THE ALABAMA DEPARTMENT OF EARLY CHILDHOOD EDUCATION

First Class Pre-K
Issue Brief 6, December 2018

Proficiency in Reading and Math:
First Class Pre-K Benefits Persist in Elementary and Middle School

Key Findings from this Study

- *Students who received First Class Pre-K are more likely to be proficient in reading and math.*
- *There is no evidence of "fade-out" of these benefits over time.*

Background

The mission of the Alabama Department of Early Childhood Education is to inspire, support, and deliver cohesive, comprehensive systems of high-quality education and care so that all Alabama children thrive and learn. Housed within the Department of Early Childhood Education, the Office of School Readiness administers Alabama's diverse delivery, voluntary, high-quality, state-funded Pre-K program.

Classrooms are funded through a competitive grant process in which sites must meet specific quality assurances and abide by rigorous operating guidelines. Alabama's First Class Pre-K program has been awarded the highest quality rating by the National Institute for Early Education Research (NIEER) for the past 12 years. The multi-disciplinary First Class Pre-K Research Evaluation Team – including faculty and staff from the UAB School of Public Health, UAB School of Education, and the Public Affairs Research Council of Alabama – provides ongoing, rigorous assessment of the program's effectiveness.

Introduction

High-quality preschool programs provide opportunities to improve child development and school readiness, promote educational outcomes, and contribute to the skilled workforce of tomorrow. Foundational small-scale early education demonstration programs targeted toward disadvantaged children (e.g., Abecedarian, Perry Preschool, Chicago Parent Center Program) resulted in substantial short-term improvements in cognitive skills and academic performance, as well as sustained differences in educational attainment, socioeconomic outcomes, and health into adulthood.[1-3]

More recent, larger-scale preschool programs have yielded mixed results over the long-term. Though it is generally accepted that high-quality preschool programs yield significant early gains (especially for more disadvantaged children), evaluation of some programs has suggested "fade out," or diminished academic benefits over time.[4-15] The purpose of this issue brief is to analyze reading and math proficiency results through middle school to compare performance and persistence over time of any differences between groups of students who received Alabama First Class Pre-K and those who did not.

Methods

All students who attended Kindergarten in the Alabama public school system were classified into cohorts based on the year they began Kindergarten. Children who received First Class Pre-K the previous year were identified. Analyses are based on the population of children in each cohort that remains observable in the school year data (i.e., did not leave the public school system).

During the study period, Alabama used the standardized ACT Aspire Assessment System© to measure reading and math proficiency beginning in 3rd grade. The ACT Aspire is a vertically articulated, standards-based system of assessments linked to ACT College Readiness Benchmarks and aligned with the Common Core State Standards.[16] ACT Aspire scale scores differ based on grade and range from 400 to 442 for reading and 400 to 460 for math.[17] The Alabama State Department of Education determined four proficiency levels based on benchmark scores for each grade and subject and equal to the ACT Readiness Levels reported by ACT Aspire. Level 3 proficiency is set according to ACT's College Readiness Benchmarks.[18]

Spring ACT Aspire results for students in Alabama public schools were available for three school years – 2014-2015, 2015-2016, and 2016-2017. Individual-level de-identified data for five separate cohorts of children were examined. Without individual level identifiers, data from each cohort year and grade are analyzed together vs. longitudinally by child. Data were structured for analyses of aggregate performance by grade over time, thereby allowing longitudinal comparisons for three groups of 3rd, 4th, and 5th graders; two groups of 6th graders; and one group of 7th graders across three years of testing. See chart below for outline of data structure.

Cohort (based on year entered Kindergarten)	**Expected Grade**		
2009/2010	5th	6th	7th
2010/2011	4th	5th	6th
2011/2012	3rd	4th	5th
2012/2013	2nd*	3rd	4th
2013/2014	1st*	2nd*	3rd
School Year of Test	2014-2015	2015-2016	2016-2017

**Standardized testing not required until 3rd grade. ACT Aspire results are only available for 3rd through 7th grades.*

Shaded cells show data included in analyses.

Student demographic data were obtained from the Alabama State Department of Education database (iNow) and included gender, race/ethnicity, poverty status, and school. Students were classified as proficient in reading or math based on a two-pronged standard: scoring at Level 3 or 4 on the relevant ACT Aspire subtest and being in the expected grade based on Kindergarten entry (i.e., never retained).

Multivariable linear regression analyses were conducted to investigate the association between receiving First Class Pre-K and reading and math proficiency, controlling for student demographic characteristics. School fixed effects were included in these models to account for unobservable, time invariant school-level factors (such as school culture, school performance indicators, community supports, and average socioeconomic status of families in neighborhoods zoned for the school) that may be associated both with proficiency and the likelihood of receiving First Class Pre-K. In essence, using this approach takes into account the experiences of attending a specific school and living in a specific neighborhood to identify the effect of First Class Pre-K on proficiency independently from within-school variation in receipt of First-Class Pre-K.

