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I. Background
BACKGROUND

The brain grows through the baby’s touch, talk, sight and sound. In fact, the first 2000 days of life is when brain development is most substantial.

Kuhl, Patricia

- Brains of 7-month and 11-month-old babies rehearse how to produce language, even though babies are still months away from saying their first words.

- Neuroimaging data show that 7-month-old infants activate auditory and motor brain areas in response to speech in native and nonnative languages. In 11- and 12-month-old infants, speech in native languages activates auditory brain areas whereas nonnative speech activates motor brain areas. This finding matches the behavior of adult brains.


Link: http://www.pnas.org/content/111/31/11238.full.pdf
II. The Problem
THE PROBLEM

While most newborns have relatively similar cognitive structures, they are not all born into the same environments. Living in poor and impoverished environments has a greater impact on infants and toddlers than middle-aged children or those later in life. The effects of these disadvantages compound throughout childhood resulting in potentially permanent cognitive, career and personal consequences.

---

**Chetty, R.**

**Duncan, G.**

- Children’s skills and knowledge when they are young are strongly related to their life outcomes. In other words, children who lag behind early are likely to continue doing so throughout their schooling and beyond.

- The relation between skills and knowledge during a child’s early years and that child’s success later on is a science-backed reason to invest in early childhood education.


**---**

**Duncan, G.**

- Longitudinal studies show early childhood poverty is a stronger predictor than resources in middle childhood or later in life of positive life outcomes. In other words, providing interventions during the late elementary and middle school years is less impactful than intervening during the early childhood years.

Garcia, E.

- Race-based gaps in skills such as reading, math, eagerness to learn, persistence and focus shrink significantly when socioeconomic status is taken into account.

- Conclusions also support various psychological studies that found traumatic experiences negatively impact early childhood development.


Hart, B.; Risley, T.R.

- The number of words spoken, the messages conveyed and the words learned by infants differs across socioeconomic groups.

- After four years of parent-child interactions, there were significant discrepancies in children’s knowledge and skills.

- Most importantly, children from high-income families were exposed to 30 million more words than children from families on welfare.

- Follow up studies showed that these differences have long-lasting effects.

Link: http://www.aft.org/sites/default/files/periodicals/TheEarlyCatastrophe.pdf

Huttenlocher, J.; Haight, W.; Bryk, A.; Sletzer, M.; Lyons, T.

- Huttenlocher et al. examines the factors that drive language development in early childhood, including the correlation between maternal speech and child vocabulary. There is a substantial relationship between individual differences in vocabulary learning and retention and the amount parents speak to their children. This relationship reflects the impact parents have on their child’s language acquisition and not the child’s innate cognitive ability.

Shonkoff, J.P.

- Positive early experiences strengthen brain architecture and toxic stress can disrupt brain circuits, undermine achievement and compromise physical and mental health.

  — As brain architecture emerges, it establishes either a sturdy or fragile foundation for all the capabilities and behavior that follow.

  — The interaction of genes and experience shapes the circuitry of the developing brain.

  — Brain plasticity and ability to change behavior decrease over time. It’s less costly to society and individuals to get it right early rather than trying to fix it later.

III. Solution: Early Childhood Education

Topics covered in this section:

- Life Outcomes 11
- Cognitive Development 11
- Return on Investment 13
- Health Outcomes 14
SOLUTION: EARLY CHILDHOOD EDUCATION

Early childhood education is a proven, direct intervention method to mitigate, and even reverse, the effects of impoverished environments on infants and toddlers. High-quality early learning programs are able to erase the achievement gap as children enter kindergarten and position them on the path to college and career readiness.

Life Outcomes

Heckman, J.J.; Mosso, S.

- Evidence on the importance of early childhood conditions in shaping multiple life skills. Authors James Heckman and Stefano Mosso find that parental engagement, stimulating interaction and attachment are essential for skill development and critical determinants of later-life success.


Link: http://heckmanequation.org/content/resource/economics-human-development-and-social-mobility

Cognitive Development


- Four separate studies come to the same conclusion:
  
  — All studies found a positive relationship between center-based care in the year prior to kindergarten and children's cognitive outcomes.
  
