Household Income and the Developing Brain:

The Baby's First Years Study

National Academies

Forum on Children's Well-Being Workshop

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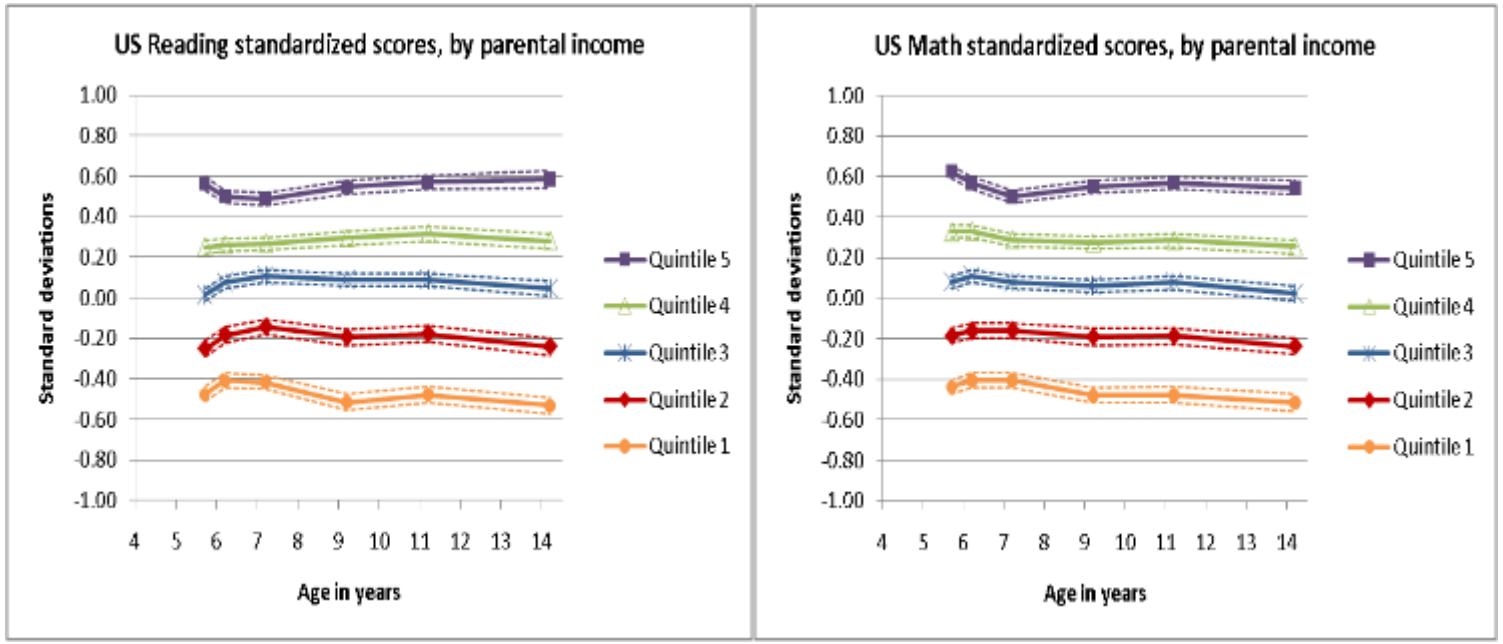
Children from low-income families enter school with lower academic skills, and these differences persist



Small income differences in childhood predict better outcomes

- $4,000 difference in annual income between the prenatal year and age 2:
  - Increased adult earnings
  - Increased time in the labor force
  - Improved cognitive development
  - Some evidence for improved health in adulthood
- **Can we move past correlation to understand if income is *causing* these differences?**

