Evaluating the Impact of Mothers' Self-esteem on Early Childhood Home Environment

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Outline

Research summary

- **Research question**
  - Development of children's cognitive and non-cognitive skills is largely determined by parental (and family) characteristics.
  - Current study examines the relationship between mother's self-esteem (an important non-cognitive parental attribute) in early childhood development process.
- **Data**: NLSY79 (mother's cohort) matched and merged with NLSY86 (child and young adult's cohort).
- **Identification**: Instrumental variable regression (supported by multiple robustness checks).
- **Key finding**: Mother's self-esteem significantly improves children's home environment quality (preschoolers).

Research Summary

Contribution to the early childhood development (ECD) literature

- First study to systematically explore how early childhood outcomes are related to mothers' self-esteem.

- Introduction of a novel way of constructing instrumental variables to address endogeneity in measures of self-esteem.

- Policy recommendations for programs and interventions directed towards mothers of young children to develop long-term human capital.

Early childhood development

- Importance of family-level (parental) characteristics and inputs during early childhood is well-documented in the ECD literature.
- These inputs are related to parental attributes (e.g. education, ability, emotional support), family relationships, and socio-economic background.
- Prominent studies in this space: **Coleman report (1966); Heckman (2000); Phillips & Shonkoff (2000); Campbell et al. (2001); Anderson et al. (2003); Heckman (2006); Cunha et al. (2006); Cunha & Heckman (2007); Currie & Almond (2011); Heckman et al. (2012); Campbell et al. (2014)**.
- Naturally, further research evidence suggests that parental inputs are key drivers of children's home environment, a precondition for child development (**Payne et al. 1994; Brooks-Gunn 1996; Baharudin & Luster 1998; Evans 2004; Strauss & Knight; Meluhish 2008**).

Mothers' self-esteem matters

- Self-esteem (how a person values herself) is closely associated with positive life outcomes **(Fox, 2000; Neiss et al. 2002; Baumeister et al., 2003; Cheng & Furnham, 2003a,b)**.

- Self-competent mothers demonstrate authoritative parenting styles **(Steinberg et al. 1989, 1992; Suldo & Huebner 2004; Milevsky et al. 2007)** characterized by:
    - Higher levels of acceptance and supervision.
    - Allowance of children's psychological autonomy.

- Mothers with high self-esteem are also more likely to be in stable marriages **(Furnham & Cheng 2000; Baumeister et al. 2003)**.

Data: National Longitudinal Survey of Youth (NLSY)

- For our analysis, we match mothers' information from the NLSY79 to their children's data from the NLSY-CYA.

- NLSY79 cohort- 12,686 respondents ages 14–22 years when first interviewed in 1979. The surveys were conducted annually till 1993 and biennially thereafter.

- NLSY-CYA cohort (NLSY-Child and Young adults)- 11,512 children born to mothers in the original NLSY79 cohort. Ongoing biennial survey commenced in 1986.

Data-Outcome variables

- **Children's home environment quality** (preschool ages):
  HOME-SF score (Home Observation Measurement of the
  Environment-Short Form), **Cognitive stimulation score**, and
  Emotional support score (separate child samples: 0-2 years
  and 3-5 years).

- **Mother-specific inputs** (preschool ages):
  Mother's report on frequencies of- reading, grocery store
  visits, conversations while working.

- **Cognitive outcomes** (ages 6-14 years) - Peabody Individual
  Achievement Test (PIAT) standardized scores in math,
  reading recognition, and reading comprehension.

Data-Covariates

- **Explanatory variable of interest (MSE)**
    - The self-esteem scores are calculated on a 10-item questionnaire designed by Rosenberg (1965).
    - For comparability across time, we consider Item Response Theory (IRT) scores of self-esteem.
    - Data-related concern: NLSY79 documents self-esteem scores for only three survey years (1980, 1987, & 2006).
    - To circumvent this problem, we estimate weighted average of 1987 and 2006 self-esteem scores (rank order-stability finding by Robins & Trzesniewski (2005)):

$$MSE_{year} = \frac{(2006-year)}{19} MSE_{1987} + \frac{(year-1987)}{19} MSE_{2006}$$

- **Mother controls**: Rotter scale, AFQT score, Pearlin mastery scale, education, BMI, self-reported health, age, and marital status.
- **Child Controls**: Age, sex, and race.
- **Family Controls**: Household size and poverty status.

Threats to identification

Possible sources of endogeneity in self-esteem scores:

- Unobserved heterogeneities in error terms that affect the dependent variables might be correlated with self-esteem scores.
- Simultaneity bias between child outcomes and mother's self-esteem.
- Measurement error.

