87} = SE87 - Proj_{z_{06}}(SE87) - Proj_{z_{80}}(SE87) \quad (5)$$

Finally, the three orthogonal vectors are normalized to obtain:

$$Orth_{06} = \frac{z_{06}}{\|z_{06}\|} ; Orth_{80} = \frac{z_{80}}{\|z_{80}\|} ; Orth_{87} = \frac{z_{87}}{\|z_{87}\|} \quad (6)$$

A few properties of $Orth_{80}$ is noteworthy. First, the variable is highly correlated to $SE80$ (correlation coefficient equals 0.94). Second, by construction $Orth_{80}$ is uncorrelated to $Orth_{06}$ and hence, with $SE06$. Third, based on the sequence of the variables, we do not impose any such restriction on the correlation between $Orth_{80}$ and $SE87$, as computation of $Orth_{80}$ does not involve $SE87$ (see equation (4)). More specifically, we allow the correlation between $Orth_{80}$ and $SE87$ to be driven by the underlying data generating process.

In the next step, using the NLSY79 sample (of all individuals), we regress $SE80$ on $Orth_{80}$ and estimate:

$$SE80_j = \alpha_0 + \alpha_1 Orth_{j80} + \eta_j \quad (7)$$

By estimating equation (7), we decompose $SE80$ into two variables $Inst_{1i}$ and $Inst_{2i}$ such that:

$$Inst_{1j} = \hat{\alpha}_0 + \hat{\alpha}_1 Orth_{j80} \quad (8.1)$$

$$Inst_{2j} = \hat{\eta}_j = SE80_j - (\hat{\alpha}_0 + \hat{\alpha}_1 Orth_{j80}) \quad (8.2)$$

$Inst_{1j}$ and $Inst_{2j}$ constitute our two instruments, which we use later in all our IV regression analyses. Estimation of overidentified models using the two IV's now allows us to empirically test whether both these instruments jointly satisfy the excludability assumption in our analysis.¹⁷ If any of the two IV's fails the exclusion restriction criterion, we may conclude that

¹⁷ An additional concern with employing $Inst_{1j}$ as one of the instruments is that by construction, the variable is uncorrelated with our key explanatory variable for survey years 2006 onwards (see our discussion following equation (1)). Limiting our study period to 1986-2005, we find that the results are similar to the estimates obtained

$SE80$ is correlated with the error term. As the regressions in the next section show, both $Inst_{1i}$ and $Inst_{2i}$ are found to be jointly uncorrelated with the error term at the 10 percent level of statistical significance. It is important to note however, that identification of effects of mothers' self-esteem relies on variations in our instrumental variables across mothers, but does not rely on the variations among children of the same mothers.

The first stage of the 2-SLS regressions estimated in our analyses is represented by:

$$MSE_{ijt} = \gamma_0 + \gamma_1 Inst_{1j} + \gamma_2 Inst_{2j} + C'_{ijt}\gamma_2 + M'_{jt}\gamma_3 + F'_{jt}\gamma_3 + e_{ijt} \quad (9)$$

The standard errors in all our regressions are clustered on the mothers. Further, we estimate weighted regressions using child sampling weights provided by the NLS-CYA.

4. Results

4.1 Mother's self-esteem and home environment qualities during early childhood

In Tables 3 and 4, we report OLS and IV regression estimates of relationship between mothers' self-esteem and children's home environment measures for infants (aged 0-2) and preschoolers (aged 3-5), respectively.

< Insert Tables 3 & 4 here >

In Table 3, both OLS and IV estimates suggest that increase in MSE is positively related to infants' home environment quality. As per the OLS results, on average, a one-unit increase in the self-esteem measure is associated with an increase in HOME-SF, cognitive stimulation, and emotional support scores by 0.020, 0.013, and 0.007 units respectively, *ceteris paribus* (see columns 1-3). The OLS regression coefficients are statistically significant at the 1 percent level for the HOME-SF and cognitive stimulation scores, and at the 10 percent level for emotional

in our primary analysis. Further, the associated Sargan-Hansen overidentification statistic values are statistically insignificant across all the home quality measures.

support score. The 2-SLS regression yields (columns 4-6) similar but marginally larger effects. In particular, on average, a one-unit rise in *MSE* is related to 0.026, 0.018, and 0.008-unit increases in HOME-SF, cognitive stimulation, and emotional support scores respectively, *ceteris paribus*. The IV estimates are statistically significant at the 5 percent level for HOME-SF score and at the 1 percent level for cognitive stimulation score.

Regression estimates reported in Table 4 indicate that *MSE* has a larger impact on preschoolers' home environment. With respect to the OLS estimates, a unit rise in *MSE* is associated with 0.035, 0.019, and 0.014-unit increases in corresponding HOME-SF, cognitive stimulation, and emotional support scores, *ceteris paribus*. Further, based on the 2-SLS estimates, we find that a one-unit increase in *MSE* prompts 0.040, 0.018, and 0.021-unit increases in HOME-SF, cognitive stimulation, and emotional support scores, respectively. All the regression estimates in the Table 4 are statistically significant at the conventional levels.

As noted earlier, causal interpretation of the 2-SLS estimates reported in Tables 3 and 4 is conditional on the IV's satisfying the relevance and exclusion restriction assumption. To examine the relevance criterion, we first present our results from the first stage regressions in Table 5. We observe that the first-stage F-statistic values are large, regardless of children's age groups (ranging from 324.62 to 511.06). Moreover, the estimated effects of both the instruments on *MSE* are statistically significant at the 1 percent level. These findings indicate that the instruments are strong and explain substantial portion of the variance of *MSE* around its mean.

< Insert Table 5 here >

To assess the second criterion (i.e. exclusion restriction), we rely on Sargan-Hansen test statistic estimated from the overidentified models. The null hypothesis of this test evaluates whether the excluded instruments are uncorrelated with error terms in the analysis sample. For

both the child samples (infants and preschoolers), the Sargan-Hansen χ^2 values (presented at the bottom of Tables 3 and 4) are statistically insignificant at the 10 percent level across all the dependent variables. This implies that the instruments used in our analysis are unlikely to be correlated with the regression error terms.

The results above indicate that *MSE* has a positive impact on children's home environment. However, the magnitude of the estimates does not have any economic interpretation, as the outcome variables as well as the measure of mothers' self-esteem (being indices) do not have any natural metrics of measurement. As such, to gain a more intuitive understanding of the regression estimates of interest reported in Tables 3 and 4, we perform standardized IV regressions. The advantage of this exercise is that it allows us to compare effects of mothers' self-esteem with potential effects of other important maternal characteristics that can affect children's home environment qualities (e.g. schooling, aptitude, and additional measures of non-cognitive traits).

Figure 3 provides a graphical representation of the estimated beta-coefficients from our standardized regressions. We find that a one-standard deviation increase in *MSE* leads to a approximately 0.1-standard deviation increase in HOME-SF as well as cognitive stimulation scores and 0.4-standard deviation increase in emotional support score for infants. Among the preschoolers, a one-standard deviation increase in mothers' self-esteem leads to a 0.1-standard deviation increase in all three measures of home environment quality.

Further, for infants, *MSE* has a larger impact than alternative measures of mothers' cognitive and non-cognitive characteristics with respect to HOME-SF and cognitive stimulation scores. However, when a child reaches preschool age, mothers' cognitive characteristics appear to catch-up with the effects of *MSE*. However, the estimated beta coefficients on the additional cognitive and non-cognitive measures (schooling, AFQT scores, Rotter and Pearlin Mastery

scales) presented in Figure 3 may not represent causal relationships as we have not accounted for possible endogeneity in those variables.

To see if our results hold across alternative estimation techniques, we estimate Two-Step Generalized Method of Moments (GMM) and Limited Information Maximum Likelihood (LIML) models. We present GMM and LIML estimates in Appendix Table A.4 (infants) and Table A.5 (preschoolers). The regressions estimates under both the empirical specifications are qualitatively similar to the estimated coefficients obtained from the 2-SLS regressions (reported in Table 3 and Table 4).

4.2 Exploring heterogeneity in mothers' socio-economic and demographic characteristics

Next, we replicate our analysis to assess the effects of mothers' self-esteem on children's home conditions by classifying our sample by mothers' education level, poverty status, race, and ethnicity. Results from this empirical analysis may provide useful insights into identifying the particular subpopulation who may receive larger benefits from adoption of social measures to improve mothers' non-cognitive abilities. We present our results for infants and preschoolers in Tables 6 and 7 separately.