Dahl and Lochner, 2012
Ziol-Guest et al 2012

Baby's First Years Study

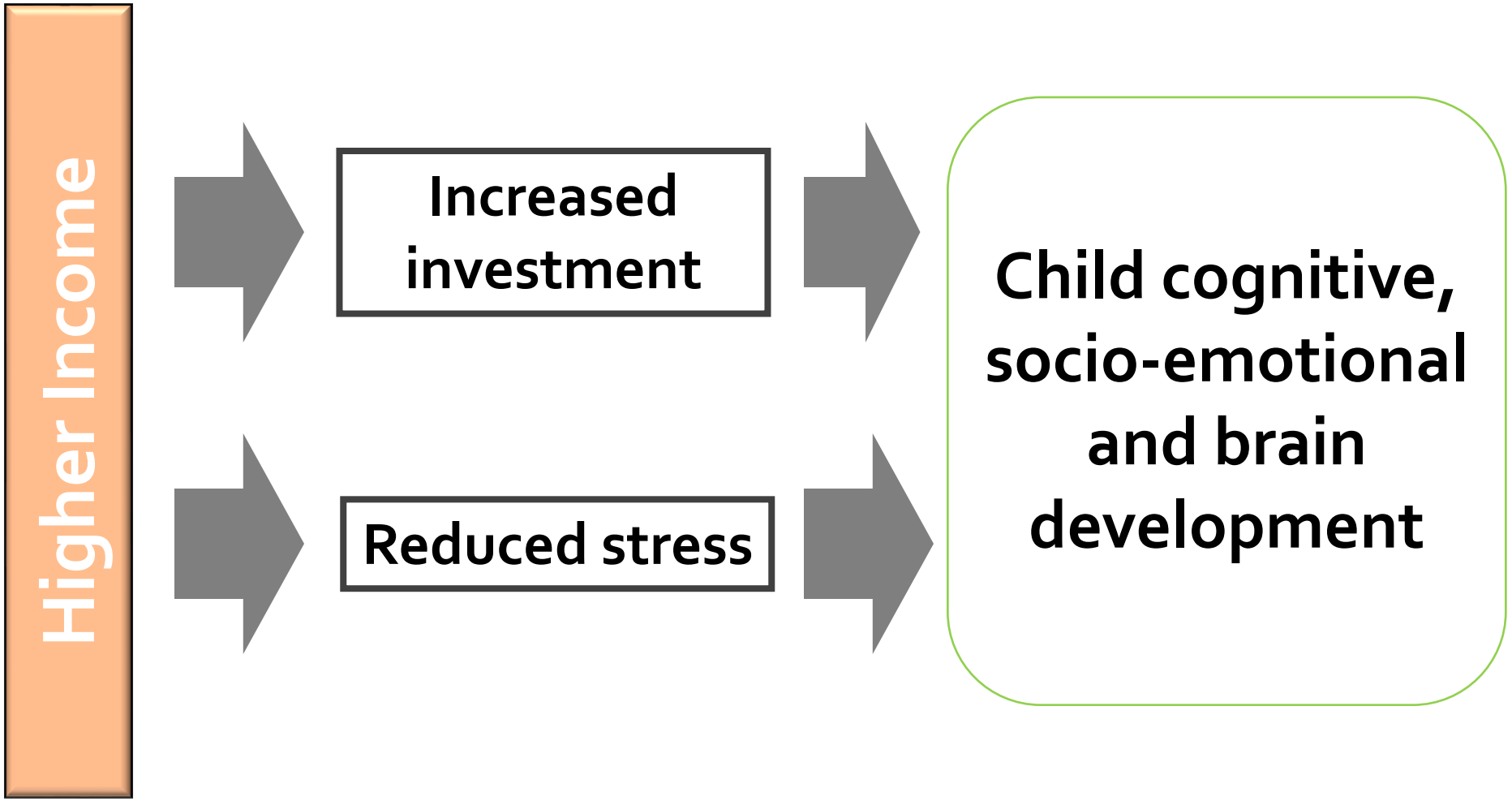
- First randomized controlled trial of poverty reduction in early childhood
- 1000 low-income mothers recruited in hospital shortly after giving birth
- 4 sites: NYC, Omaha metropolitan area, Twin Cities and NOLA
- All participants receive unconditional cash gift for 40 months
  - Treatment group: $333/month ($4000/year)
  - Control group: $20/month ($240/year)
- Monthly reload via debit card
- Launched in July 2018
- N=1000 recruitment completed June 2019
- Age-1 visits completed June 2020
- Funded by NIH and a consortium of 22 foundations
- To date, BFY has put more than $3 million to date into the pockets of low-income mothers in our study.

Baby's First Years will assess the impact of poverty reduction on children's development

Research Questions:

1) Does increasing income among poor families improve children's developmental outcomes and brain functioning by the time they reach age 3?
2) Does increasing income among poor families improve family functioning and better enable parents to support child development?

