Short and Long Term Effects of Headstart

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Abstract

Introduction

Methodology

Given that the National Longitudinal Survey of Youth consisted of survey participants from 1979 to 2004, there was a number of significant data processing steps needed prior to any analysis. With 12,686 participants spanning nearly two decades, the principal population we would be targeting their early childhood to young adulthood time frames. Individuals were interviewed annually until 1994, and then biennially afterwards. The age of the cohort within the survey consisted of individuals born between 1957 and 1964. The gender ratio was split approximately 50:50 between men and women (6,403) males and (6,283) females. Our goal on understanding on the short and long term effects of the Head Start program, focused on the subset of children born to the female NLSY79 respondents.

Using a subset of data created by Deming in his paper *"Early Childhood Intervention and Life-Cycle Skill Development: Evidence from Head Start,"* we utilized a subset of 11,470 children from the NLSY79 survey to conduct our paper. The first step was the identify which independent and dependent variables that we would examine. With variables ranging from whether or not a child had a disability to asthma, income levels at 3 years hold, to test scores on the Peabody Individual Achievement Test (PIAT) for both Math (PIATMT) and Reading Comprehension (PIAT), the goal was to read though the 882 variable list and find the features that we think would be useful to define both our research question, and provide the underlying dataset to demonstrate our findings. A summary of children who participated within the survey and are included in our research data set are included in the results section. With this in mind, we focused on the following variables to help us answer our question:

- **Composite Scores from ages 6 to 11**
- **Composite Scores from ages 12 to 14**
- **Composite Scores from ages 15 to 18**
- **Peabody Picture Vocabulary Test (PPVT) at 3 years old**
- **High School Graduation**
- **College Enrollment**
- **Grade Repetition**
- **Self Reported Health**

The **Composite Scores** were generated by selecting the number of children throughout the survey time frame who were at a given age at any given time. The composite score was generated from multiplying the percentile scores of each child from the Peabody Picture Vocabulary Test, Peabody Individual Achievement Math Test, Peabody Individual Achievement Reading Comprehension Test. The goal behind this design was such that all participating children within the study can be ranked and compared within each year's cohorts, as well as across time between cohorts.

The **Peabody Picture Vocabulary Test** itself was the direct raw score from when the child was tested at 3 years old from the years 1986, 1988, and 1990.

The **High School Graduation** was a indicator variable generated from whether or not a child every graduated from high school. Given that we have different cohorts of children each reaching and completing high school at different years, this indicator variable would be 0 for children who have not reached and

completed a high school education, i.e. a child born in 1998, was aged 6 in the year 2004, and therefore, has a High School Graduation variable as zero.

College Enrollment was an indicator variable structured much like High School Graduation. If a child ever reached 13 years of educations, namely, a university/college institution, this variable would become 1 and 0 otherwise. Children who were too young, would still have an result of 0.

Grade Repetition was an indicator variable based on whether or not a child ever repeated one or more grades from primary (elementary), secondary (middle and high), and tertiary school (university) levels.

Self Reported Health was an indicator variable based on whether or not a child ever reported a less than 3 on a scale of 5 during the survey.

Results and Analysis

Summary Table

We first begin with a summary table of the total number of children broken down by age, education level, and primary variables of interest.

Table 1: Children Summary

Age	Grade	School Type	Total	PIAT Participants	Non-HeadStart	HeadStart
6 Years Old	Kindergarden	Elementary School	4727	3425	3939	788
7 Years Old	1st Grade	Elementary School	5095	3510	4281	814
8 Years Old	2nd Grade	Elementary School	4955	3363	4127	828
9 Years Old	3rd Grade	Elementary School	5187	3370	4348	839
10 Years Old	4th Grade	Elementary School	4969	3238	4109	860
11 Years Old	5th Grade	Elementary School	5110	3155	4268	842
12 Years Old	6th Grade	Middle School	4754	2882	3917	837
13 Years Old	7th Grade	Middle School	4806	2719	4019	787
14 Years Old	8th Grade	Middle School	4366	2439	3581	785
15 Years Old	9th Grade	High School	4385	276	3656	729
16 Years Old	10th Grade	High School	3876	164	3164	712
17 Years Old	11th Grade	High School	3759	98	3129	630
18 Years Old	12th Grade	High School	3295	39	2684	611

As we have children born to females from the NLSY79 survey, there is a spread of children who become eligible for the Head Start Program at different years. We resolve this issue by tabulating the data to reflect specific criteria based on a child's age, rather than the current calendar year. Reading the table from the first row, we see that there are a total of 4,727 children in the survey who were aged 6 at some point in the survey time frame: 3,425 took a PIAT test at age 6, 3,939 did not participate in a Head Start program, and 788 participated in a Head Start program. Note, that the subset of 6 year old contain children who were born in 1979 up to 1998. This would give reason as to why for the last row of the table, there are only 3,295 children who were aged 18 - these are the children who were born from 1979 to 1986, and then through the course of the survey, continued to participate.

