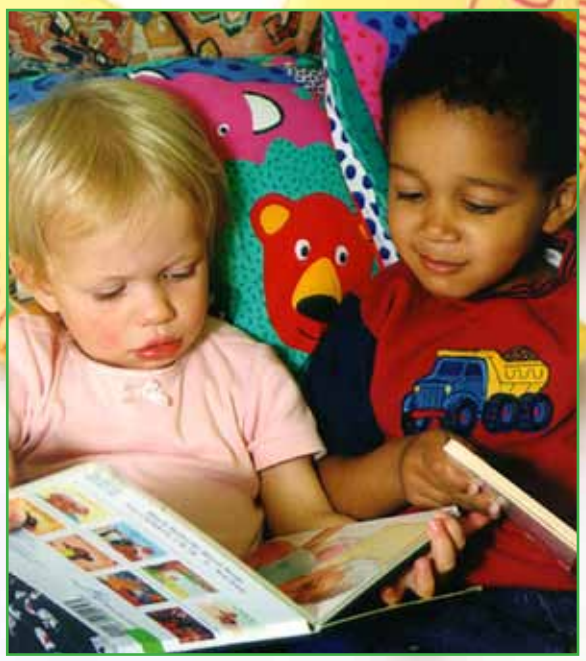
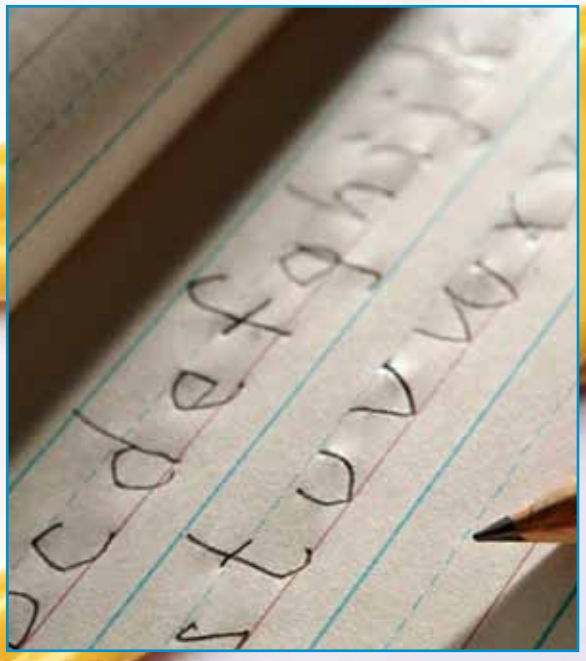


Long-term Effects of the North Carolina More at Four Pre-kindergarten Program Children's Reading and Math Skills at Third Grade



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For more information about the Evaluation of the North Carolina More at Four Pre-kindergarten Program, visit the web site at www.fpg.unc.edu/~mafeval.

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Overview of the More at Four Program

The North Carolina More at Four Pre-kindergarten Program is a state-funded initiative for at-risk 4-year-olds, designed to help them be more successful when they enter elementary school. The More at Four Program is based on the premise that all children can learn if given the opportunity, but at-risk children have not been given the same level of opportunity. The purpose of More at Four is to provide a high quality, classroom-based educational program for at-risk children during the year prior to kindergarten entry. The program targets at-risk children from low-income families (up to 300% of federal poverty rates) who are unserved in a preschool program or who are underserved (e.g., in lower quality or unregulated settings or not receiving child care subsidies). Over the years, 90% of the children served in More at Four have qualified for free or reduced-price lunch; eligibility for the program is also determined by other risk factors, such as low English proficiency, identified disability, chronic health condition, and/or developmental delay. More at Four provides funding for serving eligible children in classroom-based educational programs at a variety of sites, including public schools, Head Start, and community child care centers (both for-profit and nonprofit). The programs operate on a school day and school calendar basis for 6 to 6-1/2 hours/day and 180 days/year. Local sites are expected to meet a variety of program guidelines and standards around curriculum, training and education levels for teachers and administrators, class size and student-teacher ratios, North Carolina child care licensing levels, and provision of other program services. The More at Four Program was initiated in the 2001-2002 school year, with a full school year of services first offered in 2002-2003, and all 100 counties included since the 2003-2004 school year. More at Four has served over 160,000 children during the first nine program years (2002-2010).