  — Magnuson, Ruhm and Waldfogel found that center attendees outperformed children who stayed at home on both reading and math assessments, with differences of .12 and.10 standard deviations.
— Bassok (2010) and Magnuson, Ruhm, and Waldfogel found that targeted early intervention can be effective in closing achievement gaps. Center participation had substantially greater impacts for nonpoor blacks than for nonpoor whites. There is a large relationship between center care and cognitive outcomes for very poor children and for those with low parental education.

— These different studies used the Early Childhood Longitudinal Study and the extraordinary amounts of data it collected. Because of the large sample size the data can be further separated to analyze differences among subgroups.

Source: Bassok, Daphna; Gibbs, Chloe R.; Latham, Scott; 2013. Bassok, Daphna, 2010. Loeb, Susanna; Bridges, Margaret; Bassok, Daphna; Fuller, Bruce; Rumberger, Russell; 2007. Magnuson, Katherine A.; Ruhm, Christopher J.; Waldfogel, Jane; 2007.

**Gormley, W.T.**

- The authors used a regression discontinuity design (as mentioned earlier, using a predetermined cutoff to naturally select groups while preventing selection bias) to compare children just missing the enrollment cutoff date with those able to enroll in the Oklahoma preschool program.

- After comparing children in Oklahoma who enrolled in one year with those children whose birthdays were just after the cutoff date but who enrolled the following year, the study found a .79 standard deviation gap on letter-word identification and a .38 standard deviation gap on applied problem measure between those who attended preschool and those who did not. These positive effects were across all racial and socioeconomic groups.


**Peisner-Feinberg, E.**

- Results showed that participation in Georgia's Pre-K Program significantly improved children's school readiness skills across a wide range of language, literacy, math and general knowledge measures.

- Participation had significant effects on children's language, literacy and math skills, including in: letter knowledge, letter-word identification, phonological awareness, math problem-solving and counting.

Peisner-Feinberg, E.; Schaaf, J.M.

- Poor children who attended North Carolina’s preschool program performed better on third grade state reading and math tests than their peers who did not attend the program.


Return on Investment


- This recent follow-up study of a low-cost early childhood intervention conducted in Jamaica from 1986 through 1988 by researchers at the University of the West Indies demonstrates the effectiveness of home visiting programs, parent-child interactions and cognitive and social stimulation for infants and toddlers in closing the achievement gap and producing long-term economic gains.

- Extremely disadvantaged children treated in the Jamaican Study earned 25 percent more as adults than disadvantaged children who received no treatment—and they earned as much as their more advantaged peers. The results reinforce the value of high-quality home visiting programs for disadvantaged children in the United States.


Link: http://heckmanequation.org/content/resource/labor-market-returns-early-childhood-stimulation-intervention-jamaica

Heckman, James J., Hyeok Moon, S.; Pinto, R.; Savelyev, P.A.; Yavitz, A.

- This paper estimates the ROI (return of investment) of the Perry Preschool program, an early intervention program targeted toward disadvantaged African-American children, as 7-10 percent per annum based on improved social and economic outcomes.


Link: http://heckmanequation.org/content/resource/rate-return-highscope-perry-preschool-program
Reynolds, A.J.

- The authors compared the outcomes of program participants to those of demographically similar children living in neighborhoods where centers were operating. Children who enrolled in Chicago Child Parent Centers were less likely to be retained or placed in special education and were more likely to graduate from high school. At age 26, program participants had lower arrest rates, lower rates of depressive symptoms, and higher rates of insurance coverage. It's estimated the program had a return of nearly 11 dollars for every dollar invested.


Health Outcomes

Campbell, F.; Conti, G.; Heckman, James J.; Hyeok Moon, S.; Pinto, R.; Pungello, L.; Pan, Y.

- The authors demonstrate the great potential for high-quality early child programs that incorporate health and nutrition to prevent disease and promote adult health in disadvantaged populations.

- Abecedarian also permanently boosted IQ.


Link: [http://heckmanequation.org/content/resource/early-childhood-investments-substantially-boost-adult-health](http://heckmanequation.org/content/resource/early-childhood-investments-substantially-boost-adult-health)

Conti, G.; Heckman, James J.; Urzua, S.