Developmental theory of change



Data Collection Plans

Baseline (birth)

- Survey in the hospital

Age 1 Home Visit

- Survey
- Observation/video of interactions
- Maternal stress physiology
- Child language/social-emotional development
- Brain development

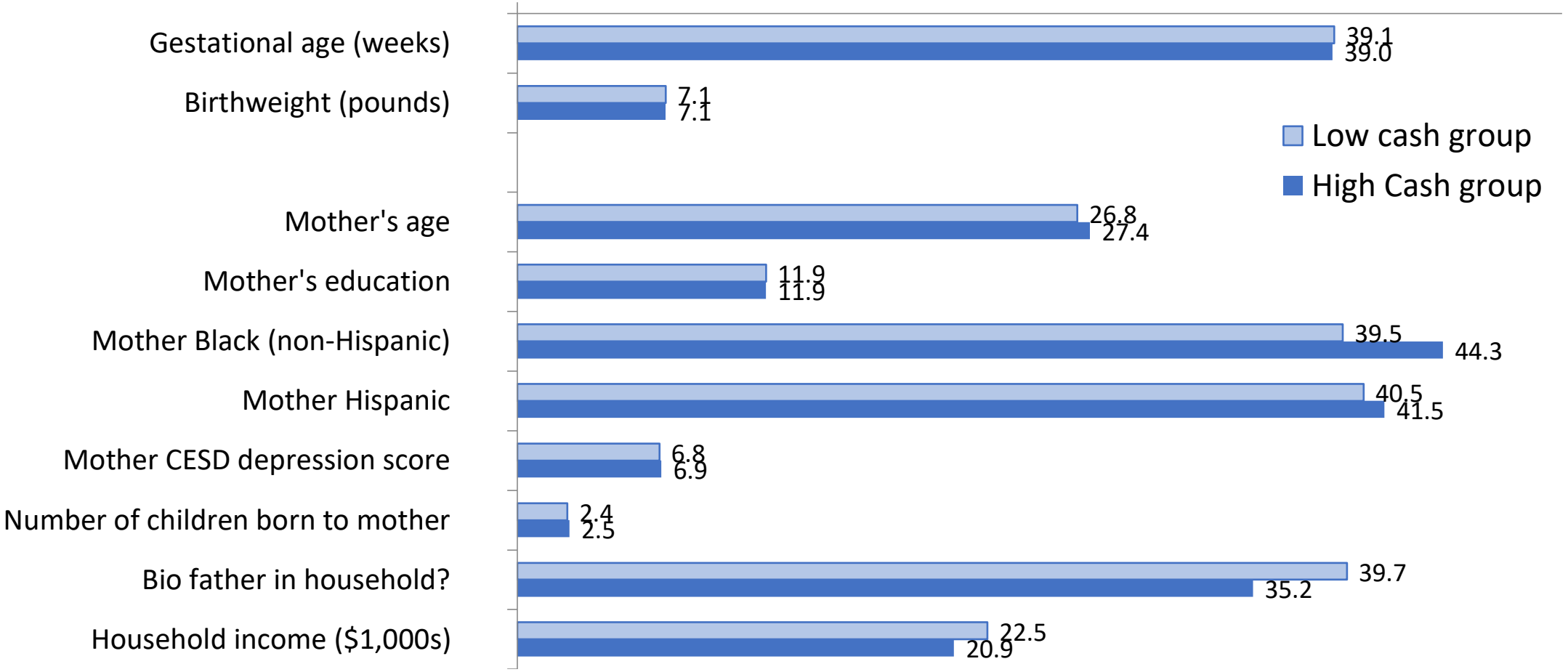
Age 2 Home Visit

- Survey
- Observation/video of interactions
- Maternal and child stress physiology
- Epigenetics
- Language/social-emotional development