Solution- Employing instrumental variables (IV) to generate exogenous variations in mothers' self-esteem scores.

- Commencement of NLSY-CYA in 1986 allows researchers to use 1980's reported self-esteem score as instrument for 1987 and 2006 self-esteem measures (Drago 2013; Baker & Tang 2016).
- Wooldridge (2009) and Reed (2015) suggest that using distant lags of explanatory variables as instruments address the concerns related to reverse causality.
- However, there may still be unobserved heteregoneities that are correlated with 1980's self-esteem measures and also affect child outcomes in later years - serial correlation.
- Not possible to empirically test the validity of exclusion restriction assumption in an exactly identified system.

Empirical strategy

- To perform empirical test for overidentifying restrictions, we devise a novel procedure of decomposing MSE_{1980} into two IV's - by using Gram-Schmidt's orthogonal transformation.
    - The orthogonal component of self-esteem 1980 is the variable of interest (ortho80).
    - By construction, ortho80 is uncorrelated with ortho06 and is likely to be correlated with MSE_{87}.
- Second, we estimate the following model:

  $Self\ esteem_{1980} = \gamma_1 + \gamma_2.(Ortho_{1980}) + \epsilon$ (1)

- Instrumental variable, Z is a vector of $(\gamma_1 + \gamma_2.(Ortho_{1980}))$ and $\widehat{\epsilon}$

- Tests for validity of instruments:
    - Overidentification test - Sargan-Hansen test, χ^2 value indicates whether the instruments are uncorrelated with the error term (correctly excluded IV's) (Cameron & Trivedi 2009).
    - High F-values (F-statistic > 10) of overall significance of models indicate relevance of IV (Stock & Yogo 2005).

Empirical strategy

- Finally, we estimate the instrumental variable regression.

  First Stage
  $MSE = \alpha_1 + \alpha_2 Z + \alpha_3 M + \alpha_4 C + \alpha_5 F + \upsilon$ (2)

  Second Stage
  $Y = \beta_1 + \theta.\widehat{MSE} + \beta_2 M + \beta_3 C + \beta_4 F + u$ (3)

- θ is the coefficient of interest
- M, C, and F are vectors of mother, child, and family controls.
- We estimate weighted OLS/LPM and IV regressions using NLSY's child sampling weights and the standard errors are clustered on mother's ID

Mothers' self-esteem & home environment - Data
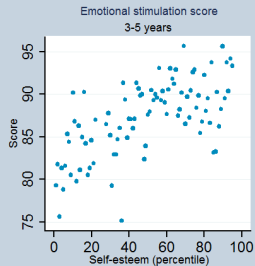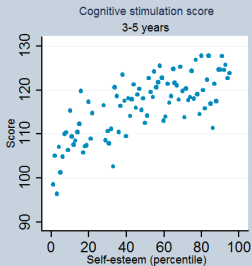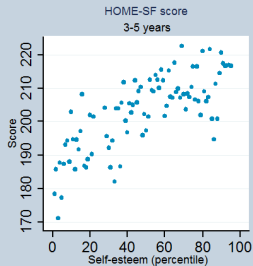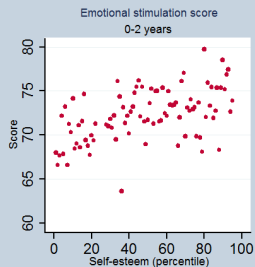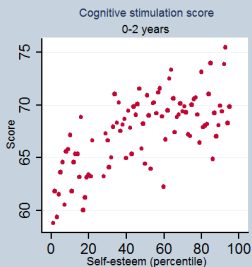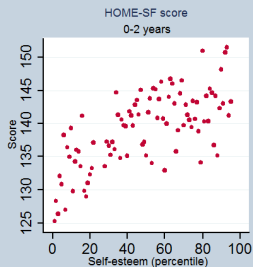
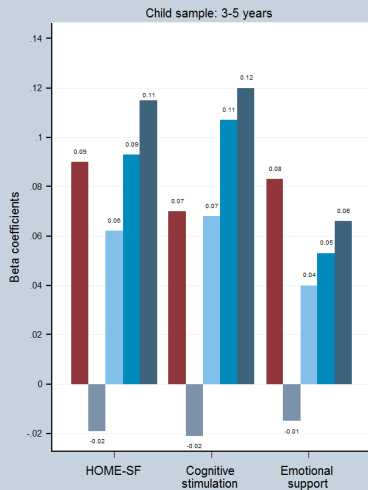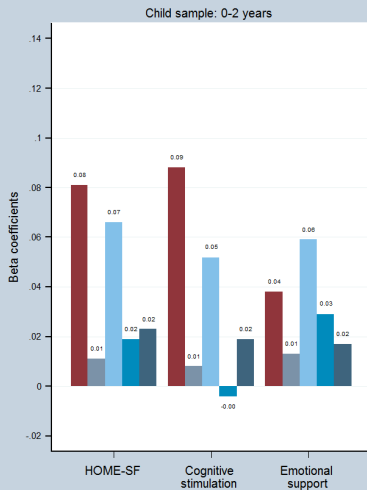## Mothers' self-esteem & home environment - Analysis