- This paper examines the relationship between early health and education and adult outcomes and suggests that it is possible to promote development through early intervention.

Ludwig, J.; Miller, D.L.

- The authors applied a regression discontinuity design, which is the closest method to randomized control trials in the natural environment. The authors compared counties just meeting the income level cut-off to receive assistance by implementing Head Start programs in those counties just missing the cut-off level.

- Counties receiving Head Start technical assistance from the federal government showed lower mortality rates than counties not receiving technical assistance. The lower rates were driven by drops in deaths from “Head Start susceptible causes” such as smallpox, polio and measles.

IV. Solution:
Home Visiting Programs

Topics covered in this section:
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• Healthy Families America 18
• Home Instruction for Parents of Preschool Youngsters (HIPPY) 19
• Child First 20
• Nurse Family Partnership 21
SOLUTION: HOME VISITING PROGRAMS

Education, health and life outcomes are greatly influenced by the interaction between parents and their children. Ultimately, parents are a child’s first and most important teacher. Home visiting programs work to foster positive parent-child interactions that last throughout life. Home visiting programs are not substitutes to other early childhood education opportunities, but when coupled with those opportunities children and parents are able to see lasting benefits for entire families.

Parents as Teachers

Albritton, S.; Klotz, J.; Roberson, T.

- Parents as Teachers parents read more to their children, used more techniques to support book/print concepts, and had more children’s books in the home.


Pfannenstiel, J.; Lambson, T.; Yarnell, V.

- More than one-half of the Parents as Teachers children observed with developmental delays overcame those delays by age 3.


Wagner, M.; Iida, E.; Spiker, D.

- Adolescent mothers in an urban community who participated in Parents as Teachers scored lower on a child maltreatment precursor scale than mothers in the control group. These teen mothers showed greater improvement in knowledge of discipline, showed more positive involvement with children and organized their home environment in a way that was more conducive to child development.
• Children participating in Parents as Teachers were much more likely to be fully immunized for their given age, and less likely to have been treated for an injury in the previous year.


Healthy Families America


• Women enrolled prenatally in Health Families America (HFA) had fewer low-birth weight babies. Low birth weight is associated with higher infant mortality as well as substantial short- and long-term challenges to child health and development.


Kirkland, K.; Mitchell-Herzfeld, S.

• Research shows that HFA reduces the number of Adverse Childhood Experiences (ACEs), which research definitively shows is essential for life-long health and productivity. For example, HFA reduces child maltreatment, harsh punishment, and improved the use of non-violent discipline.


Mitchell-Herzfeld, S.


Link: ocf.s.state.ny.us/main/prevention/assets/HFNY FirstYearProgramImpacts.pdf
Home Instruction for Parents of Preschool Youngsters (HIPPY)

Jacobson, A.L.; Ramisetty-Mikler, S.
Black, M.M.; Powell, D.

- Parents participating in the HIPPY program report spending more time reading to their children; teaching them letters, words and numbers; visiting the library and monitoring their child’s TV use.


Nievar, A. M.; Jacobson, A.; Dier, S.
Bradley, R.H.; Gilkey, B.

Center for Human Investment Policy

- Children participating in Home Instruction for Parents of Preschool Youngsters have demonstrated statistically significant higher achievement scores in reading, math and social studies in third, fifth and sixth grades based on multiple measures used in Arkansas, Texas, Florida and Colorado.


Child First


Crusto, C.A.; Whitson, M.L.; Feinn, R; Gargiulo, J; Hold, C; Paulicin, B.; Simmons, W.; Lowell, D.

Lowell, D.I.; Carter, A.S.; Godoy, L.; Paulicin, B.; Briggs-Gowan, M.J.
Nurse Family Partnership

Nurse-Family Partnership has consistent evidence, based upon replicated randomized controlled trials with different populations living in different contexts, that it:

- improves prenatal health \(^7\text{-}^9\)
- reduces childhood injuries \(^7,\, 10,\, 11\)
- reduces the rates of subsequent pregnancies and births \(^7,\, 9,\, 12\text{-}14\)
- increases the intervals between first and second pregnancies and births \(^7,\, 9,\, 12\text{-}14\)
- increases maternal employment \(^7,\, 9,\, 14\)
- reduces women’s use of welfare \(^12\text{-}14,\, 25\)
- reduces children’s mental health problems \(^15,\, 16,\, 24\)
- increases children’s school readiness and academic achievement \(^9,\, 16,\, 17\)
- reduces costs to government and society \(^18,\, 19,\, 25\)
- is most effective for those most susceptible to the problems examined \(^1\)