< Insert Tables 6 & 7 here >

Classifying our sample by mothers' schooling, regression estimates show that change in *MSE* has a bigger impact on children's home environment with respect to mothers who never went to college. This result holds for both infants and preschoolers (Panel A; Tables 6 and 7). However, for mothers with college education, the effects of *MSE* on home environment are statistically insignificant. The insignificant results for educated mothers could be due to their higher levels of labor market commitments. In addition, considering that educated families tend to have better home conditions to begin with, it is also possible that the marginal benefit of

mothers' self-esteem decreases at higher levels of home environment qualities. Our findings are consistent with the studies on relationship between mother's employment and early childhood development (Baydar and Brooks-Gunn, 1991; Brooks-Gunn et al. 2002; Baum II, 2003; Bernal, 2008). With respect to emotional support score for infants, the Sargan-Hansen statistic is statistically significant at the 5 percent level for mothers with no college education. This indicates the instruments for this specific subpopulation may suffer from omitted variable biases, which is likely due to the presence of a serial correlation between unobserved heterogeneities over time that affect individuals' self-esteem.

Panel B in Table 6 and Table 7 report estimated effects of mothers' self-esteem across poor and non-poor families. Although regression coefficients for poor families in both the child age groups are larger than non-poor families, self-esteem measures of poor mothers appear to have a statistically significant relationship only with HOME-SF scores for preschoolers (column 1; Table 7) and cognitive stimulation scores for infants (column 2; Table 6). Both the effects are statistically significant at the 10 percent level. In comparison, non-poor mothers have stronger impacts on children's home conditions across both the groups. More specifically, while effects of mothers' self-esteem in non-poor families is significantly related to HOME-SF and cognitive stimulation scores at the 10 percent level for infants, the regression coefficients across all three home quality scores are statistically significant at least at the 5 percent level for preschoolers. These results indicate that the economic conditions are likely to play an important role in determining the effectiveness of maternal characteristics on children's well-being.

In general, our findings in Panels A and B in Table 6 and Table 7 suggest that self-esteem-augmenting interventions aimed at disadvantaged families (characterized by lower education and economic conditions) are likely to have a sizable impact in terms of parental investments towards children (especially for preschoolers).

Further, we study the effects of mothers' self-esteem by race and ethnicity. Regression estimates reported in Panel C of Table 6 and Table 7, suggest that increase in mothers' self-esteem has much larger (more than twice) and statistically significant impact on children's home environment quality (in terms of HOME-SF scores) in African-American families compared to their comparable group. However, results presented in Panel D of Table 6 and Table 7 indicate that compared to Hispanic mothers, non-Hispanic mothers have stronger influences on family-level childcare investments.

4.3 Mothers' self-esteem and their parental practices

The findings above are important but beg a follow up question. What is it that the mothers with higher self-esteem do that improves the home environment? To answer this question, we select a few survey-specific measures from the NLS-CYA, which are used to construct the HOME-SF scales. In particular, based on mothers' self-reported assessments of their parenting behavior, these measures evaluate- whether mothers read stories to their children ('Reading'), whether they interact with their children while working ('Talking'), and how frequently mothers take their children along with them to grocery stores ('Grocery'). Based on the NLS-CYA's classification, we construct binary indicators for all the measures studied. We estimate linear probability models (LPM) and two-stage IV regressions for our analysis. Table 8 presents the regression results. With respect to the LPM estimates (columns 1-4), we find that mothers with higher self-esteem scores are more likely to interact with their infants (0-2 years) while performing household chores. The effect is statistically different from zero at the 1 percent level. However, the IV regression estimates suggest that a unit increase in a mother's self-esteem score leads to a 0.07 percent increase in the probability that she frequently takes her child to grocery stores (column 6) and 0.02 percent increase in the probability that she interacts with her child while performing household activities (column 7). Both the estimates are statistically significant at the conventional levels. The insignificant coefficients on reading

in the IV regressions indicate that childcare responsibilities can be subject to division of labor among adult family members. We find that Sargan-Hansen test statistics support the validity of our instruments.

< Insert Table 8 here >

4.4 Mothers' self-esteem and school-age children

So far, our analysis has assessed the impact of mothers' self-esteem on early childhood home environment. Based on the results discussed in the previous section, we expect that the effects of higher levels of maternal self-esteem can be realized through better child outcomes (such as cognitive abilities). To evaluate this indirect link (the mediation via improvement in home environment), we analyze the relationship between mothers' self-esteem and cognitive outcomes of school-age children (6-14 years).

Table 9 reports the OLS and the IV regression estimates with respect to children's cognitive outcomes measured in terms of standardized PIAT scores in math, reading recognition and reading comprehension. The results from OLS regressions (columns 1-3) show that there is a significant relationship between mothers' self-esteem and children's test scores in reading comprehension (statistically significant at the 10 percent level). Moreover, the 2-SLS regression estimates suggest that mothers' self-esteem scores are positively related to test scores in reading comprehension and reading recognition (columns 5-6). In particular, a unit increase in mothers' self-esteem scores results in 0.007 unit increase in each of the reading test scores. Based on the positive association between reading abilities and vocational expectations (Creed et al. 2007), the results suggest that mothers' self-esteem is likely to be linked to better future human capital outcomes. The effects are small but significantly different from zero at least at the 10 percent level. Further, the χ^2 values with respect to overidentification tests remain statistically insignificant across all the three test scores.

< Insert Table 9 here >

4.5 Additional robustness checks – Limited sample analysis

The scope of our analysis, presented in the previous sections, is likely to be restricted by the data limitations in the NLSY79. Since the NLSY79 does not report self-esteem scores for all the years in our study period, our study relies on interpolated measures of reported self-esteem scores. Therefore, although our primary analysis provides useful evidence on the importance of mothers' self-esteem during early childhood, it can be argued that the magnitude of the estimates may not represent the true impact mothers' self-esteem. To further verify this, we restrict our analysis samples to NLS-CYA survey years that are at a close proximity to the self-esteem score-reporting years in NLSY79. Considering that self-esteem scores reported in a particular survey year represents respondents' self-esteem levels during adjacent years as well (i.e. years immediately prior to and next to the year of interest), we particularly focus on six years from our study period. More specifically, given the biennial nature of NLS-CYA, we construct our explanatory variable of interest (mothers' self-esteem scores) in a way such that *MSE87* corresponds to home quality scores reported in 1986 and 1988 (NLS-CYA) surveys and *MSE06* corresponds to 2004, 2006, and 2008 home quality scores. Replicating our primary regressions using the restricted sample shall now allow us to estimate the impact of mothers' self-esteem using observed measures.

Table 10 reports estimated coefficients of interest obtained from the 2-SLS regressions for both infants and preschoolers. Not surprisingly, we find that mothers' self-esteem has statistically significant relationship (at the 1 percent level) with HOME-SF scores. For preschoolers, we do not find any significant effects for emotional support index. Once again, we observe that the Sargan-Hansen χ^2 values are statistically insignificant. Finally, comparing the regression coefficients in Table 10 with the corresponding IV estimates in Table 3 and Table 4 (columns

4-6), we find that the differences are statistically insignificant for all the dependent variables except for cognitive stimulation scores for preschoolers (significant at the 10 percent level). For preschoolers, when we consider, the effect of (more accurate measures of) mothers' self-esteem on family inputs that support children's cognitive development is comparatively larger.

< Insert Table 10 here >

5. Conclusion

To the best of our knowledge, this is the first empirical study to present a comprehensive empirical evidence on the importance of mothers' self-esteem in determining young children's home environment qualities. However, it is important to note that the study is characterized by some limitations, some of which are already noted earlier. Moreover, given that both our explanatory as well as outcome variables of interest are indexed in terms of scores, the magnitude of the regression estimates bears limited economic interpretation. To some extent, we address this issue by assessing the importance mothers' self-esteem in relation with other important cognitive and non-cognitive traits. Nonetheless, the main objective of this paper is to empirically explore whether there is a positive and causal link between mothers' self-esteem and family-level inputs provided during early childhood. Our findings provide compelling support to the expectation that a mother who values herself also values the quality of inputs provided to her children.

Further, the results obtained from our study have important policy implications. Usually early childhood interventions have focused on young children as the primary target group. The current analysis attempts to propose an alternative policy pathway that can augment the effectiveness of early childhood development programs by accounting for welfare of primary caregivers as well. Our study suggests that social programs (such as confidence-building exercises) designed to elevate mothers' self-esteem can have significant impact on childcare

investments and parental abilities. Finally, this study provides useful empirical evidence by exploring socio-economic and demographic heterogeneities among American families that can help policymakers to identify appropriate target groups for the proposed family-level social programs to be more effective and cost-efficient.

We do acknowledge the data limitations that can potentially restrict the scope of our empirical analysis. However, reliability of our findings is adequately substantiated by robust empirical support presented by multiple sensitivity analyses. In general, this study adds to the early childhood development research by demonstrating the importance of parental non-cognitive skills in child-rearing activities.

