

DOES EARLY CHILDHOOD EDUCATION HELP TO IMPROVE HIGH SCHOOL OUTCOMES? RESULTS FROM TULSA

Sara Anderson, William T. Gormley, Jr., Amy Claessens, Katherine Magnuson, & Katelyn Romm

Motivation

In recent years, early childhood education (ECE) scholars have turned their attention to long-term effects of state-funded and federally-funded preschool programs. Many studies show persistent positive effects of high-quality programs, but the Head Start Impact Study and the Tennessee Voluntary Pre-K Study have produced contrary findings (Lipsey, Farran, & Hofer, 2015). Early studies, like the Perry Preschool Study and the Abecedarian Project and the Chicago Child Parent Centers Study, found positive effects many years after the intervention (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Heckman, 2006). Most contemporary programs, however, are too young to be compared to these iconic programs. The Tulsa pre-K study is a rare exception. We have been following students who entered Tulsa's kindergarten in the fall of 2006; many students in this cohort recently graduated from high school (in May 2019). We are now in a position to analyze high school outcomes, comparing students who completed the Tulsa Public Schools pre-K program with a control group of students who did not attend pre-K or Head Start. We then compare Head Start alumni to students who did not attend pre-K or Head Start.

Tulsa Data

Students in our sample started kindergarten in Tulsa Public Schools in the fall of 2006; about 40% of them attended pre-K the year prior. In 2006, we obtained school administrative data on a range of demographic characteristics, such as gender, race/ethnicity, and special needs status. Parents also completed a survey at the start of that academic year that covered characteristics including maternal marital and education status, presence of father and Internet in the home, language spoken, and books in the home. Approximately 64% of families completed that questionnaire. Our current data is derived from two overlapping data sets: The first, covering a wide range of outcomes (courses taken, letter grades, special education status, school suspensions, and attendance), consists of data obtained from the Tulsa Public Schools District and three adjacent school districts (Broken Arrow, Jenks, Union). The second, covering a narrower range of outcomes (attendance, SAT and ACT test scores), consists of data obtained from the Oklahoma Department of Education. For the first data set, we expect to have students representing approximately 50 percent of our original cohort. For the second data set, we expect to have students representing approximately 65 percent of our original cohort.

Outcomes of Interest

In the first paper from our high school data set, we focus on the following outcomes: absenteeism, AP courses, GPA, and SAT/ACT scores. We have selected these variables because they serve as indicators of academic success or failure. Our control variables come from administrative data, a 2006 parent survey, a 2014 student survey, and Census Bureau data, as described. They include: gender, race/ethnicity, school lunch eligibility, mother's education, the presence of the biological father in the home, parental involvement and discipline, and neighborhood income, among others.

Estimating Technique

To minimize the threat of bias from excluding subjects with missing data, we employed multiple imputation, which estimated missing variables on the covariates using a series of chained equations, filling in missing data as estimates from complete data in an iterative process (Little & Rubin, 2014). We then used multiple regression (either ordinary least squares or logistic depending on whether the outcome variable was continuous or dichotomous) to estimate the effects of ECE during the 2017-18 academic year, when most of our students were high school juniors. Specifically, the current analyses examined enrollment in Head Start and Tulsa's school-based pre-K program as predictors of students' total number of absences, whether a student was chronically absent, ACT/SAT math and English Language Arts (ELA) scores, whether a student was enrolled in an advanced placement (AP) course, and a student's academic GPA..

Preliminary Results

Table 1 presents the descriptive statistics for study outcome variables. Tables 2 and 3 present the results for the role of TPS pre-K participation and Head Start participation, respectively, on students' academic outcomes during the 2017-18 academic year. TPS pre-K participation was associated with increased odds of being enrolled in an AP course and a higher academic GPA, whereas Head Start participation was associated with fewer absences during the 2017-18 academic year. We hope and expect to build on this work, by including 2018-19 data and by incorporating propensity score weighting. We also will examine sub-group effects, by focusing on analyses by gender, race/ethnicity, and English-language learner status, among other groups.

Implications

Though very preliminary, the analyses provide very tentative evidence that Head Start and pre-K participation may contribute to high school outcomes. This work, along with related literature on experimental and non-experimental studies, will continue to illuminate if and how ECE programs contribute to development in adolescence.

References

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Outcome Variable	<i>M/%</i>	<i>SD</i>
Number of Days Absent	15.99	15.09
% of Students Chronically Absent	33.49%	--
ACT/SAT Math	17.14	4.36
ACT/SAT ELA	33.37	11.11
AP Course	35.73%	--
GPA	2.29	1.01

Table 1

Percentages or Means and Standard Deviations of High School Outcome Variables

Note. Results combined across 40 imputed data sets.

