

Effects of Childcare on Child Cognitive Development

UTS Speaks Lecture

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The Context: Why is this an important question?

1. Recent research in economics finds lifetime income is largely determined by about age 16 (perhaps even earlier):

If we want to improve outcomes for disadvantaged youth, policy interventions at later ages (e.g., college tuition subsidies, job training programs) have only small effects^{*****}

^{*****}See, e.g., Keane and Wolpin (JPE, 1997, IER, 2001), Cameron and Heckman (JPE, 1998, 2001).

The Context: Continued

1. Some Evidence:

- Studies of college financial aid consistently find only small effects:
- So, College tuition subsidies are largely transfers to people who would have gone anyway (Regressive)
- Studies of training programs consistently show small effects:
- If it takes 4 years of college raise wages about 60%, how can a few weeks of training do much?

The Context: Continued

- We often hear the following fallacious argument:
 - College grads earn much more than HS grads
 - So College is the “key to success”
 - Therefore, we should provide subsidies to induce more people to go to college
- Problem: The “non-College” types don’t go to college for a reason: Their gains from going would be pretty small
- College can’t magically undo 18 years of a poor family background, poor schools, etc.

The Context: Why is this an important question?

2. Wide differences in child cognitive ability - as measured by test scores - open up at **early ages** (4, 5, 6). And
3. These test scores are strong predictors of later life outcomes:
 - E.g., Bernal-Keane find PPVT and PIAT scores at ages 4, 5, 6 are much better predictors of whether a person goes to college than parents' IQ or income (only parent education is close).

Importance of Early Test Scores

- PIAT (Peabody Individual Achievement Test)
- Age 6 Reading Score
 - Mean = 100
 - Standard Deviation = 10****
- A 1 standard deviation (10-point) increase is predicted to increase completed education **1/4 year**
- Sounds small but
- This translates into an increase in percent who attend college from about **30%** to about **36%**
- **Same effect as 2 1/2 extra years of education for mother**

****Note: One standard deviation above the mean is the 16th percentile of a normal

The Context: Why is this an important question?

4. Putting 1, 2 and 3 together, we come to the Holy Grail of human capital development:

If we can find policies that improve cognitive outcomes at young ages, we can have a big impact on later life outcomes.

Conversely, bad influences at young ages may have long run negative effects

Child Care

- This is where child care comes in:
- There is a raging debate over such questions as:
 - “Do mothers going to work and placing kids in child care have a negative impact on child development?”
 - “Can placing disadvantaged or “at risk” kids in high quality child care improve outcomes?”

Child Care

- Also, the number of mothers who work and place children in child care is very large
- In Australia, the number of kids in some form of child care increased from:^{***}
 - 1999 577,500
 - 2004 752,800
- A 30% increase (5.25% per year).
- Many parents are concerned about the effects this may be having on children

^{***}Source: 2004 Census of Child Care Services

Child Care

- Unfortunately, solid evidence on how child care affects child outcomes is scarce.
- Examples of **outcomes of interest**:
 1. Cognitive ability test scores
 2. Social development
 3. Behavioral problems / Delinquency / Crime
 4. Educational Achievement
 5. Labor market outcomes
 - Wages, Employment, Welfare Participation

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effects of child care?

Why should anyone care what
an economist has to say ~~about~~
~~effects of child care~~ ?

Economists have developed methods for distinguishing causation from mere correlation that are useful here

Notable contributors:

Koopmans, Marshak, Haavelmo, etc., in the 40s, 50s, and more recently Jim Heckman (Nobel Prize, 2000)

The Problem

- Kids placed in day care tend to score slightly **higher** on standard cognitive ability tests (PPVT, PIAT) than kids cared for at home by the mother.
- But mother's who work also have higher IQ scores, education levels, etc., than mothers who do not.

The Problem

- Are the higher test scores of the day care kids due to an effect of day care?
- Or just smarter mothers having smarter kids?

The Problem

- Loosely speaking, one can think of the problem as arising because we can't do a controlled experiment:
- Kids can't be randomly assigned to either "day care" or "home" and outcomes compared for the two groups.
- (Note: even if they could, it wouldn't be enough to solve the problem - a subtle issue for another day).

Proposed Statistical Solution

- Can we find some real world event that roughly mimics the idealized controlled experiment?
- A good candidate is the U.S. welfare system reform of the mid-1990s.
- By historical accident, most welfare benefits in the U.S. are targeted at single (lone) mothers

Proposed Solution

- Prior to the mid-90s, single (lone) mothers had strong incentives to stay at home and live on government benefits.
 - The system imposed severe work disincentives
- The reform introduced a system of work requirements and child care subsidies for single mothers.