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Table 1
Summary statistics of variables

Child sample-	0-2 years Mean (SD)	3-5 years Mean (SD)	6-14 years Mean (SD)
Dependent variables			
HOME-SF score	140.010 (25.263)	204.677 (36.911)	
Cognitive stimulation score	67.871 (15.726)	117.299 (22.324)	
Emotional support score	72.744 (15.168)	87.930 (20.421)	
Reading	0.556 (0.497)	0.610 (0.488)	
Grocery	0.356 (0.479)		
Talking	0.867 (0.340)		
PIAT math score			102.369 (14.775)
PIAT reading recognition score			104.941 (15.152)
PIAT reading comprehension score			100.712 (13.892)
Mother characteristics			
Self-esteem 1980 score	471.098 (81.757)	470.398 (81.931)	468.579 (80.930)
Self-esteem 1987 score	497.273 (82.828)	495.147 (82.789)	494.223 (83.645)
Self-esteem 2006 score	500.379 (88.451)	501.189 (88.149)	498.940 (88.524)
Interpolated self-esteem score	497.069 (76.254)	495.364 (75.864)	495.714 (77.607)
Rotter scale	8.791 (2.393)	8.819 (2.397)	8.818 (2.387)
AFQT	40.959 (28.466)	39.750 (28.171)	39.536 (28.286)
Pearlin mastery scale	22.013 (3.212)	21.947 (3.208)	21.950 (3.186)
Schooling	13.031 (2.300)	12.968 (2.321)	13.153 (2.427)
Body Mass Index	25.498 (5.737)	25.801 (5.874)	27.432 (6.463)
Health	0.588 (0.492)	0.580 (0.494)	0.578 (0.494)
Age	30.662 (4.914)	32.298 (5.495)	38.762 (5.472)
Married	0.723 (0.448)	0.682 (0.466)	0.644 (0.479)
Family and school characteristics			
Family size	4.199 (1.383)	4.324 (1.404)	4.366 (1.417)
Poverty status	0.248 (0.432)	0.245 (0.430)	0.217 (0.412)
Public school			0.878 (0.327)
Child characteristics			
African-American	0.272 (0.445)	0.281 (0.449)	0.292 (0.455)
Hispanic	0.193 (0.395)	0.194 (0.395)	0.191 (0.393)
Female	0.494 (0.500)	0.493 (0.500)	0.497 (0.500)
Age	1.583 (0.937)	4.517 (0.950)	10.827 (2.363)
Sample sizes (range)	4,514-5,612	6,035-6,801	14,353-15,494

Notes: The descriptive information (mean and standard deviations (SD)) of the dependent variables are estimated based on the respective regression samples used to estimate ordinary least square models (see columns (1), (2), and (3) in Tables 3, 4, and 7). The mean and standard deviations of the covariates (including mother, family and school, and child characteristics) are based on OLS regression samples used for HOME-SF scores (for children in samples of 0-2 and 3-5 years; see column (1) of Tables 3 and 4) and PIAT math scores (for children aged 6-14; see column (1) of Table 7). Variables 'Health', 'Married', 'Poverty status', 'Public school', 'African-American', 'Hispanic', 'Female' are binary indicators. Further, information on reading ('Reading'), grocery visits with child ('Grocery'), and talking to child while working ('Talking') are recoded to binary indicators based on NLSY's methods (See details in <https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/codebook-supplement/appendix-home-sf-scales/page/0/1>; Retrieved on November 2, 2015). We also report the range (minimum-maximum) of analysis sample sizes used in our analysis for each age group of children studied.

Figure 1

Scatter plot of association between mothers' self-esteem scores and measures of children's home environment qualities (0-2 years and 3-5 years)

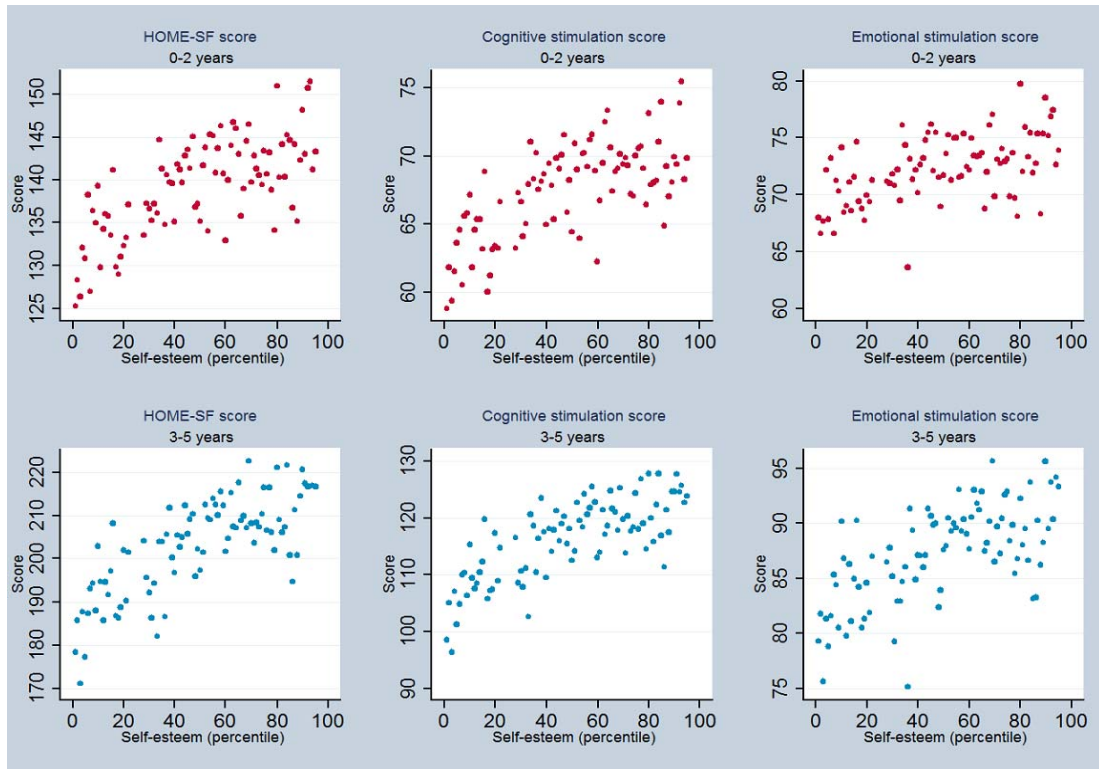


Figure 2

Scatter plot of association between mothers' self-esteem scores and measures of children's cognitive outcomes (6-14 years)

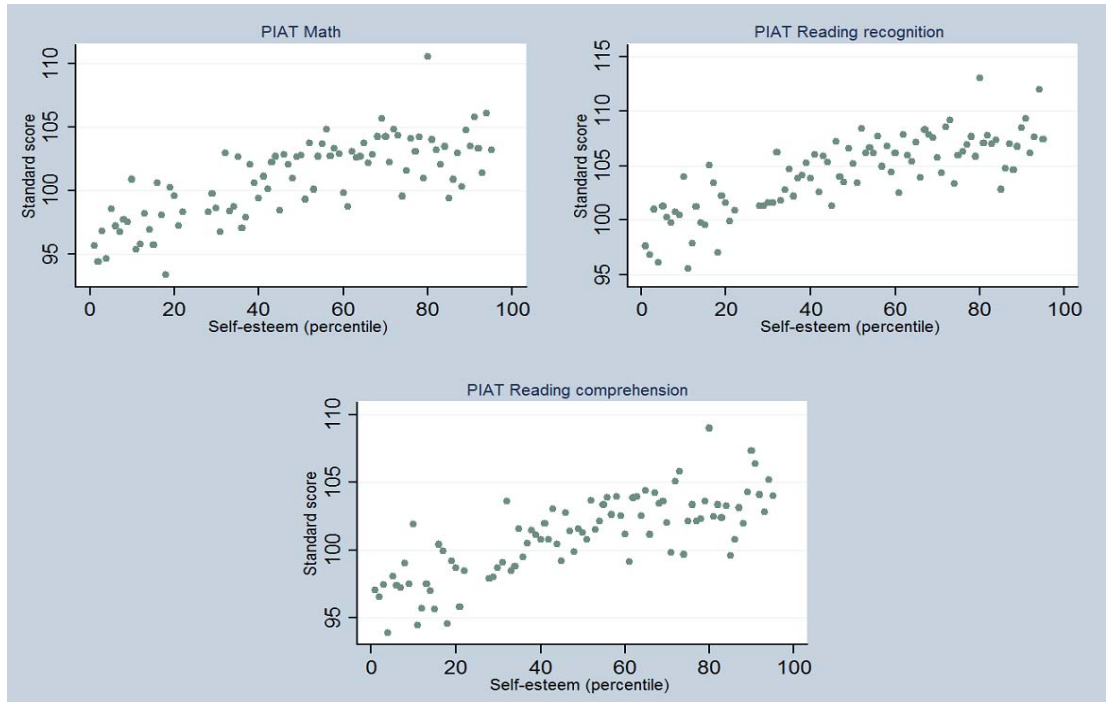


Table 3
Effects of mothers' self-esteem on children's home environment qualities
(ages 0-2 years)