Overview of the Present Study

Since its inception in 2002, the statewide evaluation of the North Carolina More at Four Pre-kindergarten Program has been conducted by the FPG Child Development Institute at the University of North Carolina at Chapel Hill. The present report describes findings on the long-term effects of participation in More at Four on children's third-grade End of Grade (EOG) math and reading scores. A quasi-experimental design was employed, using statewide data from the NC Department of Public Instruction for all third-graders in two cohorts of children, representing the 2006-2007 and the 2007-2008 school years. Comparisons were conducted between children who attended More at Four during pre-k (in 2002-2003 and in 2003-2004) and those who did not, as well as by children's poverty status (i.e., whether they qualified for free or reduced-price lunch in third grade). Two primary research questions were addressed by this study:

- Are there any long-term benefits of participation in the More at Four Pre-k Program on children's math and reading skills in third grade?
- Do the effects of More at Four participation on children's third-grade math and reading skills vary by children's poverty status?

Methods

Participants

Two cohorts of children were included in this study, based on all North Carolina third-graders who completed the EOG math and reading assessments in 2006-2007 and in 2007-2008. The sample included two groups of children—the More at Four (MAF) group that participated in the More at Four Program during either of the first two full years of the program (2002-2003 and 2003-2004) and the comparison group that never participated in More at Four. For the More at Four (MAF) group, the sample was restricted to children who had attended the program for at least 70% of the school year (126 days), in order to ensure that they had received adequate exposure to the pre-k program. The public education dataset contained information on 108,363 third-graders in 2006-2007 and 111,898 third-graders in 2007-2008. The criteria for inclusion in the study sample were that at least one third-grade EOG score (math, reading, or both) was reported and complete data on all other analysis variables (poverty status, gender, race/ethnicity, and state and local per pupil expenditures) were reported. The final study sample included 102,852 children (985 MAF and 101,867 comparison) in the 2006-2007 cohort and 102,765 children (4,569 MAF and 98,196 comparison) in the 2007-2008 cohort. The MAF group included children who participated in the program in 2002-2003 or 2003-2004 and took the third-grade EOGs in 2006-2007 or 2007-2008, including children who may have been accelerated, retained in grade, or delayed entry into school (i.e., had EOG scores in the year prior or subsequent to the expected year). Demographic characteristics of the MAF and comparison groups for each year are contained in Table 1. As expected, these data indicate relatively higher proportions of children who were poor and from non-White racial/ethnic groups in the MAF group, and similar proportions of boys and girls in the MAF and comparison groups each year.

Procedures

Educational data for all third-grade students in the state in 2006-2007 and 2007-2008 were obtained from the NC Department of Public Instruction (DPI) public education database, housed at the North Carolina Education Research Data Center, including EOG scores, special status, poverty status, gender, race/ethnicity, and per pupil expenditures. In order to identify children who previously participated in the More at Four Pre-k Program, demographic data were obtained from the statewide More at Four Program database, housed at the University of North Carolina at Chapel Hill. The More at Four database contains monthly service report data from each local More at Four contractor about the sites, classrooms, teachers, and children participating in the program. Pre-k data were obtained for 2002-2003 and 2003-2004, the expected years for attending pre-k corresponding to attending third grade in 2006-2007 and 2007-2008. Children who met the study criteria for pre-k attendance (at least 70% of the program year/126 days) were matched across the two databases using a combination of information, including first name, last name, date of birth, school district attended, and social security number (when available). Of the eligible children who attended More at Four, data on 72% of the first cohort and 65% of the second cohort (66% across both cohorts) were located in

the third-grade data set and included in the study sample. Pre-k demographic characteristics were compared between those who were included in the third-grade study sample and those who were not included, as shown in Table 2. Based on chi-square analyses of pre-k information, there were no differences between sample and non-sample children on gender or poverty status in the first cohort (2002-2003), but there were some differences in race/ethnicity, with proportionally more White/European-American and fewer Hispanic/Latino children in the study sample. In the second cohort (2003-2004), there were small differences in all characteristics, with the study sample containing proportionally more girls and fewer boys; proportionally fewer Hispanic/Latino children and slightly more White/European-American children and Black/African-American children; and slightly more children not in poverty and fewer children in poverty.

Measures

All data used in this study were obtained from the public education database. Child outcomes included third-grade EOG math and reading scale scores and achievement levels; in addition, data on identification as academically gifted or learning disabled were reported. Other data used in these analyses included child characteristics of poverty status, gender, and race/ethnicity; school and local education agency (LEA); and district-level state and local per pupil expenditures for the LEA.

