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# Third-Grade Achievement for Children Who Participated in Georgia's Pre-K

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## Introduction

Georgia's Pre-K, administered by Bright from the Start: Georgia Department of Early Care and Learning (DECAL), aims to provide high-quality preschool experiences to four-year-olds to help prepare them for kindergarten. Georgia's Pre-K was the nation's first state-funded universal pre-kindergarten program and served more than 80,000 four-year-olds in the 2015–16 school year, across all 159 counties.

A recent evaluation of Georgia's Pre-K program indicated that participation in the program had significant positive effects on children's school readiness skills—including language, literacy, and math—as they entered kindergarten.<sup>1</sup> Likewise, a study in the early 2000s indicated that children who participated in Georgia's Pre-K fared better in first grade than children who had attended other types of preschool programs.<sup>2</sup> However, no recent study has examined outcomes at later grades for Georgia's Pre-K children, compared with children who did not participate.



Research in other states to evaluate long-term outcomes has produced mixed results. Most studies considered targeted pre-K programs (i.e., those serving only children at risk for school failure), finding that children who attended public pre-K programs scored higher on both reading and math tests in second or third grade than children who had not. This included studies in Louisiana, Michigan, New Jersey, North Carolina, and Texas.<sup>3</sup> However, a study of Tennessee's targeted pre-K program found that, despite outperforming their nonparticipating peers at the beginning of kindergarten, the pre-K program participants scored lower in math and reading than nonparticipants by second grade.<sup>4</sup>

The current project was designed to compare third-grade scores on the Georgia Milestones End-of-Grade (EOG) standardized achievement test for children who had and had not participated in Georgia's Pre-K. The goals of this project were to answer three main questions:

1. Do children who participated in Georgia's Pre-K perform better on EOGs in third grade than those who did not participate?
2. Is the link between Georgia's Pre-K participation and third-grade test scores stronger for children who were or were not enrolled in free/reduced lunch (FRL)?
3. Is the link between Georgia's Pre-K participation and third-grade test scores stronger for children whose home language is not English?<sup>5</sup>

<sup>1</sup> Peisner-Feinberg, E. S., Schaaf, J. M., LaForett, D. R., Hildebrandt, L. M., & Sideris, J. (2014). *Effects of Georgia's pre-k program on children's school readiness skills: Findings from the 2012–2013 evaluation study*. Chapel Hill, NC: University of North Carolina, Frank Porter Graham Child Development Institute. Retrieved from [http://dec.al.ga.gov/documents/attachments/GAPreKEval\\_RDDReport.pdf](http://dec.al.ga.gov/documents/attachments/GAPreKEval_RDDReport.pdf)

<sup>2</sup> Henry, G. T., & Rickman, D. K. (2004). *The Georgia Early Childhood Study final report*. Atlanta: Georgia State University.

<sup>3</sup> LA: Ramey, C. T., Ramey, S. L., & Asmus, G. J., & Rockhold, L. J. (2011). *LA 4 Longitudinal Study: The impact of LA 4 participation on academic achievement in 3rd & 4th Grade: iLeap & LEAP performance for cohorts 1-4*. Lafayette, LA: Cecil J. Picard Center for Child Development and Lifelong Learning. Retrieved from <http://picardcenter.louisiana.edu/sites/picardcenter/files/LA%204%20iLEAP%20and%20LEAP%20Report.pdf>

MI: Xiang, Z., & Schweinhart, L. J. (2002). *Effects five years later: The Michigan School Readiness Program evaluation through age 10*. Ypsilanti, MI: High/Scope Educational Research Foundation.

NJ: Frede, E., Jung, K., Barnett, W. S., & Figueras, A. (2009). *The APPLES blossom: Abbott preschool program longitudinal effects study (APPLES), preliminary results through 2nd grade*. New Brunswick, NJ: National Institute for Early Education Research. Retrieved from <https://pdfs.semanticscholar.org/fce1/1efb4f8943c-07f207a545dae8dd0f58f4278.pdf>

NC: Dodge, K. A., Bai, Y., Ladd, H. F., & Muschkin, C. G. (2016). *Impact of North Carolina's early childhood programs and policies on educational outcomes in elementary school*. Child Development, 88(3), 996-1014. doi: 10.1111/cdev.12645

TX: Andrews, R. J., Jargowsky, P., & Kuhne, K. (2012). *The effects of Texas's targeted pre-kindergarten program on academic performance* (No. w18598). Cambridge, MA: National Bureau of Economic Research.

<sup>4</sup> Lipsey, M. W., Farran, D. C., & Hofer, K. G. (2015). *A randomized control trial of a statewide voluntary prekindergarten program on children's skills and behaviors through third grade*. Nashville, TN: Peabody Research Institute.