Age 3 Lab Visit

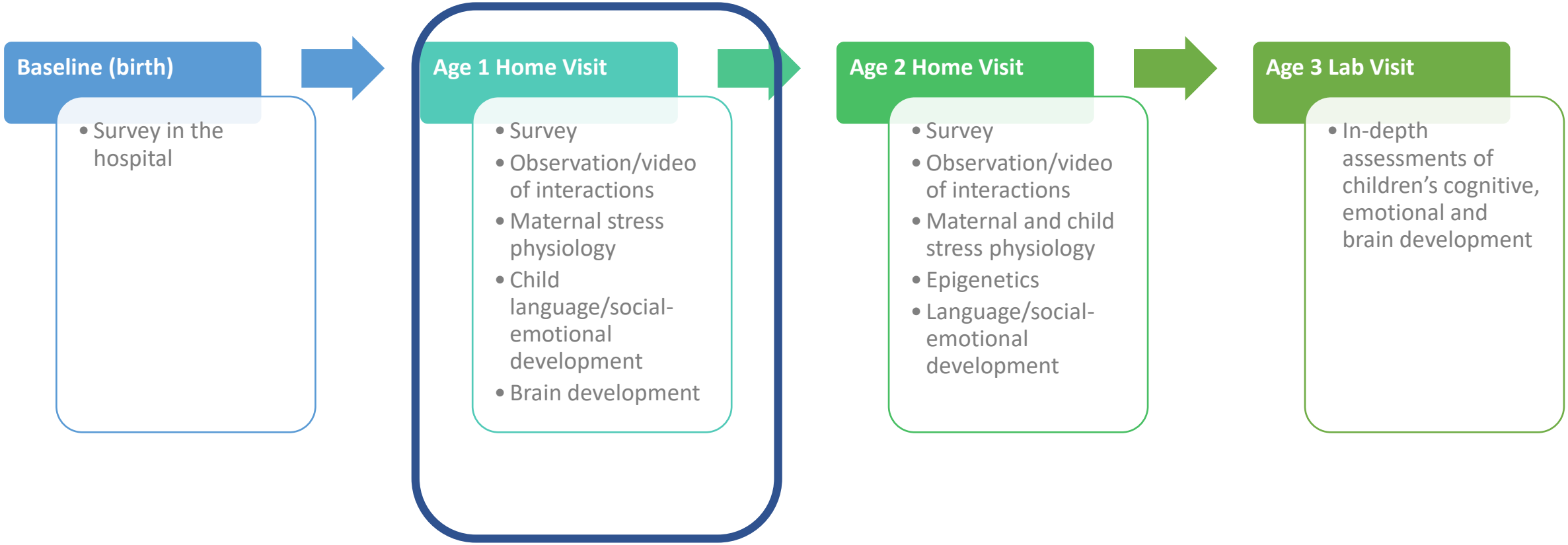
- In-depth assessments of children's cognitive, emotional and brain development

Baseline randomization was successful



Note: P value of joint test=.280; no pairwise differences are $p<.05$

Data Collection Plans



One Highlight of our Age-1 data collection

(completed in June 2020)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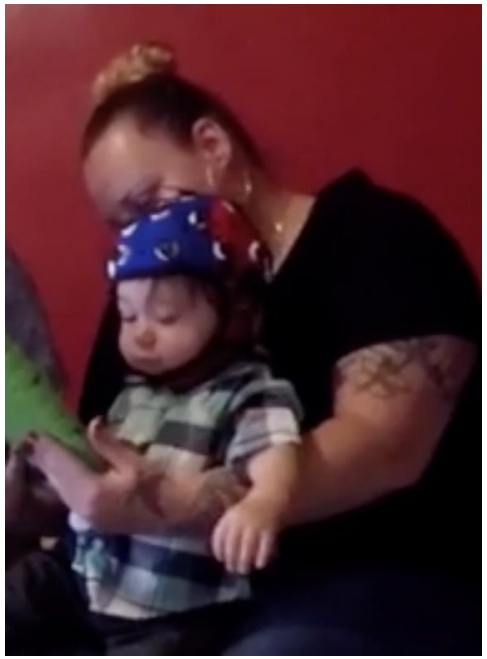
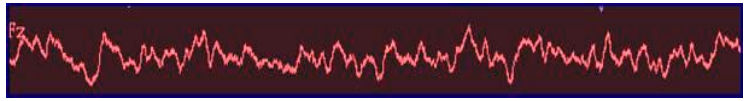
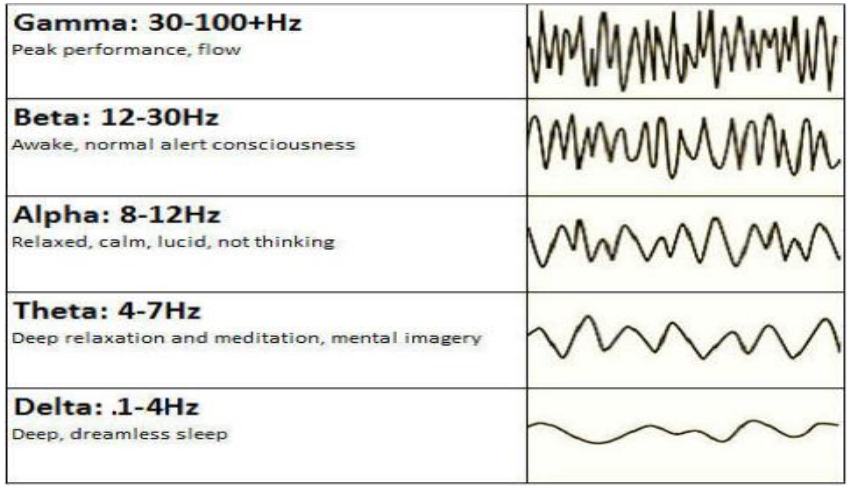