Variables	Ordinary least squares			Instrumental variables estimation		
	HOME-SF (1)	Cognitive stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional support (6)
Mother's self-esteem	0.020*** (0.007)	0.013*** (0.004)	0.007* (0.004)	0.026** (0.011)	0.018*** (0.007)	0.008 (0.007)
Mother characteristics						
Rotter scale	0.109 (0.185)	0.055 (0.112)	0.064 (0.121)	0.126 (0.188)	0.058 (0.113)	0.080 (0.123)
AFQT	0.018 (0.023)	-0.000 (0.014)	0.014 (0.015)	0.017 (0.024)	-0.002 (0.014)	0.015 (0.016)
Pearlin mastery scale	0.547*** (0.167)	0.278*** (0.092)	0.269** (0.112)	0.507*** (0.176)	0.247** (0.100)	0.271** (0.117)
Schooling	0.286 (0.313)	0.155 (0.166)	0.122 (0.213)	0.247 (0.317)	0.135 (0.168)	0.105 (0.217)
Body Mass Index	-0.033 (0.075)	-0.078* (0.045)	0.062 (0.050)	-0.044 (0.075)	-0.086* (0.045)	0.060 (0.050)
Health	1.101 (0.892)	0.192 (0.561)	0.728 (0.574)	0.816 (0.910)	0.013 (0.568)	0.629 (0.584)
Age	0.422** (0.170)	0.482*** (0.073)	-0.071 (0.120)	0.439** (0.173)	0.483*** (0.074)	-0.057 (0.122)
Married	9.581*** (1.269)	3.349*** (0.799)	6.016*** (0.840)	9.572*** (1.289)	3.340*** (0.814)	5.986*** (0.851)
Family characteristics						
Household size	-1.513*** (0.408)	-1.301*** (0.222)	-0.144 (0.274)	-1.515*** (0.412)	-1.299*** (0.224)	-0.131 (0.278)
Poverty status	-2.422* (1.288)	-1.707** (0.784)	-1.168 (0.827)	-2.154 (1.331)	-1.746** (0.803)	-0.975 (0.846)
Child characteristics						
African-American	-11.712*** (1.312)	-5.983*** (0.813)	-5.765*** (0.822)	-11.982*** (1.353)	-6.088*** (0.843)	-5.854*** (0.851)
Hispanic	-6.335*** (1.315)	-4.694*** (0.775)	-1.551* (0.829)	-6.178*** (1.335)	-4.710*** (0.792)	-1.359* (0.824)
Female	2.071*** (0.689)	0.857** (0.420)	1.438*** (0.462)	2.012*** (0.697)	0.762* (0.424)	1.446*** (0.468)
Age	4.629*** (0.388)	5.450*** (0.249)	-1.248*** (0.243)	4.600*** (0.392)	5.428*** (0.252)	-1.269*** (0.245)
Observations	5,124	4,987	4,629	5,005	4,877	4,514
R-squared	0.18	0.24	0.11	0.18	0.24	0.11
F-value	52.23	67.36	30.46	49.05	64.49	28.56
Hansen J statistic				0.20	0.01	1.98
P-value (Hansen J)				0.66	0.91	0.16

Notes: Columns 1, 2, and 3 report estimated coefficients from weighted OLS regressions of measures of home environment qualities on mother's self-esteem scale, and controls for mother, family, and child-specific characteristics. Columns 4, 5, and 6 report estimated coefficients from weighted instrumental variable regressions. Robust standard errors are clustered on mother's identity and are reported in parentheses. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. *** p<0.01, ** p<0.05, * p<0.1

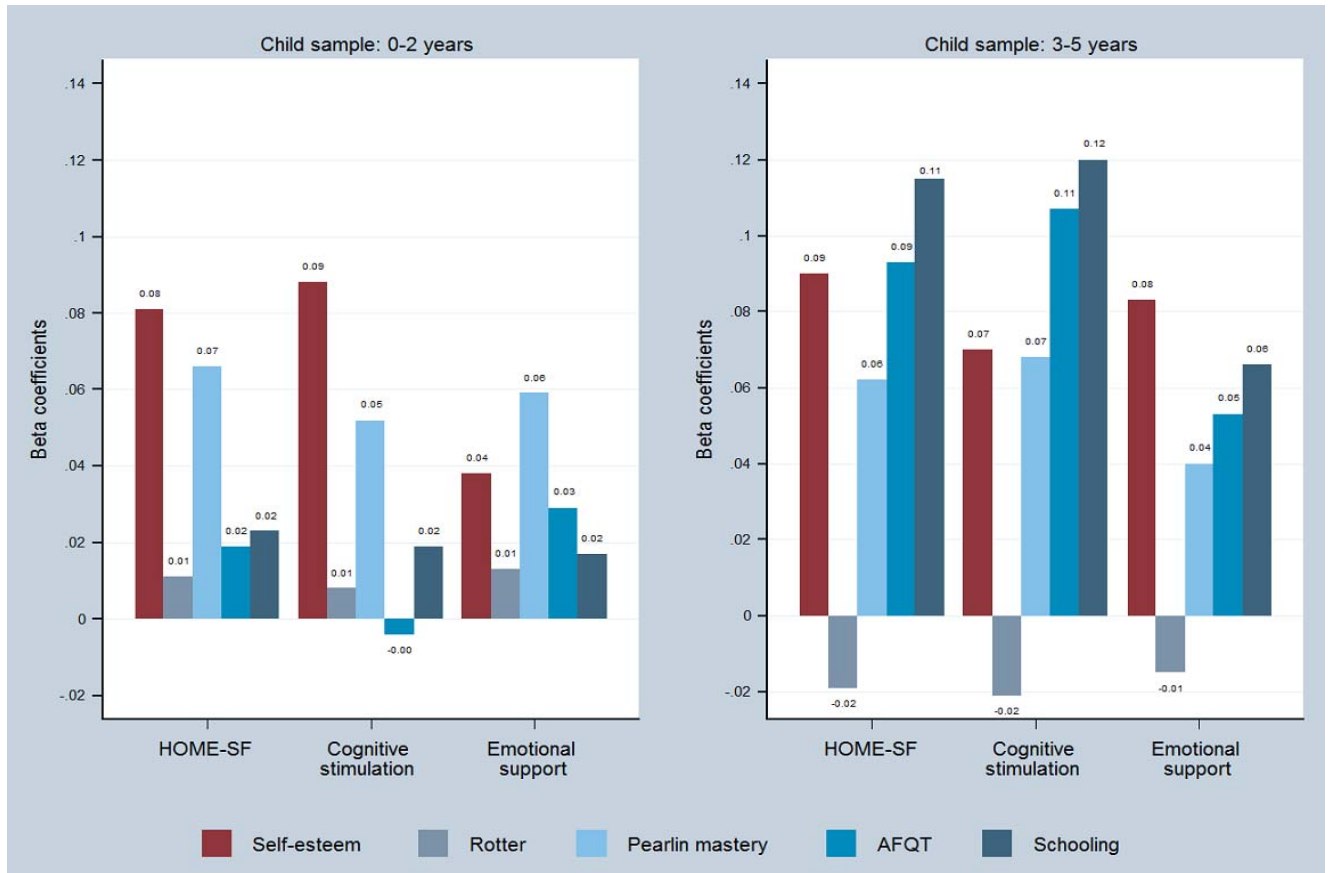
Table 4
Effects of mothers' self-esteem on children's home environment qualities
(ages 3-5 years)