Linear Modeling of Composite Scores

Our first approach was to define an measure the impact of Head Start programs to the Peabody Picture Vocabulary Test, Peabody Individual Achievement Math Test, and Peabody Individual Achievement Reading Comprehension Test for each child. As the survey was administered annually up to 1994 and then biennially to 2004, we have target data of most children for each year, specifically whether or not they took the PIAT tests. But as the level of participation dropped as the survey moved forward, the data we have for effects

when children are older are much smaller. The reasoning for this phenomena is currently unknown. Given this, a decision was made to categorize and analyze children based on age ranges rather than specific ages. This would allow an additional level of functional analysis on the school type level, namely, the effects of Head Start on Elementary, Middle, and High School children.

Table 2: Composite Score based on Age

	Dependent variable:		
	compscore6to11	compscore12to14	compscore15to18
	(1)	(2)	(3)
Hispanic	−4.045** (1.751)	−3.377 (2.327)	−10.085*** (3.251)
Black	−1.429 (1.780)	−7.926*** (2.323)	−15.868*** (2.735)
Male	2.266* (1.242)	2.977* (1.640)	1.877 (2.155)
FirstBorn	4.615*** (1.334)	5.738*** (1.749)	4.397* (2.654)
LogInc_0to3	2.600*** (0.926)	1.793 (1.206)	2.925** (1.468)
MothED	1.295*** (0.307)	1.372*** (0.399)	1.467*** (0.475)
Father_HH_0to3	0.900 (1.780)	2.546 (2.287)	
PPVTat3	0.500*** (0.053)	0.386*** (0.070)	
logBW	7.851** (3.275)	4.867 (4.426)	14.670*** (4.907)
Repeat	−10.832*** (1.572)	−11.877*** (2.082)	−17.776*** (2.214)
PoorHealth	−3.193 (2.139)	−1.672 (2.774)	−3.919 (3.281)
Age_Moth_Birth	0.344 (0.268)	0.683* (0.358)	−0.128 (0.789)
headstart	−2.851* (1.591)	−1.373 (2.113)	−3.912* (2.309)
mentaldisability	−32.610*** (11.974)	−33.917 (20.830)	−30.146*** (11.293)
learndisability	−12.013*** (3.889)	−10.912** (5.329)	−19.514*** (4.601)
Constant	−48.026*** (17.843)	−32.606 (24.023)	−58.448** (28.763)
Observations	683	629	347
Log Likelihood	−2,849.281	−2,769.074	−1,508.296
Akaike Inf. Crit.	5,730.561	5,570.148	3,044.592
Note:			*p<0.1; **p<0.05; ***p<0.01

In the dependent variables, we have broadly categorized individuals aged 6 to 11 as Elementary School children, 12 to 14 as Middle School, and 15 to 18 as High School; with **compscore6to11**, **compscore12to14**, and **compscore15to18**, reflecting each category respectively. While in the independent variables, we have a similar list of variables from Elementary School to Middle School. The reason why **Father_HH_0to3** and **PPVTat3** were excluded from the High School Linear Model was because at this point in time, there were no values reported in either variable for each children who participated in the PIAT testing - all values for these two variables were Not-Available. Because of the time frame of the survey, not all children consistently participated in the PIAT tests used to run our regression models.

In terms of magnitude (the absolute value of the coefficient) and significance (p-value), the independent variables that we see that are the biggest factors in a child's testing performance were:

- Race:
  - **Hispanic**: whether the child was Hispanic, 0 or 1.
  - **Black**: whether the child was Black, 0 or 1.
- Socioeconomic factors:
  - **FirstBorn**: whether or not the child was the eldest among siblings, 0 or 1.
  - **LogInc_0to3**: the log scale income of the child from ages 0 to 3.
  - **Mother ED**: the mother's age in years/
  - **logBW**: a log scale of the child's weight at birth.
  - **Repeat**: whether or not the child ever repeated a grade, 0 or 1.
- Individual Factors

- **mentaldisability**: whether or not this child was diagnosed with a mental disability, 0 or 1.
- **learndisability**: whether or not this child was diagnosed with a learning disability, 0 or 1.

Overall, we find that the role of Head Start on a child's short term (Elementary School), to long term (High School), effects to be insignificant at best and negative in magnitude at worst. Whether or not this was attributed to the significant (almost 1/2 decrease) drop in participating children in the survey or because the effects of Head Start (in terms of what it teaches a child and its relevance to subsequent testing parameters) were not related to what was being assessed in the PIAT tests. What we can definitively was that throughout a child's formative years, mental health and learning disability, followed by whether a child has needed to repeat a grade level, and race, play a significant role in their success.

Conclusion

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