Table 2

Coefficients (and Standard Errors) for TPS pre-K Participation Predicting Academic Outcomes

Predictor	Number of Days		ACT/SAT Math	ACT/SAT ELA	AP Course	GPA
	Absent	Chronic Absences				
TPS pre-K	-.99(.60)	.91(.08)	.18(.21)	.15(.51)	1.23*(.14)	.10**(.05)
Race						
Black	.49(.84)	.97(.12)	-1.62***(.29)	-4.60***(.70)	.87(.13)	-.13*(.07)
Hispanic	.66(.92)	1.02(.14)	-.66**(.33)	-2.25***(.81)	.98(.16)	-.12(.08)
Asian/Hawaiian	-4.63*(2.65)	.38*(.21)	3.64***(.75)	6.59***(1.79)	4.71***(2.44)	.27(.19)
Native American	1.68(1.04)	1.40**(.22)	-.98***(.36)	-2.32***(.85)	.57**(.13)	-.12(.10)
Mom marital status						
Married	-1.01(.96)	.83(.12)	.29(.31)	.72(.75)	1.19(.20)	.02(.07)
Remarried	-.49(2.46)	.94(.31)	-.23(.85)	-.45(2.23)	1.06(.49)	-.11(.22)
Separated	-.03(1.60)	.91(.22)	.47(.58)	1.00(1.46)	1.23(.36)	-.13(.15)
Divorced	-.91(1.32)	.77(.15)	.14(.44)	.39(1.09)	1.25(.31)	-.01(.12)
Widowed	1.79(3.04)	1.24(.55)	.28(1.10)	.88(2.68)	1.62(.90)	.06(.24)
Mom education						
High school or GED	.21(1.21)	1.12(.19)	.21(.41)	.93(1.01)	.96(.18)	.04(.10)
Some college	-1.94(1.21)	.66**(.12)	.58(.39)	1.79*(.93)	1.13(.21)	.11(.11)
College degree	-3.15*(1.61)	.58**(.15)	2.10***(.49)	6.80***(1.24)	1.85**(.46)	.29**(.13)
Lunch status						
Reduced price lunch	-2.30**(.99)	.68**(.10)	.80**(.33)	2.05***(.79)	1.27(.23)	.20**(.09)
Full price lunch	-3.30***(.93)	.54***(.08)	1.50***(.30)	4.19***(.72)	1.36*(.23)	.38***(.08)
Female	1.22**(.59)	1.15(.10)	-.25(.21)	1.89***(.50)	1.64***(.18)	.43***(.05)
Internet access at home	-1.80**(.91)	.93(.12)	.28(.29)	1.71**(.67)	1.26(.19)	.02(.08)
Neighborhood income (in \$10,000)	-.11(.18)	.98(.03)	.27***(.06)	.86***(.14)	1.10***(.04)	.04**(.01)
Lives with father	-.97(1.04)	.79*(.11)	.56*(.29)	.94(.76)	1.32*(.21)	.14*(.07)

Note. Results combined across 40 imputed data sets. Coefficients for dichotomous outcomes (i.e., AP Course, Chronic Absences) are presented as odds ratios.

*** $p < .01$, ** $p < .05$, * $p < .1$

Table 3

Coefficients (and Standard Errors) for Head Start Participation Predicting Academic Outcomes

Predictor	Number of Days		ACT/SAT Math	ACT/SAT ELA	AP Course	GPA
	Absent	Chronic Absences				
Head Start	-2.16**(.98)	.89(.13)	.11(.35)	-.95(.85)	1.24(.22)	.05(.08)
Race						
Black	1.87*(1.09)	1.06(.17)	-1.21***(.39)	-4.08***(.94)	.69*(.15)	-.24***(.09)
Hispanic	1.76(1.16)	1.13(.19)	-.59(.42)	-1.57(1.02)	1.02(.23)	-.18*(.10)
Asian/Hawaiian	1.54(3.37)	.67(.40)	2.66***(1.01)	4.39*(2.43)	2.85*(1.81)	.06(.25)
Native American	1.48(1.31)	1.33(.26)	-.81*(.47)	-2.70**(1.13)	.38***(.12)	-.14(.13)
Mom marital status						
Married	.12(1.19)	1.04(.18)	.34(.37)	.83(.97)	1.04(.22)	.06(.09)
Remarried	-.52(3.01)	.86(.36)	.32(1.11)	1.87(2.76)	1.65(.97)	.11(.25)
Separated	2.30(1.88)	1.13(.30)	-.10(.74)	.76(1.89)	1.24(.43)	-.05(.16)
Divorced	-.21(1.70)	.82(.20)	.19(.52)	1.20(1.29)	.96(.33)	.02(.14)
Widowed	3.16(3.82)	1.60(.91)	.33(1.71)	.95(4.12)	1.28(1.04)	.07(.35)
Mom education						
High school or GED	.90(1.37)	1.22(.23)	.01(.48)	.38(1.12)	.83(.21)	-.04(.11)
Some college	-1.80(1.40)	.71(.15)	.65(.47)	1.75(1.10)	.92(.23)	.08(.13)
College degree	-2.49(1.82)	.62(.18)	2.47***(.60)	7.61***(1.50)	2.31***(.74)	.25(.16)
Lunch status						
Reduced price lunch	-3.94***(1.32)	.61**(.13)	.69(.45)	1.83*(1.08)	1.95***(.46)	.13(.11)
Full price lunch	-3.26***(1.16)	.56***(.10)	1.18***(.40)	3.76***(.95)	1.44(.33)	.32***(.10)
Female	1.16(.74)	1.11(.12)	.05(.26)	2.54***(.64)	1.71***(.24)	.48***(.06)
Internet access at home	-2.42**(1.13)	.87(.14)	.61*(.37)	2.34***(.84)	1.34(.26)	.11(.10)
Neighborhood income (in \$10,000)	-.05(.22)	1.03(.03)	.28***(.07)	.82***(.17)	1.09**(.04)	.03(.02)
Lives with father	-1.53(1.22)	.69**(.12)	.48(.38)	.91(.95)	.19(.07)	.16*(.09)

Note. Results combined across 40 imputed data sets. Coefficients for dichotomous outcomes (i.e., AP Course, Chronic Absences) are presented as odds ratios.

*** $p < .01$, ** $p < .05$, * $p < .1$