Electroencephalography (EEG)



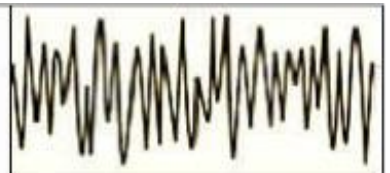
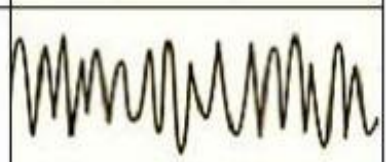
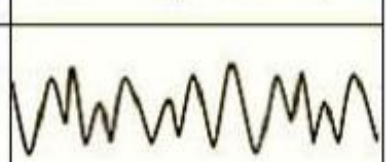
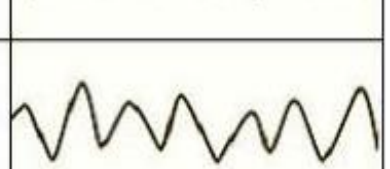
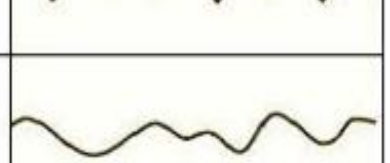
- We can measure the electrical activity of the human brain by placing electrodes on the scalp and amplifying the signal

- This signal can be decomposed into oscillations occurring in different frequency bands



Children at-risk for learning and attention disorders tend to exhibit

Excess low-frequency oscillations

Gamma: 30-100+Hz Peak performance, flow	
Beta: 12-30Hz Awake, normal alert consciousness	
Alpha: 8-12Hz Relaxed, calm, lucid, not thinking	
Theta: 4-7Hz Deep relaxation and meditation, mental imagery	
Delta: .1-4Hz Deep, dreamless sleep	

Deficit of high-frequency oscillations

Pivoting in light of COVID-19

- In mid-March, we paused in-person age-1 visits
- Survey data collection resumed 2 days later via phone
- Because of the randomized control study design, COVID-19 does not jeopardize our ability to answer the study's core research questions about the casual impact of poverty reduction.
- Critically, redundancy was built into study design

Successful retention at age 1

- Total surveys: N = 931 (includes in-person as well as phone)
- In-person only:
  - Total parent-child interaction: N = 570
  - Total maternal hair cortisol: N = 409
  - Total EEG: N = 484

Age 2 visits launched

- June 2020: Training for interviewers, all retained from Age 1
- Phone interviews to be converted into in-person if and when feasible

Age 3 data collection:
Culminating outcomes for the initial 5-year study

- Child cognitive assessments: Language, executive functioning
- Child socioemotional development
- Child brain function (EEG/ERP)
- Child and maternal stress physiology (hair cortisol)
- BMI
- Age 2 carry-overs
  - Maternal executive function
  - Epigenetics
  - Parent-child interaction
- Survey for moms on economic hardship and family life

Age 3 data collection planning and dilemmas

- Currently planning in parallel for in-person and virtual data collection
- Options being considered if lab visit is unsafe or not allowed by IRB:
  - Contactless drop-off and pick-up of tablet, wifi hotspot, and testing materials
  - Extending to year 4
    - Continuing the cash gifts for an additional 8-12 months: $1.2 - 1.8 million

Policy implications

- Has the potential to provide direct evidence of the effects of poverty reduction on the developing brain and mind
- Informs debates on the generosity or cuts to existing or new social service programs that affect families with young children

Income may not the only or the most important factor in children's brain development, but it may be most manipulable from a policy perspective.

For more information, see BabysFirstYears.com

Baby's First Years Team and Funders

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NIH Eunice Kennedy Shriver National Institute of Child Health and Human Development
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Bill & Melinda Gates foundation
Brady Education Foundation
Chan Zuckerberg Initiative
CWF Childwelfarefund
Ford Foundation
Greater New Orleans Foundation For a vibrant region.
Heising-Simons Foundation
Jacobs Foundation Our Promise to Youth
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