Variables	Ordinary least squares			Instrumental variables estimation		
	HOME-SF (1)	Cognitive stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional support (6)
Mother's self-esteem	0.035*** (0.007)	0.019*** (0.005)	0.014*** (0.005)	0.040*** (0.012)	0.018** (0.007)	0.021*** (0.008)
Mother characteristics						
Rotter scale	-0.299 (0.219)	-0.188 (0.144)	-0.153 (0.140)	-0.253 (0.222)	-0.170 (0.146)	-0.116 (0.141)
AFQT	0.116*** (0.026)	0.077*** (0.017)	0.039** (0.016)	0.109*** (0.027)	0.075*** (0.017)	0.035** (0.017)
Pearlin mastery scale	0.666*** (0.171)	0.403*** (0.111)	0.285*** (0.107)	0.649*** (0.186)	0.418*** (0.120)	0.240** (0.118)
Schooling	1.592*** (0.266)	1.009*** (0.171)	0.515*** (0.167)	1.606*** (0.270)	1.004*** (0.173)	0.528*** (0.168)
Body Mass Index	-0.148* (0.089)	-0.118** (0.056)	-0.030 (0.056)	-0.148* (0.090)	-0.118** (0.057)	-0.028 (0.056)
Health	4.149*** (1.090)	2.256*** (0.681)	2.269*** (0.713)	4.130*** (1.121)	2.275*** (0.695)	2.219*** (0.734)
Age	1.228*** (0.106)	0.461*** (0.065)	0.753*** (0.069)	1.245*** (0.106)	0.472*** (0.065)	0.764*** (0.070)
Married	9.844*** (1.371)	2.515*** (0.956)	7.005*** (0.881)	9.760*** (1.385)	2.503*** (0.966)	6.990*** (0.888)
Family characteristics						
Household size	-2.845*** (0.422)	-1.364*** (0.299)	-1.347*** (0.248)	-2.794*** (0.430)	-1.327*** (0.304)	-1.333*** (0.251)
Poverty status	-10.703*** (1.627)	-8.506*** (1.119)	-2.616*** (0.968)	-10.511*** (1.668)	-8.495*** (1.147)	-2.358** (0.986)
Child characteristics						
African-American	-18.091*** (1.625)	-7.998*** (1.142)	-9.833*** (0.936)	-18.252*** (1.693)	-8.033*** (1.184)	-9.967*** (0.970)
Hispanic	-8.606*** (1.633)	-6.813*** (1.155)	-1.039 (0.912)	-8.245*** (1.608)	-6.465*** (1.140)	-0.898 (0.905)
Female	4.731*** (0.777)	1.950*** (0.485)	2.666*** (0.514)	4.737*** (0.784)	1.994*** (0.489)	2.623*** (0.518)
Age	1.595*** (0.344)	1.217*** (0.220)	0.530** (0.235)	1.545*** (0.346)	1.230*** (0.221)	0.441* (0.236)
Observations	6,695	6,284	6,170	6,552	6,151	6,035
R-squared	0.39	0.31	0.26	0.39	0.31	0.26
F-value	139.35	87.79	88.28	135.24	86.04	86.92
Hansen J statistic				1.50	0.24	0.95
P-value (Hansen J)				0.22	0.63	0.33

Notes: Columns 1, 2, and 3 report estimated coefficients from weighted OLS regressions of measures of home environment qualities on mother's self-esteem scale, and controls for mother, family, and child-specific characteristics. Columns 4, 5, and 6 report estimated coefficients from weighted instrumental variable regressions. Robust standard errors are clustered on mother's identity and are reported in parentheses. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. *** p<0.01, ** p<0.05, * p<0.1

Figure 3

Standardized regression coefficients - comparing effects of mothers' self-esteem with other maternal qualities



Notes: The above graph represents estimated standardized regression coefficients from two-stage regressions using specifications similar to IV models estimated for results reported in Table 3 (for 0-2 years) and Table 4 (for 3-5 years).

Table 5
First stage estimates of two-stage least squares regressions

Variables	Child sample: 0-2 years			Child sample: 3-5 years		
	HOME-SF (1)	Cognitive stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional sSupport (6)
Excluded Instruments						
Instrument1	14.155*** (1.629)	14.238*** (1.636)	14.309*** (1.672)	13.076*** (1.406)	13.161*** (1.443)	13.451*** (1.447)
Instrument2	1.602*** (0.065)	1.616*** (0.065)	1.608*** (0.066)	1.761*** (0.057)	1.756*** (0.059)	1.738*** (0.059)
Mother characteristics						
Rotter scale	-0.027 (0.676)	0.014 (0.667)	0.165 (0.680)	0.158 (0.566)	0.159 (0.582)	0.122 (0.581)
AFQT	0.282*** (0.076)	0.269*** (0.076)	0.275*** (0.078)	0.229*** (0.068)	0.223*** (0.070)	0.220*** (0.069)
Pearlin mastery scale	3.193*** (0.496)	3.177*** (0.500)	3.215*** (0.507)	2.732*** (0.445)	2.723*** (0.455)	2.775*** (0.450)
Schooling	0.797 (0.830)	0.729 (0.840)	0.939 (0.822)	0.536 (0.666)	0.470 (0.680)	0.549 (0.686)
Body Mass Index	0.050 (0.236)	0.009 (0.235)	-0.024 (0.234)	0.139 (0.185)	0.154 (0.189)	0.163 (0.192)
Health	2.387 (3.100)	2.449 (3.107)	2.294 (3.183)	5.607** (2.722)	5.509** (2.801)	5.645** (2.811)
Age	-0.161 (0.267)	-0.120 (0.269)	-0.156 (0.269)	0.187 (0.212)	0.185 (0.220)	0.090 (0.222)
Married	-2.601 (3.422)	-2.117 (3.473)	-1.820 (3.589)	3.153 (2.890)	3.582 (3.036)	3.143 (3.020)
Family characteristics						
Household size	-1.982** (0.934)	-2.135** (0.943)	-1.914** (0.933)	-1.251 (0.851)	-1.284 (0.891)	-1.032 (0.902)
Poverty status	-11.349*** (3.732)	-11.496*** (3.789)	-10.162*** (3.772)	-10.073*** (3.205)	-10.852*** (3.380)	-10.444*** (3.360)
Child characteristics						
African-American	9.866** (4.039)	9.718** (4.057)	9.214** (4.162)	9.841*** (3.452)	10.007*** (3.556)	9.618*** (3.559)
Hispanic	-5.430 (3.964)	-5.501 (3.975)	-6.673* (4.034)	-0.158 (3.321)	0.095 (3.405)	-0.482 (3.383)
Female	0.043 (1.960)	-0.183 (1.949)	0.362 (1.999)	0.191 (1.654)	0.242 (1.713)	-0.038 (1.714)
Age	-1.108 (0.795)	-1.115 (0.800)	-1.268 (0.860)	-0.063 (0.637)	-0.117 (0.666)	0.173 (0.676)
Observations	5,005	4,877	4,514	6,552	6,151	6,035
Partial F-value	332.97	334.59	324.62	511.06	483.33	476.07

Notes: Columns 1, 2, and 3 report results from the first-stage of 2-SLS regressions whose second-stage results are reported in columns 4, 5, and 6 in Table 3. Columns 4, 5, and 6 report results first-stage of 2-SLS regressions whose second-stage results are reported in columns 4, 5, and 6 in Table 4. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. Robust standard errors are clustered by mother's identity and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6
Effects of mothers' self-esteem on home environment qualities, by mothers' characteristics
(0-2 years)

	HOME-SF (1)	Cognitive stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional support (6)
Panel A						
	Less than college			College education		
Mother's self-esteem	0.028* (0.015)	0.018* (0.010)	0.008 (0.009)	0.012 (0.014)	0.010 (0.008)	0.001 (0.009)
Observations	2,784	2,704	2,517	2,199	2,153	1,976
R-squared	0.25	0.28	0.16	0.10	0.19	0.07
F-value	42.06	49.38	20.75	15.64	25.09	8.63
Hansen J statistic	1.07	0.05	6.69	0.71	0.34	0.31
P-value (Hansen J)	0.30	0.82	0.01	0.40	0.56	0.58
Panel B						
	Poor			Not poor		
Mother's self-esteem	0.045 (0.030)	0.033* (0.018)	0.010 (0.017)	0.021* (0.011)	0.013* (0.007)	0.006 (0.007)
Observations	1,229	1,184	1,122	3,776	3,693	3,392
R-squared	0.23	0.27	0.17	0.11	0.20	0.05
F-value	12.27	16.90	10.59	31.11	46.11	14.08
Hansen J statistic	2.30	0.40	5.17	0.00	0.13	0.51
P-value (Hansen J)	0.13	0.53	0.02	0.96	0.72	0.48
Panel C						
	African-American			Non-African-American		
Mother's self-esteem	0.042* (0.022)	0.034** (0.014)	0.003 (0.012)	0.021* (0.012)	0.014* (0.007)	0.007 (0.007)
Observations	1,361	1,312	1,246	3,644	3,565	3,268
R-squared	0.20	0.24	0.17	0.12	0.21	0.05
F-value	15.65	22.96	16.65	25.22	45.61	8.25
Hansen J statistic	1.00	1.39	1.27	0.05	0.16	1.43
P-value (Hansen J)	0.32	0.24	0.26	0.82	0.69	0.23
Panel D						
	Hispanic			Non-Hispanic		
Mother's self-esteem	-0.009 (0.024)	-0.005 (0.016)	-0.006 (0.015)	0.029*** (0.011)	0.019*** (0.007)	0.009 (0.007)
Observations	957	926	841	4,048	3,951	3,673
R-squared	0.11	0.22	0.08	0.18	0.23	0.11
F-value	5.85	14.80	2.98	47.47	57.53	29.34
Hansen J statistic	0.11	0.19	0.01	0.24	0.00	2.05
P-value (Hansen J)	0.74	0.67	0.93	0.62	0.95	0.15