Proposed Solution

Thus, a system that paid single mothers to stay home was replaced by one that:

1. Required them to work for benefits, while:
 2. Also providing day care subsidies that made it easier to do so.
- Result: Work and day care use among single mothers rose substantially

Effect of Welfare Reform

- Single mothers with children aged 0-5:
- The percent who work increased from **59%** in 1992 to **78%** in 2001
- Essentially all of them use child care

An Aside

- Ironically, social conservatives in America think middle and upper class women should stay home with the kids, but that poor women should work.

Back to the Proposed Solution

Loosely speaking, the statistical procedure works as follows:

1. Find essentially “identical” women who would have stayed home under the old regime, but who work and use day care under the new regime.
2. Compare the test score outcomes for their kids under the old vs. new regime.

Proposed Solution

- This procedure attempts to get around the problem that mothers who work tend to have higher IQ, education, etc. than those who do not
- By comparing outcomes for children of “similar” women who stayed home under the old policy regime but use day care under the new policy regime

Results

- These are taken from two papers by Raquel Bernal and Michael Keane:
- “Child Care Choices and Children’s Cognitive Achievement: The Case of Single Mothers,” Working Paper
- Quasi-Structural Estimation of a Model of Child Care Choices and Child Cognitive Ability Production, *Journal of Econometrics*, forthcoming.

Results: Part I

- On average, each year of full-time child care reduces child test scores by **2.9%**
- This is a large effect. Recall a 10-point change altered chance of going to college by about 6 points (30% to 36%).
- So a 2.9-point drop will reduce chance of college attendance by about **1.75 points**

Results: II

- But this result is just an average over different kinds of:
 - Child care
 - Mothers
 - Kids
- Results differ greatly by all three

Results: III

- “Formal” Child Care has no adverse effect on test scores whatsoever
 - Center based care
 - Pre-school
- “Informal” Child Care (e.g., relatives, friends, home care) has a large negative effect
- Each year of informal care reduces scores **3.5%**
 - reduces chance of going to college by 2.1 points

Results: IV

- Note: Poorer women are much more likely to use informal care than middle/upper middle class women
- Our results imply average test scores for children of single mothers in the 1994-99 period were 2.35% lower than they would have been had the welfare rules not changed
- This is because 75% of those who went to work used informal care

Results: V

- Negative effects of child care are greater for more educated mothers
- But another way: the value of maternal time for child development is greater for more educated mothers
- Average education in the data is 11.2 years
- For a college educated mother the negative effect is about twice as great

Results: VI

- Summary of Results

Type of Mother \ Type of Care	Informal	Formal
High Education	Really Bad	No Problem
Low Education	Somewhat Bad	Good !!****

**** Except, the evidence is statistically weak.

Results:VII

- We estimate that for a mother with education 2 years below the mean (9.2 vs. 11.2 years) each year of formal child care increases test scores by 4.7%
- Unfortunately, unlike other statistics I've mentioned, this one is very imprecisely estimated (4.7 ± 4.6)
- The result is also quite sensitive to the details of the statistical procedure used.

The “Early Intervention” Debate

- There is a big debate (both academic and public policy) over whether high quality early child care improves outcomes for “At Risk” kids
- Two famous experiments:
 - The **Perry Pre-School project**
 - The **Abecedarian project**

Perry Pre-School Project

- Ypsilanti, Michigan in 1962-1967
- Low income African American Children
- Ages 3 and 4
- 2 ½ hours per day of very high quality pre-school for full school year
- Teachers all had masters degrees (1/6)
- 3 year olds got 2 years, 4 year olds 1 year
- Treatment group = 58, Controls = 63

An Aside

- N=111 seems like a small sample,
- But
- Macroeconomists basically rely on quarterly data from 1947-2006
 - $60 \times 4 = 240$ data points
- With no experimental variation whatsoever
.....
- And based on that, claim to be able to tell us how to set monetary and fiscal policy !!