EOG Scores. The EOG assessments are used to measure academic performance and competency for grade levels based on the goals and objectives of the NC Standard Course of Study. In third grade, all students take math and reading EOG assessments during the final three weeks of school. The mathematics EOG emphasizes information processing and higher order thinking, and measures competency in number and operations, measurement, geometry, data analysis and probability, and algebra across 80 items. The same math assessment was used in 2006-2007 and 2007-2008. The reading EOG focuses on children's reading and comprehension of literary and informational texts, and measures cognition (e.g., determining meaning, summarizing, identifying the purpose of text features), interpretation (e.g., making inferences and generalizations), critical stance (e.g., comparing/contrasting, understanding the impact of literary elements), and connections (e.g., connecting knowledge with outside experiences) across 50 items. The items and scoring for the reading EOG were changed from the 2006-2007 to the 2007-2008 assessments.

Two types of EOG math and reading scores were examined: developmental scale scores and achievement levels. Developmental scale scores are calculated from the raw scores (number of items correct) on the EOG assessments to show students' growth from year-to-year. The range for scale scores on the math assessment is 311-370 for both years; on the reading assessment the range for scale scores is 216-272 for 2006-2007 and 302-367 for 2007-2008. Achievement level scores group students' performance based on predetermined standards. Achievement Level 1 means that a student has an insufficient mastery of knowledge and skills; Level 2 means that a student has an inconsistent mastery of knowledge and skills; Level 3 means that a student has demonstrated mastery of knowledge and skills; and Level 4 means that a student

has a superior mastery of knowledge and skills. Achievement levels were examined as a 4-level variable indicating actual achievement level (scored 1, 2, 3, or 4). In cases where children had more than one score for the same assessment in the same year (due to re-testing), we included the highest score in the analysis in accord with the typical use of these scores by school districts. In cases where children had scores in both years, we only used the data from the first year to ensure independence among the observations in the analysis.

Special Status. In addition, information on special status classifications of children as academically gifted or learning disabled was obtained from the public education database. Children could be identified as academically gifted in math or reading; children also could be identified as having a learning disability in the areas of math, reading, writing, or other.

Poverty status. The poverty status of all children at third grade was determined based on identification in the public education database as qualified or not qualified for free or reduced-price lunch. Children qualified for free or reduced-price lunch if their family income was at or below 185% of poverty based on federal income guidelines.

Gender and race/ethnicity. Children's gender and race/ethnicity were obtained from the public education database. The database listed each child's race/ethnicity according to one of the following categories: American Indian, Asian, Black, Hispanic, Multi-Racial, or White. These classifications were collapsed into four categories for these analyses, given the small sample sizes for some cells: Black/African-American, Hispanic/Latino, White, and Other.

Per pupil expenditures. District-level information on per pupil expenditures from state and local sources was included as a measure of the quality/resources available to students. There were small negative correlations between state and local expenditures across the different years (r=-.15 to -.20); they were both included because they captured different aspects of the overall provision of resources. Expenditures from federal sources were not included because they were highly correlated with state expenditures (r=.57 to .61).

Results

Analysis Strategy

Analyses of third-grade EOG math and reading scores were conducted to examine the long-term effects of participation in the More at Four Program. Data were examined for two cohorts of children, NC third-graders in 2006-2007 and 2007-2008. Analyses compared the performance of children who attended the More at Four Program during pre-k (MAF group) to all other children in NC (comparison group). The analyses also took into account poverty status at third grade, examining two groups of children, those eligible for free or reduced-price lunch (poor group) and those not eligible (non-poor group).

Separate analyses were conducted for math and reading scale scores and achievement levels. For the math assessment data, both cohorts were analyzed together. Because the test items and scoring criteria for the reading assessment changed from the first to the second cohort, separate analyses were conducted for each cohort. The analyses focused on comparisons among four groups of children: 1) poor children who attended More at Four (MAF poor), 2) poor children who did not attend More at Four (Comparison poor), 3) non-poor children who attended More at Four (MAF non-poor), and 4) non-poor children who did not attend More at Four (Comparison non-poor). In addition, the analyses adjusted for children's demographic characteristics of gender and race/ethnicity, as well as for state and local per pupil expenditures, which represented variations in the quality and resources provided by the school districts attended by different groups of children.

For the EOG math and reading scale scores and achievement levels, three-level hierarchical linear regression models were used to examine whether children's performance was different based on participation in More at Four and poverty status, accounting for students nested within schools and schools nested within LEAs. Each model contained the following predictors: pre-k group (1=MAF, 0=comparison), poverty status at third-grade (1=poor, 0=not poor), pre-k group x poverty status interaction, race/ethnicity (coded with White as the reference cell), gender (1=male, 0=female), and LEA state and local per pupil expenditures. In the case of significant pre-k group x poverty interactions, follow-up tests of differences in the adjusted means for scale scores and achievement levels based on the regression models were conducted to examine the extent to which performance differed among the four groups of children. Effect sizes for between-group comparisons were calculated for scale scores and achievement levels using Cohen's *d*, (calculated as the mean difference between groups divided by the square root of the model pooled variance).