<sup>5</sup> Children whose home language was not English were identified by their enrollment in the Limited English Proficiency (LEP) program in kindergarten. For a detailed description of which children are enrolled in the LEP Program, see the data dictionary at <https://gosa.georgia.gov/data-requests>

## Methods

To answer these questions, DECAL provided Child Trends with de-identified administrative records from Georgia’s Academic and Workforce Analysis and Research Data System (GA•AWARDS; see box) for all children who were in third grade in 2015–16. This dataset included records from 136,310 children who had valid Georgia Milestones EOG test scores and information from DECAL about which children had participated in Georgia’s Pre-K four years earlier.

Children who had and had not participated in Georgia’s Pre-K may be different from one another in many important ways, and those other differences might affect their third-grade test scores. For that reason, we sought to match children who had participated in Georgia’s Pre-K with otherwise similar children who had not participated, creating two groups (Georgia’s Pre-K and non-Georgia’s Pre-K) that were as similar as possible on key variables. Children were matched using a statistical technique called propensity score matching. This match was based on the school where the children attended kindergarten;<sup>6</sup> their enrollment in the free/reduced lunch (FRL) (which serves as an indicator of family poverty) in kindergarten; home language spoken in kindergarten; identified disability in kindergarten; and third-grade reports of gender, race, Hispanic origin, and age in years.

After matching, each group included 46,262 children. About one-third of the original 136,310 children were excluded from the analyses because they could not be matched (n = 43,786, 32%).<sup>7</sup> See Table 1 for a summary of the characteristics of the children in each group.

Housed in the Governor’s Office of Student Achievement, GA•AWARDS is a statewide longitudinal data system that combines education and workforce data from 10 state agencies to support research and informed decision making. For more information, see <https://gosa.georgia.gov/statewide-longitudinal-data-system-ga%E2%80%A2awards>

**Table 1. Summary of Child Characteristics in Georgia’s Pre-K and non-Georgia’s Pre-K Groups**

*After matching, children in the two groups were almost identical on several key variables.*

|  | Georgia’s Pre-K<br>(n = 46,262) | Non-Georgia’s<br>Pre-K<br>(n = 46,262) |
|--|---------------------------------|--|
| Age in years in third grade (mean)       | 8.4                             | 8.4                                    |
| Free/reduced lunch (FRL) in kindergarten | 74%                             | 73%                                    |
| Home language other than English         | 11%                             | 11%                                    |
| Identified disability in kindergarten    | 3%                              | 3%                                     |
| Gender (boys)                            | 49%                             | 49%                                    |
| Race                                     |                                 |  |
| Black or African American                | 42%                             | 42%                                    |
| White                                    | 50%                             | 50%                                    |
| Other                                    | 8%                              | 8%                                     |
| Hispanic                                 | 12%                             | 12%                                    |

Source: GA•AWARDS

<sup>6</sup> Note that these children were in kindergarten in 2012–13, before Georgia implemented Community Eligibility (CEP) for free/reduced lunch. For more details, see [http://www.gadoe.org/School-Improvement/Federal-Programs/title-i/Pages/Community-Eligibility-Provision\(CEP\).aspx](http://www.gadoe.org/School-Improvement/Federal-Programs/title-i/Pages/Community-Eligibility-Provision(CEP).aspx).

<sup>7</sup> Of these, 14,548 were children who had participated in Georgia’s Pre-K and 29,238 were children who had not.



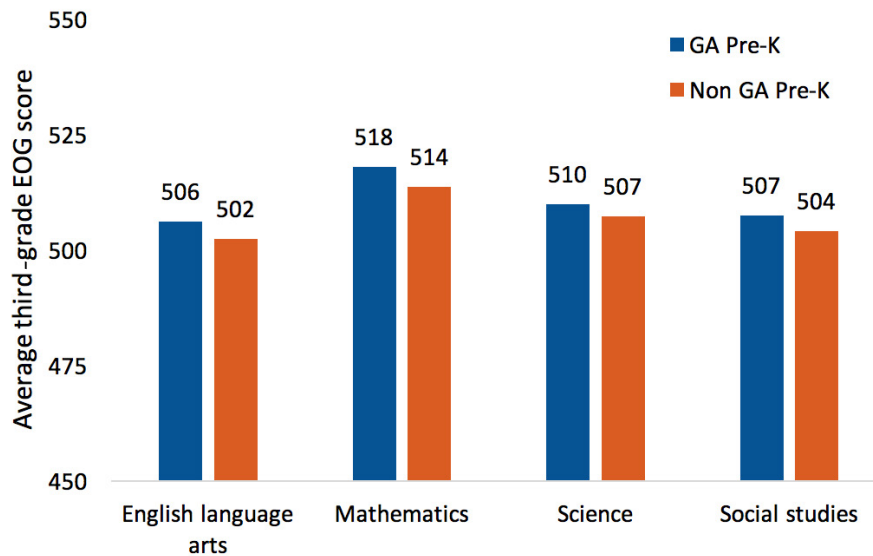
## Results

### Do children who participated in Georgia's Pre-K perform better on EOGs in third grade than those who did not participate?