To test for fade out, linear probability models were estimated for each outcome. These models included a variable representing the interaction between the receipt of First Class Pre-K and "time," along with all other student demographics mentioned above. "Time" is defined as students aging over each subsequent test/school year. The interpretation of the interaction term between First Class Pre-K and time indicates whether the impact of First Class Pre-K on proficiency changes as students age. The results from linear probability models are coefficients that can be interpreted as percentage point changes associated with the likelihood of being proficient in either reading or math. Clustered standard errors are estimated that account for multiple observations within schools. Statistical significance was set at p-values <0.05, or less than a 5% probability that the findings were due to random chance.

Findings

Demographics

Overall during the study period, 6.4% of students received First Class Pre-K. First Class Pre-K recipients were more likely to be Black and live in poverty than children who did not receive First Class Pre-K.

Table 1: Sample Demographics

	First Class Pre-K		No First Class Pre-K	
	Number in sample	**Percent in sample**	**Number in sample**	**Percent in sample**
First Class Pre-K	38,762	6.4	566,973	93.6
Poverty	27,210	70.2	354,628	62.5
Race/ethnicity				
Asian	265	0.7	6,723	1.2
Black	16,584	42.8	186,484	33.0
White	18,894	48.8	319,598	56.5
Hispanic	1,971	5.1	39,134	6.9
Other-multi	990	2.6	13,806	2.4
Male	19,002	50.0	283,796	51.2

Statewide Proficiency

Across the three school years and five cohorts, 34.7% of all Alabama students were proficient in reading and 46.1% were proficient in math based on test score and placement in expected grade/lack of retention.

Table 2: Statewide Proficiency in Reading and Math (scored Level 3 or Level 4 on ACT Aspire and never retained); combined averages of 3rd-7th grades in 2014-2015, 2015-2016, 2016-2017 school years

	Reading proficiency (percent)	**Math proficiency (percent)**
Statewide	34.7	46.1

Multivariable Analyses

With all other factors held constant, students in poverty, males, and students of the minority race/ethnicity groups of Black, Hispanic, or Other-Multiple race/ethnicities were less likely to be proficient in either skill.

Further, controlling for these demographics and school attended, **students who received First Class Pre-K were 1.6 percentage points more likely to be proficient in reading and 3.2 percentage points more likely to be proficient in math** compared to students who did not receive First Class Pre-K.

The First Class Pre-K/Time interaction variable was not statistically significant for either outcome, indicating that there is **no evidence of fade out of the benefits of First Class Pre-K** over the grades included in the analyses. This means that the observed **differences in performance of First Class Pre-K students did not change over time and that the positive benefits persist as children age and progress to later grades.**

Table 3: Reading and Math Proficiency (scored Level 3 or Level 4 on ACT Aspire and never retained); 3rd-7th grades; 2014-2015, 2015-2016, 2016-2017 school years

Demographic Characteristic	**Reading proficiency (n=579,729 observations)**	**Math proficiency (n=579,602 observations)**
	Percentage point change	**Percentage point change**
Received First Class Pre-K (compared to No First Class Pre-K)	+1.6*	+3.2*
Time (each subsequent year compared to first standardized test)	-2.3*	-6.9*
First Class Pre-K x Time (each subsequent school year – First Class Pre-K compared to first standardized test – First Class Pre-K)	Not statistically significant	Not statistically significant
Student in poverty	-17.0*	-17.3*
Male (compared to females)	-7.9*	-5.2*
Race/ethnicity (compared to White)		
Asian	+8.3*	+10.9*
Black	-14.2*	-14.2*
Hispanic	-12.7*	-8.2*
Other-Multiple	-2.3*	-2.3*
School – fixed effects variable (each school compared to all others)	Absorbed	

** Statistically significant at p<0.05*

Implications

Students who received First Class Pre-K were statistically significantly more likely to be proficient in math and in reading compared to students who did not receive First Class Pre-K. These results persist after controlling for factors that have been shown to influence academic performance, including poverty, gender, race/ethnicity, classroom/school factors, and time. Further, effects are independent from within-school variation in the receipt of First-Class Pre-K, eliminating the potential for confounding from between-school differences in neighborhood socioeconomic status.

The analyses also indicate **no evidence of fade out of the benefits of First Class Pre-K over time**. These findings are especially meaningful considering that the observations are for students in 3rd-7th grades, representing persistence of the benefits of First Class Pre-K well beyond the end of the program and into later grades where some other programs have shown diminished academic impact.

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