In addition, descriptive data are presented regarding the percentage of children identified as academically gifted in math or reading and the percentage identified as having learning disabilities (across all categories as well as within specific categories of math, reading, writing, and other), by pre-k group (More at Four vs comparison) and poverty status (poor vs non-poor). Because of the small numbers in some of these cells, no further statistical analyses were conducted for these data.

Descriptive Results

Information on children's performance on the NC third-grade EOG math and reading assessments is provided for the 2006-2007 and 2007-2008 cohorts by pre-k group (MAF vs. comparison) and poverty status (poor vs. non-poor). The means, standard deviations, and ranges for the scale scores and achievement levels are shown in Table 3, and the percentages at each achievement level are shown in Table 4.

Scale Scores

Results from the hierarchical linear regression analyses for math and reading EOG scale scores are shown in Table 5, Table 6 shows the adjusted means (adjusted for variations in children's demographic characteristics and state and local per pupil expenditures) and group comparisons based on this model, and Table 7 shows the effect size calculations. For both math and reading scores, a consistent pattern was found where non-poor children performed better than poor children, both for those who attended More at Four and those who did not. However, these differences related to poverty were much stronger within the comparison group (*d*=.46-.55) than within the MAF group (*d*=.16-.31), based on comparisons of the effect sizes. Further, the regression analyses showed significant interactions between pre-k group and poverty, indicating that participation in More at Four was associated with higher math and reading scores for poor children, but not for non-poor children. Among poor children, those who attended More at Four performed better than their peers who did not attend More at Four, with effect sizes ranging from *d*=.14-.18. Among non-poor children, comparison group children performed better than participants in More at Four (*d*=.09-.17).

Achievement Levels

Results from the hierarchical linear regression analyses for math and reading EOG achievement levels are shown in Table 8, Table 9 shows the adjusted means (adjusted for variations in children's demographic characteristics and state and local per pupil expenditures) and group comparisons based on this model, and Table 10 shows the effect size calculations. The results are similar to those for the scale scores in both domains. For both math and reading achievement levels, a consistent pattern was found where non-poor children performed better than poor children, although these differences related to poverty status were greater for the comparison group (*d*=.42-.53) than for children who attended More at Four (*d*=.18-.33). Further, the regression analyses showed significant interactions between pre-k group and poverty status. Among poor children, those who attended More at Four had higher math and reading achievement levels than their peers who did not attend More at Four (*d*=.12-.19). Among non-poor children, there were no differences between the MAF group and the comparison group in reading achievement levels in the first cohort. For math achievement levels and reading achievement levels in the second cohort for non-poor children, those in the comparison group performed slightly better than participants in More at Four (*d*=.06-.08).

Special Status Indications

As seen in Table 11, among poor children, the percentage of children identified as academically/intellectually gifted in math and reading was similar for those who attended the More at Four program during pre-k compared to those who did not (the percentage for the MAF group was slightly lower in the first cohort and slightly higher in the second). Among non-poor children, a somewhat lower percentage of children who attended More at Four were identified as academically gifted compared to all other non-poor peers. As seen in Table 11, the percentage of children identified as having a learning disability was substantially lower overall for children who attended More at Four compared to their peers, both for the poor group in the two cohorts and the non-poor group in the second cohort. In the first cohort, the percentage was similar or slightly higher for non-poor More at Four participants compared to other non-poor children.

Summary and Conclusions

These findings suggest that for poor children (those who qualified for free or reduced-price lunch), participating in the More at Four Program during pre-k had longer-term benefits in terms of math and reading skills at the end of third grade. Based on the third-grade EOG assessments, poor children who attended More at Four had higher math and reading scale scores and achievement levels than similarly poor children who did not attend More at Four. These findings were consistent across all outcomes, indicating a broad positive effect of participation in the More at Four Program on children's later academic skills. Descriptive results also showed somewhat lower proportions of children who attended More at Four being identified with a learning disability than other children, especially among poor children. Altogether, these findings are of note, because they pertain to the majority of children served by the More at Four Program. Children from poor families are one of the primary target groups of this pre-k program, and family income is one of the key eligibility criteria. At the time these cohorts of children entered More at Four, 90% qualified for free or reduced-price lunch, a percentage that has remained consistent in the program over time as well.