Yes, children who participated in Georgia's Pre-K performed significantly better on third-grade EOGs than those who did not, in all areas tested: English language arts (ELA), math, science, and social studies. As seen in Figure 1, children who participated in Georgia's Pre-K scored three to four points higher on the EOGs in each subject than their peers who did not participate. Effect sizes for regressions comparing the scores were small, with Cohen's *d* ranging from .06 to .09. These effect sizes are comparable to those found in Texas<sup>8</sup> but somewhat smaller than those found in New Jersey, where the effect sizes were about .20.<sup>9</sup>

**Figure 1.** Average Third-grade EOG Scores for Children Who Did and Did Not Participate in Georgia's Pre-K

Children who participated in Georgia's Pre-K scored significantly higher on Georgia Milestones EOGs in third grade than children who did not participate.



Source: GA-AWARDS

Note: These values have been adjusted to account for child age (in years) in third grade, gender, race, Hispanic origin, FRL status in kindergarten, home language in kindergarten, and identified disability in kindergarten. The Y axis range represents roughly one standard deviation above and below the mean.

In addition to scores, Georgia Milestones reports student achievement on EOGs in four levels: *beginning*, *developing*, *proficient*, and *distinguished*. Children who score in the proficient or distinguished groups are prepared for the next grade level, according to Georgia Milestones.<sup>10</sup> Children who score in the developing or beginning groups are likely to need additional support to be successful in the next grade. As seen in Figure 2, the odds of being proficient or distinguished in ELA in third grade were 11 percent higher for a child who went to Georgia's Pre-K than for a child who did not. For math, the odds of being proficient or higher were 17 percent higher for a Georgia's Pre-K child; for science, 11 percent higher, and for social studies, 14 percent higher.<sup>11</sup>

<sup>8</sup> Andrews, R. J., Jargowsky, P., & Kuhne, K. (2012). *The effects of Texas's targeted pre-kindergarten program on academic performance* (No. w18598). National Bureau of Economic Research.

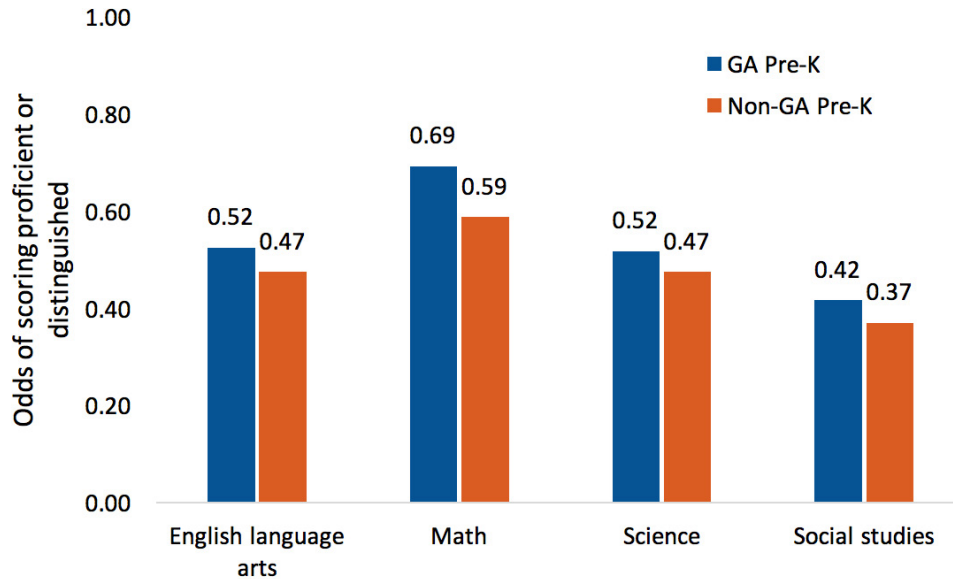
<sup>9</sup> Frede, E., Jung, K., Barnett, W. S., & Figueras, A. (2009). *The APPLES blossom: Abbott preschool program longitudinal effects study (APPLES), preliminary results through 2nd grade*. National Institute for Early Education Research.

<sup>10</sup> Georgia Department of Education. (2015). *Georgia Milestones Achievement Level Descriptors*. Retrieved from <http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Pages/Georgia-Milestones-ALD.aspx>

<sup>11</sup> Odds is defined as the ratio of success to failure (Vogt, 1999). It is calculated by dividing the probability that something will happen by the probability that it will not happen. For ELA, the odds of a Georgia's Pre-K student being proficient or distinguished are  $34.4/(100-34.4)=.52$  and the odds of a non-Georgia's Pre-K student being proficient or distinguished are  $32.2/(100-32.2)=.47$ . The odds ratio is calculated by dividing the Georgia's Pre-K odds by the non-Georgia's Pre-K odds ( $.52/.47=1.11$ ). The percentage over 1.00 in the odds ratios is the increase in odds associated with the numerator.