Notes: The above table reports estimated coefficients from weighted instrumental variables regressions performed to study the relationship between measures of home environment qualities and mother's self-esteem scale for different subpopulations of mothers classified by their socio-economic and demographic characteristics. In addition, all the regressions incorporate controls for mother, family, and child-specific information depending on the subpopulation studied. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. Robust standard errors are clustered on mother's identity and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7
Effects of mothers' self-esteem on home environment qualities, by mothers' characteristics
(3-5 years)

Variables	HOME-SF (1)	Cognitive Stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional support (6)
Panel A						
	Less than college			College education		
Mother's self-esteem	0.058*** (0.019)	0.028** (0.013)	0.029** (0.012)	0.014 (0.014)	0.003 (0.008)	0.011 (0.010)
Observations	3,784	3,556	3,480	2,741	2,568	2,528
R-squared	0.36	0.28	0.25	0.22	0.17	0.15
F-value	73.23	46.07	45.16	32.10	20.85	23.37
Hansen J statistic	0.01	0.49	0.46	1.99	1.84	0.22
P-value (Hansen J)	0.93	0.49	0.50	0.16	0.17	0.64
Panel B						
	Poor			Not poor		
Mother's self-esteem	0.065* (0.035)	0.039 (0.027)	0.024 (0.021)	0.035*** (0.012)	0.014** (0.007)	0.022*** (0.008)
Observations	1,588	1,461	1,425	4,964	4,690	4,610
R-squared	0.35	0.24	0.23	0.27	0.20	0.19
F-value	32.30	22.61	16.45	81.88	45.26	59.34
Hansen J statistic	0.35	0.51	0.00	0.70	0.00	0.69
P-value (Hansen J)	0.55	0.48	1.00	0.40	0.97	0.41
Panel C						
	African-American			Non-African-American		
Mother's self-esteem	0.082*** (0.025)	0.046*** (0.016)	0.029* (0.015)	0.033** (0.013)	0.013 (0.008)	0.021** (0.008)
Observations	1,836	1,710	1,644	4,716	4,441	4,391
R-squared	0.31	0.28	0.18	0.31	0.25	0.19
F-value	31.66	26.02	15.29	72.59	49.67	41.02
Hansen J statistic	0.45	0.01	0.45	1.10	0.24	0.62
P-value (Hansen J)	0.50	0.93	0.50	0.30	0.62	0.43
Panel D						
	Hispanic			Non-Hispanic		
Mother's self-esteem	0.027 (0.032)	-0.013 (0.023)	0.013 (0.014)	0.040*** (0.012)	0.020** (0.008)	0.022*** (0.008)
Observations	1,257	1,163	1,152	5,295	4,988	4,883
R-squared	0.33	0.26	0.22	0.39	0.30	0.26
F-value	27.32	17.87	13.64	124.56	72.85	87.12
Hansen J statistic	0.41	0.00	0.49	1.68	0.19	1.21
P-value (Hansen J)	0.52	1.00	0.49	0.20	0.66	0.27

Notes: The above table reports estimated coefficients from weighted instrumental variables regressions performed to study the relationship between measures of home environment qualities and mother's self-esteem scale for different subpopulations of mothers classified by their socio-economic and demographic characteristics. In addition, all the regressions incorporate controls for mother, family, and child-specific information depending on the subpopulation studied. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. Robust standard errors are clustered on mother's identity and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8
Effects of mothers' self-esteem on selected maternal inputs used in
HOME-SF scores

Variables	Linear probability model				Instrumental variables estimation			
	Reading (0-2 years) (1)	Grocery (0-2 years) (2)	Talking (0-2 years) (3)	Reading (3-5 years) (4)	Reading (0-2 years) (5)	Grocery (0-2 years) (6)	Talking (0-2 years) (7)	Reading (3-5 years) (8)
Mother's self-esteem	0.0002 (0.0001)	0.0002 (0.0001)	0.0002*** (0.0001)	0.0001 (0.0001)	-0.0000 (0.0002)	0.0007*** (0.0002)	0.0002* (0.0001)	0.0001 (0.0002)
Mother characteristics								
Rotter scale	-0.004 (0.004)	0.002 (0.004)	0.004* (0.002)	-0.006 (0.004)	-0.005 (0.004)	0.003 (0.004)	0.004* (0.002)	-0.006 (0.004)
AFQT	0.000 (0.000)	-0.001* (0.000)	0.000* (0.000)	0.001 (0.000)	0.000 (0.000)	-0.001** (0.001)	0.000 (0.000)	0.001 (0.000)
Pearlin mastery scale	0.004 (0.003)	0.004 (0.003)	0.004** (0.002)	0.005* (0.003)	0.006* (0.003)	0.000 (0.004)	0.005** (0.002)	0.005 (0.003)
Schooling	0.020*** (0.005)	-0.020*** (0.005)	-0.007** (0.003)	0.026*** (0.004)	0.020*** (0.005)	-0.019*** (0.005)	-0.007** (0.003)	0.026*** (0.005)
Body Mass Index	-0.001 (0.002)	-0.001 (0.002)	-0.000 (0.001)	-0.001 (0.001)	-0.001 (0.002)	-0.001 (0.002)	-0.000 (0.001)	-0.001 (0.001)
Health	0.039** (0.019)	-0.020 (0.021)	-0.006 (0.011)	0.024 (0.018)	0.042** (0.019)	-0.026 (0.022)	-0.008 (0.011)	0.025 (0.018)
Age	0.014*** (0.002)	0.007*** (0.002)	0.003** (0.001)	0.011*** (0.001)	0.014*** (0.002)	0.007*** (0.002)	0.003** (0.001)	0.011*** (0.001)
Married	0.090*** (0.027)	0.003 (0.029)	0.013 (0.015)	0.059*** (0.022)	0.090*** (0.028)	-0.004 (0.029)	0.010 (0.015)	0.057** (0.022)
Family characteristics								
Household size	-0.037*** (0.007)	0.014* (0.007)	-0.017*** (0.005)	-0.034*** (0.006)	-0.038*** (0.007)	0.016** (0.007)	-0.016*** (0.005)	-0.034*** (0.006)
Poverty status	-0.020 (0.027)	0.051* (0.028)	-0.040** (0.017)	-0.028 (0.024)	-0.027 (0.027)	0.064** (0.029)	-0.043** (0.018)	-0.029 (0.024)
Child characteristics								
African-American	-0.170*** (0.027)	-0.036 (0.028)	-0.080*** (0.018)	-0.185*** (0.026)	-0.163*** (0.028)	-0.056* (0.030)	-0.082*** (0.019)	-0.183*** (0.026)
Hispanic	-0.153*** (0.026)	0.034 (0.028)	-0.060*** (0.018)	-0.153*** (0.026)	-0.152*** (0.027)	0.037 (0.028)	-0.058*** (0.018)	-0.149*** (0.026)
Female	0.027* (0.014)	0.020 (0.015)	0.005 (0.008)	0.020 (0.013)	0.026* (0.014)	0.017 (0.015)	0.005 (0.009)	0.019 (0.013)
Age	0.037*** (0.009)	0.021*** (0.005)	0.002 (0.004)	-0.021*** (0.005)	0.037*** (0.009)	0.021*** (0.006)	0.001 (0.004)	-0.021*** (0.005)
Observations	5,607	5,612	5,589	6,801	5,486	5,492	5,468	6,653
R-squared	0.13	0.03	0.04	0.15	0.13	0.03	0.04	0.15
F-value	50.59	6.97	10.45	61.61	49.66	7.05	9.84	59.53
Hansen J statistic					0.15	2.07	0.00	0.00
P-value (Hansen J)					0.70	0.15	0.96	0.98

Notes: Columns 1, 2, 3, and 4 report estimated coefficients from weighted LPM regressions of measures of mother-specific inputs (variables were selected from mother's report on items in HOME scale) on mother's self-esteem scale, and controls for mother, family, and child-specific characteristics. Columns 5, 6, 7, and 8 report estimated coefficients from weighted instrumental variables regressions. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. Robust standard errors are clustered on mother's identity and are reported in parentheses. Due to the small magnitude of the estimates, coefficients of interest are reported to the fourth decimal place. *** p<0.01, ** p<0.05, * p<0.1

Table 9
Relationship between mothers' self-esteem and children's cognitive outcomes
(ages 6-14 years)