Not surprisingly, non-poor children performed better than poor children, both for those who attended More at Four and those who did not. This achievement gap in academic skills related to poverty is something that is widespread in our country. The strongest effects in this sample were found for differences related to poverty status. However, these effects were greater for the comparison group and substantially reduced for the MAF group. Such results may indicate that participation in More at Four has an ameliorating effect on the negative effects of poverty related to children's academic achievement. In accord with this idea, the differences between the More at Four and comparison groups were greater for poor children than non-poor children, with consistent positive effect of More at Four on the performance of poor children.

For non-poor children, those in the comparison group generally performed better than those who attended More at Four. However, children in the non-poor comparison group likely

consist of a more advantaged group overall; they represent a wider range of family socioeconomic status and include children who would not have qualified for the More at Four Program during pre-k on the basis of income. In contrast, many of the MAF children who were not poor at third grade were most likely poor at pre-k, given that 90% of the children served by More at Four were poor at that time. In addition, many of these children would have had other risk factors to qualify for the pre-k program.

Compared to the non-poor group, the poor group represents a narrower range of family socioeconomic status (i.e., those eligible for free or reduced-price lunch vs. all higher income levels). It is likely that poor children in the MAF and comparison groups are more similar to one another in this regard than non-poor MAF and comparison group children. This difference, in conjunction with the high proportion of poor children served by the More at Four Program during pre-k, suggests that the results for poor children offer the best representation of the long-term effects of the program. Although poor children who attended More at Four still were not caught up to their non-poor peers in math and reading skills at the end of third grade, they were scoring higher than poor children who did not attend the program. Furthermore, it is important to note that nothing is known about the preschool experiences of children who did not attend More at Four. It is quite likely that many of them also attended pre-k, so these results represent the effects of the More at Four Program above and beyond those of a variety of other types of preschool experiences. In sum, these findings provide evidence that the More at Four Program is helping to lessen the achievement gap for poor children in both math and reading performance, and that such early pre-k experiences can have a lasting effect into the elementary school years.

Table 1. Third-grade Sample Characteristics for More at Four and Comparison Groups

Factor	2006-2007 N=102,852		2007-2008 N=102,765	
	MAF (n=985)	**Comp** (n=101,867)	**MAF** (n=4,569)	**Comp** (n=98,196)
Gender (%)				
Female	49.9%	49.3%	52.1%	49.5%
Male	50.2%	50.7%	47.9%	50.5%
Race/Ethnicity (%)				
Black/African-American	44.8%	26.2%	41.8%	24.9%
White/European-American	32.2%	55.7%	32.7%	56.0%
Hispanic/Latino	13.8%	10.5%	15.7%	11.1%
Other/Multiracial	9.2%	7.6%	9.8%	8.0%
Poverty Status (%)				
Poor	75.0%	48.7%	72.8%	47.5%
Not Poor	25.0%	51.3%	27.2%	52.5%

Table 2. Pre-k Characteristics of More at Four Participants in Third-grade Study Sample and Not in Sample

Factor	2002-2003 N=1,593			2003-2004 N=6,816		
	Study Sample (n=1,149)	**Not in sample** (n=444)	**Sig**[a]	**Study Sample**[b] (n=4,405)	**Not in sample** (n=2,411)	**Sig**[a]
Gender[c] (%)						
Female	48.0%	46.6%	NS	51.9%	43.0%	***
Male	52.0%	53.4%		48.1%	57.0%	
Race/Ethnicity[d] (%)						
Black/African-American	45.4%	46.2%	*	42.7%	39.5%	***
White/European-American	31.8%	25.6%		32.3%	29.7%	
Hispanic/Latino	14.9%	19.2%		16.2%	22.2%	
Other/Multiracial	8.0%	9.1%		8.8%	8.7%	
Poverty Status in Pre-k[e] (%)						
Poor	86.3%	89.2%	NS	87.1%	90.5%	***
Not Poor	13.7%	10.8%		12.9%	9.5%	

[a] Significant comparisons represent differences between the two groups based on chi-square tests. Significance levels are *p< .05, **p< .01, ***p< .001.

[b] Of these children, 175 attended MAF in 2002-2003 and their EOG scores were found in the 2007-2008 data, a year later than expected; 11 attended MAF in 2003-2004 and their EOG scores were found in the 2006-2007 data, a year earlier than expected.

[c] Gender was not reported for 13 children in 2003-2004.

[d] Race/Ethnicity was not reported for 11 children in 2002-2003.