	OLS			**IV**		
Variable	HOME-SF	Cognitve	Emotional	Total	Cognitive	Emotional
Mother Self Esteem	0.020***	0.013***	0.007*	0.026**	0.018***	0.008
	(0.007)	(0.004)	(0.004)	(0.011)	(0.007)	(0.007)
N	5124	4987	4629	5005	4877	4514
R-squared	0.18	0.24	0.10	0.18	0.24	0.11
P-value (SH test)	-	-	-	0.66	0.91	0.16

Table: Sample: Children aged 0-2

	OLS			**IV**		
Variable	HOME-SF	Cognitve	Emotional	Total	Cognitive	Emotional
Mother Self Esteem	0.035***	0.019***	0.014***	0.040***	0.018**	0.021***
	(0.007)	(0.005)	(0.005)	(0.012)	(0.007)	(0.008)
N	6695	6284	6170	6552	6151	6035
R-squared	0.39	0.31	0.26	0.39	0.31	0.26
P-value (SH test)	-	-	-	0.22	0.63	0.33

Table: Sample: Children aged 3-5

Standardized regressions

Mother Self-esteem and mother inputs

	LPM				**IV**			
Variables	Reading	Grocery	Talking	Reading	Reading	Grocery	Talking	Reading
	(0-2)	(0-2)	(0-2)	(3-5)	(0-2)	(0-2)	(0-2)	(3-5)
MSE	0.0002	0.0002	0.0002***	0.0001	-0.0000	0.0007***	0.0002*	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
N	5607	5612	5589	6801	5486	5492	5468	6653
P-value (SH test)	-	-	-	-	0.70	0.15	0.96	0.98

Mothers' self-esteem & cognitive outcomes- Data
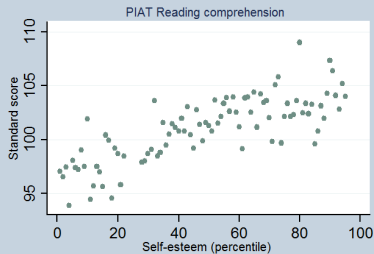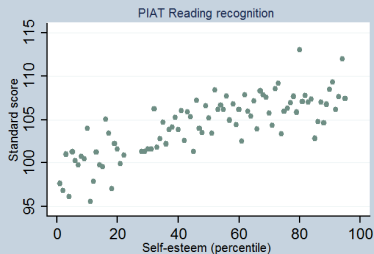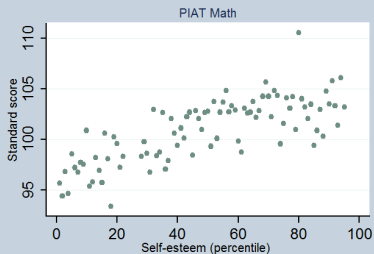
Mothers' self-esteem & cognitive outcomes- Analysis

	OLS			IV		
Variable	Math	Reading-recog.	Reading-comp.	Math	Reading-recog.	Reading-comp.
Mother Self Esteem	0.001	0.005	0.005*	-0.000	0.007*	0.006**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
N	15494	15490	14568	15268	15265	14353
R-squared	0.23	0.19	0.26	0.23	0.19	0.25
P-value (SH test)	-	-	-	0.72	0.77	0.75

Table: PIAT Scores 6-14 years

Additional analysis & robustness checks

- Regression estimates are robust to estimation of limited information maximum likelihood & generalized methods of moments models.

- Limited sample analysis- No significant differences in regression coefficients when we perform our analysis restricting our sample to survey years that are close to MSE reported years (1986, 1988, 2004, 2006, 2008).

- Further analysis performed by mothers' demographic characteristics - Increase in MSE has larger impacts for mothers belonging to low socio-economic background (poor & low education group), especially for children aged 3-5.

Concluding remarks

- This is the first study to investigate the presence of a causal link between mothers' self-esteem and family-specific inputs that are important for child development.

- Mothers with high self-esteem are more efficient in ensuring the better quality of inputs that determine the development of their children.

- The results motivate scope for alternative early childhood policy options that can be directed towards improvements in mother's non-cognitive traits for ensuring better future human capitals for children.

Thank you for your time!