Variables	Ordinary least squares			Instrumental variables estimation		
	Math (1)	Reading recognition (2)	Reading comprehension (3)	Math (4)	Reading recognition (5)	Reading comprehension (6)
Mother's self-esteem	0.001 (0.003)	0.005 (0.003)	0.005* (0.003)	-0.000 (0.003)	0.007* (0.004)	0.006** (0.003)
Mother characteristics						
Rotter scale	0.041 (0.090)	-0.048 (0.103)	-0.038 (0.086)	0.044 (0.091)	-0.047 (0.104)	-0.036 (0.087)
AFQT	0.122*** (0.011)	0.116*** (0.012)	0.113*** (0.010)	0.122*** (0.012)	0.115*** (0.012)	0.112*** (0.010)
Pearlin mastery scale	0.070 (0.070)	0.088 (0.078)	0.054 (0.063)	0.081 (0.071)	0.074 (0.080)	0.046 (0.064)
Schooling	0.660*** (0.120)	0.523*** (0.123)	0.534*** (0.103)	0.665*** (0.121)	0.534*** (0.124)	0.546*** (0.105)
Body Mass Index	-0.119*** (0.038)	-0.114*** (0.040)	-0.106*** (0.033)	-0.117*** (0.038)	-0.112*** (0.040)	-0.107*** (0.033)
Health	0.689 (0.477)	0.697 (0.518)	0.176 (0.437)	0.758 (0.484)	0.631 (0.527)	0.144 (0.443)
Age	0.291*** (0.039)	0.177*** (0.039)	0.003 (0.034)	0.289*** (0.039)	0.178*** (0.039)	0.001 (0.034)
Married	2.594*** (0.486)	3.066*** (0.544)	2.871*** (0.456)	2.514*** (0.489)	2.970*** (0.548)	2.797*** (0.458)
Family characteristics & school type						
Household size	-0.613*** (0.166)	-1.005*** (0.165)	-0.904*** (0.140)	-0.613*** (0.168)	-1.008*** (0.167)	-0.897*** (0.142)
Poverty status	-0.905 (0.555)	-0.960 (0.612)	-0.355 (0.524)	-0.862 (0.561)	-0.851 (0.616)	-0.299 (0.530)
Public school	0.034 (0.615)	-2.082*** (0.575)	-2.126*** (0.506)	0.131 (0.624)	-2.028*** (0.579)	-2.155*** (0.515)
Child characteristics						
African-American	-3.551*** (0.567)	-2.337*** (0.664)	-3.052*** (0.541)	-3.576*** (0.574)	-2.406*** (0.671)	-3.120*** (0.545)
Hispanic	-1.556*** (0.567)	0.908 (0.632)	-0.152 (0.517)	-1.605*** (0.573)	0.899 (0.639)	-0.247 (0.521)
Female	-1.380*** (0.356)	2.100*** (0.373)	0.713** (0.316)	-1.435*** (0.358)	2.043*** (0.376)	0.690** (0.319)
Age	-0.090* (0.054)	-0.197*** (0.055)	-1.329*** (0.051)	-0.088 (0.055)	-0.204*** (0.055)	-1.319*** (0.052)
Observations	15,494	15,490	14,568	15,268	15,265	14,353
R-squared	0.23	0.19	0.26	0.23	0.19	0.25
F-value	89.26	69.62	153.57	88.28	68.30	150.80
Hansen J statistic				0.13	0.09	0.10
P-value (Hansen J)				0.72	0.77	0.75

Notes: Columns 1, 2, and 3 report estimated coefficients from weighted OLS regressions of standard PIAT scores on math and reading (recognition and comprehension) on mother's self-esteem scale, and controls for mother, family, and child-specific characteristics. Columns 4, 5, and 6 report estimated coefficients from weighted instrumental variable regressions. Robust standard errors are clustered on mother's identity and are reported in parentheses. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. *** p<0.01, ** p<0.05, * p<0.1

Table 10
Limited sample analysis (NLS-CYA survey years = 1986, 1988, 2004, 2006, 2008)

Variables	0-2 years			3-5 years		
	HOME-SF (1)	Cognitive stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional support (6)
Mother's self-esteem	0.034*** (0.011)	0.019*** (0.007)	0.014* (0.007)	0.042*** (0.013)	0.029*** (0.008)	0.012 (0.008)
Observations	1,874	1,785	1,777	2,172	2,025	1,992
R-squared	0.21	0.26	0.20	0.37	0.30	0.25
Difference in estimated coefficients of interest	$\chi^2= 1.95$ p= 0.16	$\chi^2= 0.64$ p= 0.42	$\chi^2= 1.89$ p= 0.17	$\chi^2= 0.68$ p= 0.41	$\chi^2= 3.56$ p= 0.06	$\chi^2= 0.55$ p= 0.47
F-value	26.14	33.84	15.24	55.18	37.34	32.02
Hansen J statistic	0.20	1.60	0.76	1.07	0.00	0.57
P-value (Hansen J)	0.66	0.21	0.38	0.30	0.99	0.45

Notes: The above table reports estimated coefficients from weighted instrumental variables regressions performed to study the relationship between measures of home environment qualities and mother's self-esteem scale using a restricted sample. In addition, all the regressions incorporate controls for mother, family, and child-specific information considered in our primary analysis. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. Robust standard errors are clustered on mother's identity and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix

Table A.1

Survey items used in the construction of the HOME-SF scales, cognitive stimulation scores, and emotional support scores (0-2 years)

Survey question	Respondent	Scale
How often does child have a chance to get out of the house?	Mother	Cognitive
About how many children's books does child have?	Mother	Cognitive
How often do you get a chance to read to child?	Mother	Cognitive
How often do you take child to the grocery store?	Mother	Cognitive
About how many, if any, cuddly, soft, or role-playing toys does child have?	Mother	Cognitive
About how many, if any, push or pull toys does child have?	Mother	Cognitive
Some parents spend time teaching their children new skill while other parents believe children learn best on their own. Which most closely describes your attitude?	Mother	Cognitive
How often does child eat a meal with both you and his/her father/step/father-figure?	Mother	Emotional
How often do you talk to child while you are working?	Mother	Emotional
About how many times, if any, have you had to spank child in the past week?	Mother	Emotional
Mother spontaneously spoke to child twice or more (excluding scolding)?	Interviewer	Emotional
Mother responded verbally to child's speech?	Interviewer	Emotional
Mother caressed, kissed, or hugged child at least once?	Interviewer	Emotional
Mother slapped or spanked child at least once?	Interviewer	Emotional
Mother interfered w/ child's actions or restricted child from exploring >= 3 times?	Interviewer	Emotional
Mother provided toys or interesting activities for child?	Interviewer	Cognitive
Mother kept child in view/ could see child/ looked at him/her often?	Interviewer	Emotional
Child's play environment is safe?	Interviewer	Cognitive

Notes: Responses to questions related to emotional scale and cognitive scale are used to construct Cognitive Stimulation and Emotional Support scores respectively. Retrieved from <https://www.nlsinfo.org/> on November 22, 2015. For more information, see <https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/codebook-supplement/appendix-home-sf-scales/page/0/1>.

Table A.2

Survey items used in the construction of the HOME-SF scales, cognitive stimulation scores, and emotional support scores (3-5 years)

Survey question	Respondent	Scale
How often do you read stories to child?	Mother	Cognitive
About how many children's books does child have?	Mother	Cognitive
How often do you take child to the grocery store?	Mother	Cognitive
About how many magazines does your family get regularly?	Mother	Cognitive
Does child have the use of a CD player, tape deck, or tape recorder, or record player at home and at least 5 children's records or tapes?	Mother	Cognitive
Do you or have you helped [child] with numbers?	Mother	Cognitive
Do you (or someone else) help [child] with the alphabet?	Mother	Cognitive
Do you (or someone else) help [child] with colors?	Mother	Cognitive
Do you (or someone else) help [child] with shapes and sizes?	Mother	Cognitive
How much choice is child allowed in deciding foods s/he eats at breakfast & lunch?	Mother	Emotional
About how many hours is the TV on in your home each day?	Mother	Emotional
If child got so angry that s/he hit you, what would you do? Hit him/her back/	Mother	Emotional
Send child to room / Spank child / Talk to child/ Ignore it/ Give child a chore/ Take away allowance/ Hold hands until calm/ Other/ Short time-out	Mother	Emotional
How often does a family member get a chance to take child on any kind of outing?	Mother	Cognitive
How often has a family member taken or arranged to take child to any type of museum?	Mother	Cognitive
How often does child eat a meal with you and his/her father/stepfather/father-figure?	Mother	Emotional
About how many times, if any, have you had to spank child in the past week?	Mother	Emotional
Mother conversed w/ child ≥ 2 times (no scolding or suspicious comments)?	Interviewer	Emotional
Mother answered child's questions or requests verbally?	Interviewer	Emotional
Mother caressed, kissed, or hugged child at least once?	Interviewer	Emotional
Mother introduced interviewer to child by name?	Interviewer	Emotional
Mother physically restricted or (shook/grabbed) child?	Interviewer	Emotional
Mother slapped or spanked child at least once?	Interviewer	Emotional
Mother's voice conveyed positive feeling about child?	Interviewer	Emotional
Child's play environment is safe?	Interviewer	Cognitive
Interior of the home is dark or perceptually monotonous?	Interviewer	Cognitive
All visible rooms of house/apartment are reasonably clean?	Interviewer	Cognitive
All visible rooms of house/apartment are minimally cluttered?	Interviewer	Cognitive

Notes: Responses to questions related to emotional scale and cognitive scale are used to construct Cognitive Stimulation and Emotional Support scores respectively. Retrieved from <https://www.nlsinfo.org/> on November 22, 2015. For more information, see <https://www.nlsinfo.org/content/cohorts/nlsy79-children/other-documentation/codebook-supplement/appendix-home-sf-scales/page/0/1>.