[e] Poverty status was not reported for 1 child in 2003-2004.

Table 3. Mean Scores for Third-grade EOG Assessments

Cohort	Poverty Status	Pre-k Group	Scale Scores		Achievement Levels	
			Math	Reading	Math	Reading
			Mean (SD) Range	Mean (SD) Range	Mean (SD) Range	Mean (SD) Range
2006-2007	Poor	MAF n= 734-738	341.0 (8.8) 315-364	245.7 (7.8) 219-268	2.6 (0.8) 1-4	3.1 (0.8) 1-4
		Comp n= 49,173-49,519	340.3 (9.0) 311-370	244.8 (8.4) 217-271	2.6 (0.8) 1-4	3.0 (0.8) 1-4
	Non-poor	MAF n=246	344.3 (8.9) 319-366	248.2 (8.3) 224-271	2.9 (0.7) 1-4	3.3 (0.7) 1-4
		Comp n= 52,104-52,279	347.7 (9.1) 314-370	251.4 (8.1) 217-271	3.2 (0.7) 1-4	3.5 (0.7) 1-4
2007-2008	Poor	MAF n= 3,314-3,325	342.9 (7.9) 318-368	335.0 (10.6) 306-367	2.8 (0.7) 1-4	2.2 (1.0) 1-4
		Comp n= 46,268-46,582	342.2 (8.2) 315-369	334.0 (11.0) 303-367	2.7 (0.7) 1-4	2.1 (1.0) 1-4
	Non-poor	MAF n= 1,241-1,242	346.4 (8.0) 322-369	340.1 (10.5) 310-367	3.1 (0.7) 1-4	2.6 (1.0) 1-4
		Comp n= 51,412-51,538	349.0 (8.5) 316-369	343.6 (10.9) 305-367	3.3 (0.7) 1-4	2.9 (1.0) 1-4

Table 4. Achievement Levels for Third-grade EOG Assessments

Cohort	Poverty Status	Math					Reading				
		Pre-k Group	Ach Level 1	Ach Level 2	Ach Level 3	Ach Level 4	Pre-k Group	Ach Level 1	Ach Level 2	Ach Level 3	Ach Level 4
2006-2007	Poor	MAF n= 738	9.4% (69)	28.3% (209)	51.2% (378)	11.1% (82)	MAF n= 734	2.7% (20)	18.4% (135)	46.7% (343)	32.2% (236)
		Comp n= 49,519	10.7% (5,297)	30.4% (15,062)	48.8% (24,149)	10.1% (5,011)	Comp n= 49,173	5.3% (2,606)	19.9% (9,777)	45.6% (22,429)	29.2% (14,361)
	Non-poor	MAF n= 246	4.1% (10)	20.3% (50)	56.1% (138)	19.5% (48)	MAF n= 246	1.6% (4)	12.2% (30)	39.4% (97)	46.8% (115)
		Comp n= 52,279	2.9% (1,495)	12.7% (6,618)	49.7% (25,998)	34.8% (18,168)	Comp n= 52,104	1.2% (633)	6.7% (3,500)	29.9% (15,591)	62.1% (32,380)
2007-2008	Poor	MAF n= 3,325	3.5% (115)	26.2% (871)	56.0% (1,863)	14.3% (476)	MAF n= 3,314	33.3% (1,102)	25.3% (837)	32.9% (1,091)	8.6% (284)
		Comp n= 46,582	4.7% (2,197)	28.9% (13,478)	53.2% (24,766)	13.2% (6,141)	Comp n= 46,268	37.6% (17,414)	23.2% (10,716)	31.0% (14,326)	8.2% (3,812)
	Non-poor	MAF n=1,242	0.9% (11)	15.9% (198)	57.1% (709)	26.1% (324)	MAF n=1,241	17.7% (220)	19.9% (247)	43.0% (533)	19.4% (241)
		Comp n= 51,538	1.0% (537)	10.2% (5,275)	49.0% (25,272)	39.7% (20,454)	Comp n= 51,412	12.3% (6,306)	14.4% (7,393)	41.7% (21,434)	31.7% (16,279)

