

Income and the Developing Brain During the First Three Years of Life

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A growing body of small-scale studies documents that the cognitive and brain development of low-income children differs from that of children reared in higher-income families. Differences favoring more affluent children are found for young children's language, memory, executive function, and socioemotional processing, with corresponding differences in neural structure and function in brain regions that support these skills. At the same time, a large body of social science research documents income disparities in more general measures of children's achievement, school performance, and learning-related behaviors such as attention and self-regulation. Developmental scientists agree that poverty is especially likely to shape children's early development because of the high plasticity and rapid growth of the brain during the first three years of life. Yet, there has not been a rigorous study of how income supports for families affect the brain function and development of infants and toddlers.

On May 10, 2018 we began enrolling mothers in the first randomized experiment testing causal connections between poverty reduction and brain development among very young children. We will randomly assign 1,000 low-income mothers and their newborns in several ethnically and geographically diverse communities to either (1) an experimental group that receives \$333 in cash payments each month (\$4,000 each year) for each of the first 40 months of the children's lives, with the first payments occurring shortly after the baby's birth, or (2) a control group that receives much smaller payments (\$20 per month). Based on our and others' prior work, the \$3,760 annual difference will be large enough to produce and detect meaningful differences in children's cognitive development.

Moreover, to understand how poverty reduction improves brain functioning, at ages one and two we will measure family context that we expect links poverty to development: parent stress, family expenditures, routines and time use and parenting practices, and child care arrangements. Rigorous laboratory measures of children's cognitive, emotional, and brain development, as well as measures of health, stress and behavior, will be gathered at age three.

Results would provide strong and clear evidence about the magnitude and pathways of causal connections between enhanced income and early cognitive and brain development. Beyond its core contributions to science, the proposed project will provide important evidence about the likely effects of tax and income-enhancement policies for young children, such as the Child and Earned Income Tax Credits, incentive-based employment programs, and related social policies designed to enhance family economic well-being.

A one-year pilot study launched in July, 2014 established the feasibility of our proposed approach. Grants from the National Institutes of Health, as well as the Annie E. Casey Foundation, Bill and Melinda Gates Foundation, Chan-Zuckerberg Initiative, Child Welfare Fund, Ford Foundation, Jacobs Foundation, Smith-Richardson Foundation, Sherwood Foundation, W.K. Kellogg Foundation, and Weitz Family Foundations, an anonymous donor, the JBP Foundation are funding the study.

SOME DETAILS

What we would do

One thousand infants born to mothers living below the federal poverty threshold in 4 sites (250 infants in each site) in the United States will be assigned at random to experimental or control groups. Experimental group mothers would receive unconditioned cash payments of \$333 per month (\$4,000 per year) for 40 months. The control group would receive a nominal payment – \$20 per month, delivered in the same way. Following standard research procedures, all participating families would receive a \$100 respondent incentive for participating in three of our four planned interviews and a \$200 payment for our proposed age-3 laboratory assessments. The sites will be: New York City, The greater New Orleans metropolitan area, The greater Omaha metropolitan area, and the Twin Cities. The study investigators and local partners have successfully completed studies and recruited mothers in hospital settings in these cities.

Mothers will be recruited in maternity wards of participating hospitals shortly after giving birth and, after consenting, will be administered a 30-minute baseline interview. The three follow-up waves of data collection will provide information about family functioning as well as developmentally appropriate measures of children's cognitive and behavioral development. We will collect information from the mother on the phone when the infant is 12 months old and in the home from the mother and child at 24 months. At age 3, mothers and children will be assessed and interviewed in research laboratories at each site. We will additionally collect state and local administrative data regarding parental employment, utilization of public benefits such as Medicaid and Supplemental Nutrition Assistance Programs (SNAP), and any involvement in child protective services.

The compensation difference between families in the experimental and control groups would boost family incomes by \$3,760 per year, an amount shown in economics and developmental psychology to be associated with socially significant and policy relevant improvements in children's school achievement. After accounting for likely attrition, our total sample size of 800 at age 3 years, evenly divided between experimental and control groups, provides ample statistical power to detect meaningful differences in cognitive, emotional and brain functioning, and key dimensions of family context.

Cognitive and emotional development measures at age 3

At the age-three lab visit we will administer validated, reliable and developmentally sensitive measures of language, memory, executive functioning and socioemotional skills. We will also collect direct measures of young children's brain development.

Family processes that facilitate brain development

If family poverty reduction shapes early brain development and cognitive functioning, it is important to identify the family processes that help pave the way. First, additional resources enable parents to buy goods and services for their families and children that support cognitive development. These include higher quality housing, nutrition and non-parental child care; more cognitively stimulating home environments and learning opportunities outside of the home; and, by reducing or restructuring work hours, more parental time spent with children.

A second pathway is that additional economic resources may reduce parents' own stress and improve their mental health. This may allow parents to devote more positive attention to their children, thus providing a more predictable family life, less conflicted relationships, and warmer and more responsive interactions.

A Pilot Study

In June 2014 we launched a pilot study of 30 poor mothers of newborns from New York Presbyterian

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Hospital/Columbia University Medical Center to assess baseline procedures, implementation of the debit card and cash transfer, and pilot data collection to inform the development of final survey data instruments and home assessments. The pre-paid debit card did not require a bank account, and could be used to make purchases directly at stores (“point-of-service”) or to withdraw cash at ATMs or banks. Mothers consented to have the debit card company share data about debit card transactions with the research team. Cell-phone texts alerted each mother about monthly payments. Thirty mothers participated in the baseline survey, indicated a willingness to be contacted for future data collection, and agreed to participate in randomization to one of two cash receipt conditions.

After completing a baseline interview, 15 of the 30 mothers were randomly assigned to receive \$100/month for 12 months (smaller payments than in the proposed study), and 15 were assigned to receive \$20/month for 12 months. Debit cards were given out immediately following the baseline interview; all mothers used their cards within 6 weeks and regularly thereafter. Very few reported substantial issues with the card, such as a loss or theft, fraudulent charges, or needing help resetting PINS. When their infants reached their first birthdays, the mothers completed a survey interview with questions about parenting and family expenditures. While the results should be viewed with caution because of the small sample size, we found some evidence that the higher monthly income reduced household chaos and increased mother-child learning activities and child care expenditures. The pilot study suggests that study implementation, methods of income transfer and research strategy are feasible with low-income mothers with infants, in ways that can support the research at scale.

Timeline

Enrollment in the study began on May 9, 2018, some six months into the project. The 1,000 mothers and infants will be recruited between months 7 and 18 of the project. Between months 19 and 31, recruited infants would be celebrating their first birthdays, at which time we will conduct telephone interviews with their mothers. In-home interviews timed to children’s second birthdays will take place over months 32 to 43 of the project. Third-birthday lab visits would take place between months 44 and 55. Analyses would begin with partial data from the lab assessments during months 49 to 55 and would be completed by the end of the 60th month. We are eager to follow the sample beyond the children’s third birthdays, providing we collect find meaningful impacts on child and family functioning.

Connections to policy

Findings from our project will inform policy proposals across a host of federal and state programs. The Earned Income Tax Credit, SNAP, TANF and Housing Choice Vouchers are all fiercely debated in today’s budget battles. Our study’s \$4,000 annual payment is within the range of these benefits. Our study will be the first to provide definitive evidence on the extent to which young children’s cognitive, emotional and brain development is affected by increased income.