Table A.3
 Survey items used in the construction of the Rosenberg self-esteem scale
 (Reporting years: 1980, 1987, and 2006)

Survey question	Scoring method
I am a person of worth	Strongly agree=3, agree=2, disagree =1, strongly disagree=0.
I have a number of good qualities	Strongly agree=3, agree=2, disagree =1, strongly disagree=0.
I am inclined to feel that I am a failure	Strongly agree=0, agree=1, disagree =2, strongly disagree=3.
I am able to do things as well as most other people	Strongly agree=3, agree=2, disagree =1, strongly disagree=0.
I felt I do not have much to be proud of	Strongly agree=0, agree=1, disagree =2, strongly disagree=3.
I take a positive attitude toward myself	Strongly agree=3, agree=2, disagree =1, strongly disagree=0.
I am satisfied with myself	Strongly agree=3, agree=2, disagree =1, strongly disagree=0.
I wish I could have more respect for myself	Strongly agree=0, agree=1, disagree =2, strongly disagree=3.
I certainly feel useless at times	Strongly agree=0, agree=1, disagree =2, strongly disagree=3.
At times I think I am no good at all	Strongly agree=0, agree=1, disagree =2, strongly disagree=3.

Notes: Total score ranges from 0 to 30. Retrieved from <https://www.nlsinfo.org/> on November 22, 2015. For more details, see <https://www.nlsinfo.org/content/cohorts/nlsy79/other-documentation/codebook-supplement/nlsy79-appendix-21-attitudinal-scales#rosenberg>.

Table A.4
Relationship between mothers' self-esteem and children's home environment quality using
alternative estimation methods (0-2 years)

Variables	Two-step GMM			LIML		
	HOME-SF (1)	Cognitive stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional support (6)
Mother's self-esteem	0.026** (0.011)	0.018*** (0.007)	0.008 (0.007)	0.026** (0.011)	0.018*** (0.007)	0.008 (0.007)
Mother characteristics						
Rotter scale	0.120 (0.187)	0.058 (0.113)	0.071 (0.122)	0.126 (0.188)	0.058 (0.113)	0.080 (0.123)
AFQT	0.015 (0.023)	-0.002 (0.014)	0.010 (0.015)	0.017 (0.024)	-0.002 (0.014)	0.015 (0.016)
Pearlin mastery scale	0.493*** (0.173)	0.248** (0.099)	0.244** (0.116)	0.507*** (0.176)	0.247** (0.100)	0.271** (0.118)
Schooling	0.284 (0.306)	0.132 (0.165)	0.179 (0.210)	0.247 (0.317)	0.135 (0.168)	0.105 (0.217)
Body Mass Index	-0.046 (0.075)	-0.086* (0.045)	0.054 (0.050)	-0.044 (0.075)	-0.086* (0.045)	0.060 (0.050)
Health	0.813 (0.910)	0.012 (0.568)	0.619 (0.584)	0.816 (0.910)	0.013 (0.568)	0.629 (0.584)
Age	0.442** (0.172)	0.483*** (0.074)	-0.048 (0.122)	0.439** (0.173)	0.483*** (0.074)	-0.057 (0.122)
Married	9.535*** (1.287)	3.340*** (0.814)	5.856*** (0.846)	9.572*** (1.289)	3.340*** (0.814)	5.986*** (0.851)
Family characteristics						
Household size	-1.476*** (0.402)	-1.302*** (0.222)	-0.048 (0.272)	-1.515*** (0.412)	-1.299*** (0.224)	-0.131 (0.278)
Poverty status	-2.124 (1.329)	-1.748** (0.803)	-0.918 (0.845)	-2.154 (1.331)	-1.746** (0.803)	-0.975 (0.846)
Child characteristics						
African-American	-12.063*** (1.340)	-6.081*** (0.840)	-6.055*** (0.839)	-11.982*** (1.353)	-6.088*** (0.843)	-5.854*** (0.851)
Hispanic	-6.220*** (1.331)	-4.705*** (0.791)	-1.457* (0.821)	-6.178*** (1.335)	-4.710*** (0.792)	-1.359* (0.824)
Female	1.985*** (0.694)	0.763* (0.424)	1.368*** (0.464)	2.012*** (0.697)	0.762* (0.424)	1.446*** (0.468)
Age	4.621*** (0.389)	5.427*** (0.252)	-1.230*** (0.243)	4.600*** (0.392)	5.428*** (0.252)	-1.269*** (0.245)
Observations	5,005	4,877	4,514	5,005	4,877	4,514
R-squared	0.18	0.24	0.10	0.18	0.24	0.11
F-value	49.04	64.56	28.48	49.05	64.49	28.56
Hansen J statistic	0.20	0.01	1.98	0.20	0.01	1.98
P-value (Hansen J)	0.66	0.91	0.16	0.66	0.91	0.16

Notes: Estimated coefficients from two-step GMM and LIML models are reported above. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. Robust standard errors are clustered by mother's identity and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A.5
Relationship between mothers' self-esteem and children's home environment quality using
alternative estimation methods (3-5 years)

Variables	Two-step GMM			LIML		
	HOME-SF (1)	Cognitive Stimulation (2)	Emotional support (3)	HOME-SF (4)	Cognitive stimulation (5)	Emotional support (6)
Mother's self-esteem	0.039*** (0.012)	0.018** (0.007)	0.021*** (0.008)	0.040*** (0.012)	0.018** (0.007)	0.021*** (0.008)
Mother characteristics						
Rotter scale	-0.241 (0.222)	-0.173 (0.146)	-0.109 (0.141)	-0.253 (0.222)	-0.170 (0.146)	-0.116 (0.141)
AFQT	0.109*** (0.027)	0.074*** (0.017)	0.036** (0.017)	0.109*** (0.027)	0.075*** (0.017)	0.035** (0.017)
Pearlin mastery scale	0.653*** (0.186)	0.415*** (0.120)	0.237** (0.118)	0.649*** (0.186)	0.418*** (0.120)	0.240** (0.118)
Schooling	1.628*** (0.270)	1.009*** (0.172)	0.533*** (0.168)	1.606*** (0.270)	1.004*** (0.173)	0.528*** (0.168)
Body Mass Index	-0.150* (0.090)	-0.118** (0.057)	-0.027 (0.056)	-0.148* (0.090)	-0.118** (0.057)	-0.028 (0.056)
Health	4.071*** (1.120)	2.262*** (0.695)	2.206*** (0.734)	4.130*** (1.121)	2.275*** (0.695)	2.219*** (0.734)
Age	1.245*** (0.106)	0.472*** (0.065)	0.765*** (0.070)	1.245*** (0.106)	0.472*** (0.065)	0.764*** (0.070)
Married	9.829*** (1.384)	2.521*** (0.966)	6.962*** (0.887)	9.760*** (1.385)	2.503*** (0.966)	6.990*** (0.888)
Family characteristics						
Household size	-2.797*** (0.430)	-1.325*** (0.304)	-1.335*** (0.251)	-2.794*** (0.430)	-1.327*** (0.304)	-1.333*** (0.251)
Poverty status	-10.539*** (1.668)	-8.489*** (1.147)	-2.398** (0.985)	-10.511*** (1.668)	-8.495*** (1.147)	-2.358** (0.986)
Child characteristics						
African-American	-18.269*** (1.693)	-8.059*** (1.183)	-9.980*** (0.970)	-18.252*** (1.693)	-8.033*** (1.184)	-9.967*** (0.971)
Hispanic	-8.284*** (1.607)	-6.489*** (1.139)	-0.928 (0.904)	-8.245*** (1.608)	-6.465*** (1.140)	-0.898 (0.905)
Female	4.727*** (0.784)	1.991*** (0.489)	2.655*** (0.517)	4.737*** (0.784)	1.994*** (0.489)	2.623*** (0.518)
Age	1.568*** (0.345)	1.233*** (0.221)	0.441* (0.236)	1.545*** (0.346)	1.230*** (0.221)	0.441* (0.236)
Observations	6,552	6,151	6,035	6,552	6,151	6,035
R-squared	0.39	0.31	0.26	0.39	0.31	0.26
F-value	135.98	86.62	86.97	135.24	86.04	86.92
Hansen J statistic	1.50	0.24	0.95	1.50	0.24	0.95
P-value (Hansen J)	0.22	0.63	0.33	0.22	0.63	0.33

Notes: Estimated coefficients from two-step generalized method of moments (GMM) and limited information maximum likelihood (LIML) models are reported above. All regressions are weighted by child's sampling weights drawn from NLSY79 CYA. Robust standard errors are clustered by mother's identity and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1