Table 5. Regression Results for Third-grade EOG Scale Scores

Effect	Math	Reading	
	2006-2007 & 2007-2008 Combined	2006-2007	2007-2008
	Estimate[a] (SE)	Estimate[a] (SE)	Estimate[a] (SE)
Intercept	325.44*** (.66)	250.97*** (0.91)	343.49*** (1.14)
MAF	-0.81*** (0.21)	-1.37** (0.51)	-1.10*** (0.30)
Poor	-4.17*** (0.04)	-4.11*** (0.06)	-5.88*** (0.08)
MAF X Poor	2.06*** (0.25)	2.81*** (0.58)	2.56*** (0.35)
Race/Ethnicity			
Black/African-American	-5.20*** (0.05)	-4.42*** (0.07)	-5.98*** (0.10)
Hispanic/Latino	-2.89*** (0.07)	-3.75*** (0.09)	-5.36*** (0.12)
Other/Multiracial	-0.92*** (0.07)	-1.47*** (0.10)	-1.77*** (0.13)
White/European-American	—	—	—
Male	0.45*** (0.04)	-1.52*** (0.05)	-1.58*** (0.06)
Per Pupil Expenditure			
State	-0.31*** (0.01)	0.001 (0.01)	-0.02 (0.02)
Local	0.19*** (0.02)	0.07*** (0.02)	0.10*** (0.02)

[a] Significance levels are *p< .05, **p< .01, ***p< .001.

Table 6. Adjusted Means for Third-grade EOG Scale Scores

EOG	Cohort	Poverty Status	Pre-k Group	Scale Score (SE)	Significance[a]
Math	2006-2007 & 2007-2008 Combined	Poor	MAF n= 4,063	341.8 (0.4)	Comp-NP> MAF-NP> MAF-Poor> Comp-Poor[b]
			Comparison n= 96,101	340.5 (0.4)	
		Non-poor	MAF n= 1,488	343.9 (0.4)	
			Comparison n= 103,817	344.7 (0.4)	
Reading	2006-2007	Poor	MAF n= 734	247.3 (0.3)	Comp-NP> MAF-NP> MAF-Poor> Comp-Poor[c]
			Comparison n=49,173	245.8 (0.1)	
		Non-poor	MAF n= 246	248.6 (0.5)	
			Comparison n= 52,104	249.9 (0.1)	
	2007-2008	Poor	MAF n= 3,314	337.0 (0.2)	Comp-NP> MAF-NP> MAF-Poor> Comp-Poor[d]
			Comparison n= 46,268	335.6 (0.2)	
		Non-poor	MAF n= 1,241	340.3 (0.3)	
			Comparison n= 51,412	341.4 (0.2)	

[a] Significant differences indicate results of pairwise post-hoc comparisons of the least-squares means for each group based on hierarchical linear model estimations.
[b] For all significant differences, $p<.001$.
[c] MAF-Poor vs. MAF-NP, $p<.05$; Comp-NP vs. MAF-NP, $p<.01$; for all remaining significant differences, $p<.001$.
[d] For all significant differences, $p<.001$.

Table 7. Mean Differences and Effect Sizes for Between-Group Comparisons of Third-grade EOG Scale Scores

Contrast	Scale Scores					
	Math		Reading			
	2006-2007 & 2007-2008		2006-2007		2007-2008	
	Mean Diff	Effect Size	Mean Diff	Effect Size	Mean Diff	Effect Size
Comparison Non-poor vs Comparison Poor	4.2	0.46	4.1	0.51	5.9	0.55
MAF Non-poor vs MAF Poor	2.1	0.23	1.3	0.16	3.3	0.31
MAF Poor vs Comparison Poor	1.2	0.14	1.4	0.18	1.5	0.14
MAF Non-poor vs Comparison Non-poor	-0.8	0.09	-1.4	0.17	-1.1	0.10

Table 8. Regression Results for Third-grade EOG Achievement Levels

	Math	Reading	
	2006-2007 & 2007-2008 Combined	2006-2007	2007-2008
Effect	**Estimate[a] (SE)**	**Estimate[a] (SE)**	**Estimate[a] (SE)**
Intercept	1.30*** (0.06)	3.54*** (0.08)	2.91*** (0.10)
MAF	-0.05** (0.02)	-0.07 (0.05)	-0.08** (0.03)
Poor	-0.33*** (0.004)	-0.34*** (0.01)	-0.51*** (0.01)
MAF X Poor	0.16*** (0.02)	0.21*** (0.05)	0.19*** (0.03)
Race/Ethnicity			
Black/African-American	-0.41*** (0.01)	-0.36*** (0.01)	-0.53*** (0.01)
Hispanic/Latino	-0.22*** (0.01)	-0.31*** (0.01)	-0.47*** (0.01)
Other/Multiracial	-0.08*** (0.01)	-0.11*** (0.01)	-0.16*** (0.01)
White/European-American	—	—	—
Male	0.03*** (0.003)	-0.13*** (0.005)	-0.13*** (0.01)
Per Pupil Expenditure			
State	0.03*** (0.001)	-0.0001 (0.001)	-0.001 (0.001)
Local	0.02*** (0.002)	0.004** (0.001)	0.01*** (0.002)

[a] Significance levels are *p< .05, **p< .01, ***p< .001.