Perry Pre-School Project

- At age 5, IQ increased by **11** points
 - 84 for Controls, 95 for treatment group
 - Note: in ballpark of our 4.7% per year estimate
- High school graduation rate (by age 27) increased by **21** points
 - 45% for Controls, 66% for Treatment group
- Earnings at age 27 increased **60% !!!!**
 - \$766 per month for C, \$1219 per month for Ts
- Welfare participation at age 27 fell **47%**
 - 32% for Controls, 15% for Treatment group

Perry Pre-School Project

- Higher Incomes means higher taxes
- Less welfare → lower public expenditure
- Cost / Benefit analysis has been done by:
 - Barnett (Amer. J. of Orthopsychiatry, 1993)
 - RAND (Karoly et al, 1998)
- Cost: \$12,148 per child (1996 \$)

Perry Pre-School Project

- RAND Cost / Benefit Analysis:
- Cost \$12,148 per child (1996 \$)
- Benefits:
 - Increased Taxes \$ 6,566
 - Savings to Government \$ 18,871****
 - Net Savings to Government \$ 25,437
- Benefit – Cost = \$ 13,289.
- Thus, \$2 in savings for each \$1 spent.

**** Includes reduced welfare costs, special education costs, and criminal justice system costs.

Perry Pre-School Project

- RAND calculates that a two standard deviation range on their result is roughly **±10k** per person.
- So net savings to government is roughly **13k ±10k** per person.
- RAND estimate of benefits from Perry **doubles** when they include:
 - Increased Earnings for participants
 - Reduced Losses from Crime

Abecedarian Project

- CDC at U. of N. Carolina in 1972-1977
- Low income, Low parent education
 - Mostly young African American single mothers
- From 6-weeks to Age 5
- Full day, year round, high-quality day care
- Teacher/Student ratio 1/3 and 1/6
- Treatment group = 57, Controls = 54
- Note: Similar small sample size to Perry
- Follow up only to age 15 (vs. 27 for Perry)

Abecedarian Project

- At age 5, IQ increased by **8** points
 - 93.7 for Controls, 101.4 for treatment group
 - Note: in ballpark of our 4.7% per year estimate
- Strange that this is a much smaller effect than in Perry (11 points in 2 years) despite a longer and more intense intervention
- And only half of our 4.7% per year estimate
- Still, 8 IQ points is a lot.

Abecedarian Project

- The treatment group performed better on a number of academic measures taken at ages 8, 15 and 21
 - Higher math and reading test scores
 - (e.g., 11th grade level vs. 9th grade level in reading)
 - Less special education (25% vs. 48% at 15)
 - Fewer “left back” a grade (31% vs. 55% at 15)
 - College attendance of 36% vs. 14%

Conclusions

There are three main themes running through this talk:

1. Upper middle class guilt
2. Effects of welfare reform on children of low income women
3. Efficacy of quality child care intervention for “At Risk” kids

Conclusions: I

1. Upper Middle Class Guilt

Should upper middle class women worry about effects of working and sending kids to day care?

Answer: NO.

A high quality day care center won't hurt them and may even be good for them....

And they probably like being there more than being with you anyway.

Conclusions: II

2. Effects of welfare reform on children of low income women

Does welfare reform that induces more low income women to work and use day care hurt kids?

Answer: YES

Because the day care they use is mostly low quality (informal)

It would be wise to combine such policies with day care subsidies.

Conclusions: III

3. Efficacy of quality childcare interventions for “At Risk” kids:

Our results and the Perry/Abecedarian experiments suggest **modest** to **substantial** impact of high quality child care on life outcomes: education, earnings, criminal activity

This is the only kind of policy I know of where economists find evidence of substantial effects on lifetime earnings (Recall: college subsidies/training don't work)

As all policy making is done under uncertainty, this is a sensible place for government to invest money:

- high up side risk, little downside risk
- exactly what you want in an **investment**

Conclusion: IV

- Art Rolnick, Director of Research, Federal Reserve Bank of Minneapolis:

“For the Perry Preschool Program ... we estimate the average, annual real (adjusted for inflation) rate of return on investment at ... **12%** to the public ... Had the same amount of money been invested in the stock market as opposed to early intervention, the annual rate of return would only have been **7%**.”

“This is in contrast to the **0%** return on public subsidies to private businesses ...”

Conclusion: V

Ben Bernanke, U.S. Federal Reserve Board
Chairman, February 6, 2007:

“Although education ... is a lifelong process, starting early in life is crucial. Recent research, some sponsored by the Federal Reserve Bank of Minneapolis has documented the **high returns that early childhood programs can pay ...**”

The End At Last

- Finally, there are some important things I haven't talked about, like:
- Pre-natal and early childhood health care interventions
- Quality of primary schools
- These may be important as well, but the evidence is less extensive – much more research is needed here