The following outcomes have been observed among program participants compared to their counterparts assigned to the control group in at least one randomized trial:

**Improved pregnancy outcomes:**
- 35 percent fewer cases of pregnancy-induced hypertension \(^7\)
- 79 percent reduction in preterm delivery among women who smoke cigarettes \(^8\)
- 31 percent reduction in very closely spaced (<6 months) subsequent pregnancies \(^12\)

**Improved child health and development:**
- 39 percent fewer healthcare encounters for injuries or ingestions in the first two years of life among children born to mothers with low psychological resources \(^22\)
- 56 percent reduction in emergency room visits for accidents and poisonings in the second year of the child’s life \(^11\)
- 48 percent reduction in state-verified reports of child abuse and neglect by child age 15 \(^20\)
- 50 percent reduction in language delays by child age 21 months \(^9\)
- 5 point increase in language scores on a test with a mean of 100 and standard deviation of 15 among 4-year-old children born to mothers with low psychological resources \(^17\)
• 3.95 point increase in receptive language (when averaged across age 2, 4, and 6) among children born to mothers with low psychological resources

• 1.03 point increase in sustained attention when averaged across age 4, 6, and 9 among children born to mothers with low psychological resources

• 67 percent reduction in behavioral and emotional problems at child age 6

• 9 percentile increase in math and reading achievement test scores in grades 1-3 among children born to mothers with low psychological resources

• 67 percent reduction in 12-year-old children’s use of cigarettes, alcohol, or marijuana

• 28 percent reduction in 12-year olds’ mental health problems (depression and anxiety)

• 3 point increase in 12-year-old children’s reading and math achievement test scores on a test with a mean of 100 and standard deviation of 15 among those born to mothers with low psychological resources

• 6 percentile increase in group-based reading and math achievement test scores in grades 1-6 among children born to mothers with low psychological resources

• 59 percent reduction in arrests by child age 15

• 90 percent reduction in adjudication as PINS (person in need of supervision) for incorrigible behavior

• 33 percent fewer arrests among female children at age 19

• 80 percent fewer convictions among female children at age 19

• 73 percent increase in age at 1st arrest among female children at age 19

• 82 percent fewer current arrests among female children at age 19

• 89 percent fewer current convictions among female children at age 19

• Reduced childhood mortality from preventable causes at age 20

Increased self-sufficiency of the family:

• 1 month increase in labor force participation during second year of child’s life

• 46 percent increase in father presence in household by child age 4

• 30-month reduction in use of AFDC-TANF among mothers who were poor and unmarried at registration

• 7 month (or 82 percent) increase in labor force participation 4 years after delivery of first child among low-income unmarried mothers

• 1.75 month reduction in use of AFDC-TANF between child age 5 and age 6

• 1.83 month reduction in use of Food Stamps between child age 5 and 6

• 61 percent fewer arrests of mothers by child age 15

• 72 percent fewer convictions of mothers by child age 15
• $12,300 discounted savings (2006 dollars) in Food Stamps, Medicaid, and AFDC-TANF from child age 0-12 compared to program cost of $11,511 (2006 dollars)  

• 13 percent increase in duration of mothers’ relationships with current partners by child age 12  

• Reduced all-cause maternal mortality rate when comparing control group participants with combined treatment groups of participants receiving pre-natal and 2 post-partum home visits and participants who received pre-natal, post-partum, and infancy/toddler home visitation. Note: This finding is not significant when comparing the control group with participants who received the NFP intervention (i.e., prenatal, infancy, and toddler home visits), but it is observed in the expected direction (P = .19)  

Reference List:


See also Memphis Year 9 results, citation #23, finding that nurse-visited children as a trend were less likely to die from birth through age 9, an effect accounted for by deaths due to potentially preventable causes, such as preterm delivery, Sudden Infant Death Syndrome, and injuries.