Table 9. Adjusted Means for Third-grade EOG Achievement Levels

EOG	Cohort	Poverty Status	Pre-k Group	Achievement Level (SE)	Significance[a]
Math	2006-2007 & 2007-2008 Combined	Poor	MAF n= 4,063	2.7 (0.03)	Comp-NP> MAF-NP> MAF-Poor> Comp-Poor[b]
			Comparison n= 96,101	2.6 (0.03)	
		Non-poor	MAF n= 1,488	2.9 (0.04)	
			Comparison n= 103,817	2.9 (0.03)	
Reading	2006-2007	Poor	MAF n= 734	3.2 (0.03)	Comp-NP, MAF-NP> MAF-Poor> Comp-Poor[c]
			Comparison n=49,173	3.1 (0.01)	
		Non-poor	MAF n= 246	3.3 (0.05)	
			Comparison n= 52,104	3.4 (0.01)	
	2007-2008	Poor	MAF n= 3,314	2.3 (0.02)	Comp-NP> MAF-NP> MAF-Poor> Comp-Poor[d]
			Comparison n= 46,268	2.2 (0.01)	
		Non-poor	MAF n= 1,241	2.7 (0.03)	
			Comparison n= 51,412	2.7 (0.01)	

[a] Significant differences indicate results of pairwise post-hoc comparisons of the least-squares means for each group based on hierarchical linear model estimations.
[b] Comp-NP vs MAF-NP, $p<.01$, for all remaining significant differences, $p<.001$.
[c] MAF-P vs. MAF-NP, $p<.05$; for all remaining significant differences, $p<.001$.
[d] Comp-NP vs MAF-NP $p<.01$; for all remaining significant differences $p<.001$.

Table 10. Mean Differences and Effect Sizes for Between-Group Comparisons of Third-grade EOG Achievement Levels

Contrast	Achievement Levels					
	Math		Reading			
	2006-2007 & 2007-2008		2006-2007		2007-2008	
	Mean Diff	Effect Size	Mean Diff	Effect Size	Mean Diff	Effect Size
Comparison Non-poor vs Comparison Poor	0.3	0.42	0.34	0.46	0.51	0.53
MAF Non-poor vs MAF Poor	0.2	0.22	0.13	0.18	0.32	0.33
MAF Poor vs Comparison Poor	0.1	0.14	0.14	0.19	0.11	0.12
MAF Non-poor vs Comparison Non-poor	-0.1	0.06	-0.07	0.08	-0.08	0.08

Table 11. Percentage of Third-grade Children Identified with Special Status

Special Status	2006-2007				2007-2008			
	Poor		Non-poor		Poor		Non-poor	
	MAF n=739	**Comp** n=49,569	**MAF** n=246	**Comp** n=52,298	**MAF** n=3,327	**Comp** n=46,633	**MAF** n=1,242	**Comp** n=51,563
Academically/ Intellectually Gifted								
Math	2.2% (16)	2.3% (1,134)	6.1% (15)	9.4% (4,914)	2.6% (85)	2.2% (1,023)	6.0% (75)	9.0% (4,656)
Reading	2.3% (17)	2.4% (1,207)	5.7% (14)	9.9% (5,176)	2.4% (80)	2.1% (987)	5.7% (71)	9.2% (4,751)
Learning Disability								
Any	2.8% (21)	5.9% (2,944)	4.9% (12)	3.5% (1,815)	3.4% (114)	6.0% (2,810)	2.6% (32)	3.4% (1,769)
Math	0.5% (4)	2.2% (1,098)	0.8% (2)	1.1% (578)	1.6% (53)	2.7% (1,278)	1.1% (13)	1.4% (710)
Reading	2.6% (19)	5.1% (2,506)	4.5% (11)	2.9% (1,503)	2.9% (95)	5.1% (2,367)	2.1% (26)	2.8% (1,447)
Writing	1.0% (7)	3.1% (1,515)	2.4% (6)	1.8% (961)	1.6% (52)	3.2% (1,496)	1.1% (13)	1.9% (985)
Other	0.1% (1)	0.3% (126)	0.4% (1)	0.1% (61)	0.1% (4)	0.3% (130)	0.2% (2)	0.1% (70)