**Figure 2.** Odds of Scoring Proficient or Distinguished on Third-grade EOGs for Children Who Did and Did Not Participate in Georgia's Pre-K

Children who participated in Georgia's Pre-K have significantly higher odds of scoring proficient or distinguished on Georgia Milestones EOGs in third grade than children who did not participate.



Source: GA-AWARDS

Note: These values have been adjusted to account for child age (in years) in third grade, gender, race, Hispanic origin, FRL in kindergarten, home language in kindergarten, and identified disability in kindergarten.

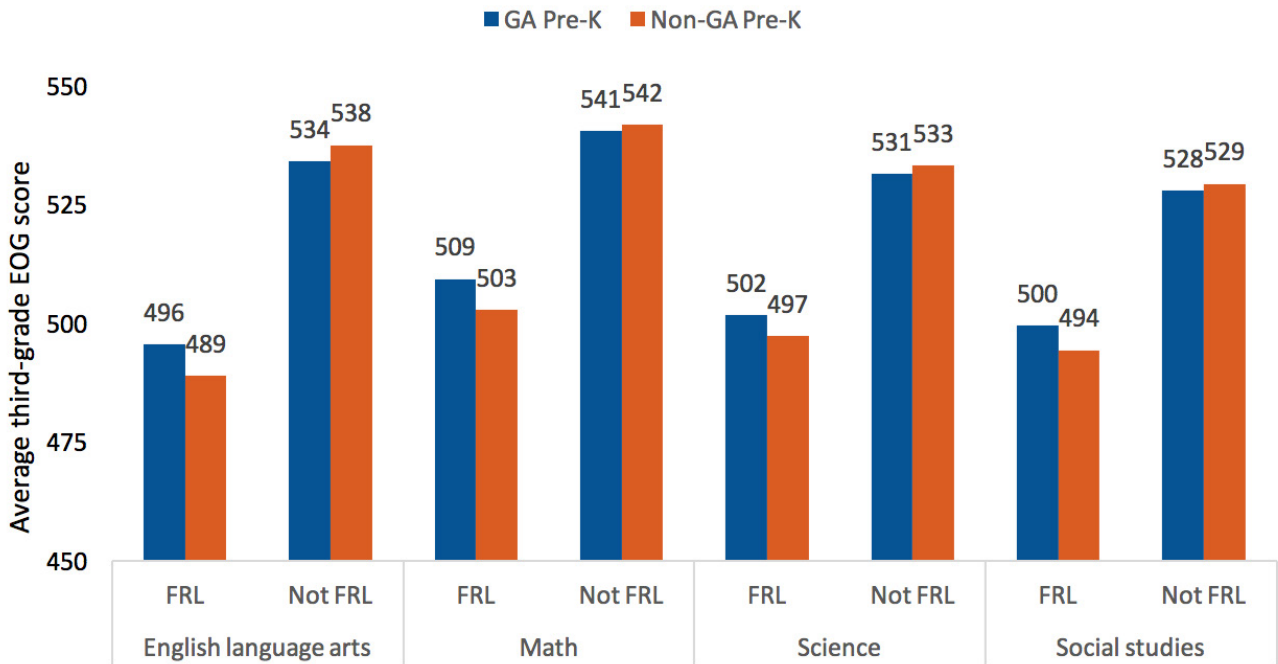
### Is the link between Georgia's Pre-K participation and third-grade test scores stronger for children enrolled in the free/reduced lunch program?

Yes, among children enrolled in FRL in kindergarten, those who participated in Georgia's Pre-K scored higher, on average, on all third-grade EOG tests, relative to nonparticipants. Among children not enrolled in FRL in kindergarten, those who had participated in Georgia's Pre-K scored lower, on average, on all third-grade EOG tests than those who had not participated (see Figure 3). All effect sizes (Cohen's  $d$ ) were small, but the effect for children enrolled in FRL (.10 to .14) was more than twice as large as the effect for children who were not enrolled in FRL (-.03 to -.06).



**Figure 3.** Average Third-grade English Language Arts EOG Scores for Children Who Did and Did Not Participate in Georgia’s Pre-K, by FRL Status

Among children enrolled in FRL, those who participated in Georgia’s Pre-K scored higher on third-grade EOGs; the opposite was true for children who were not enrolled in FRL.



Source: GA-AWARDS

Note: These values have been adjusted to account for child age (in years) in third grade, gender, race, Hispanic origin, FRL in kindergarten, home language in kindergarten, and identified disability in kindergarten.

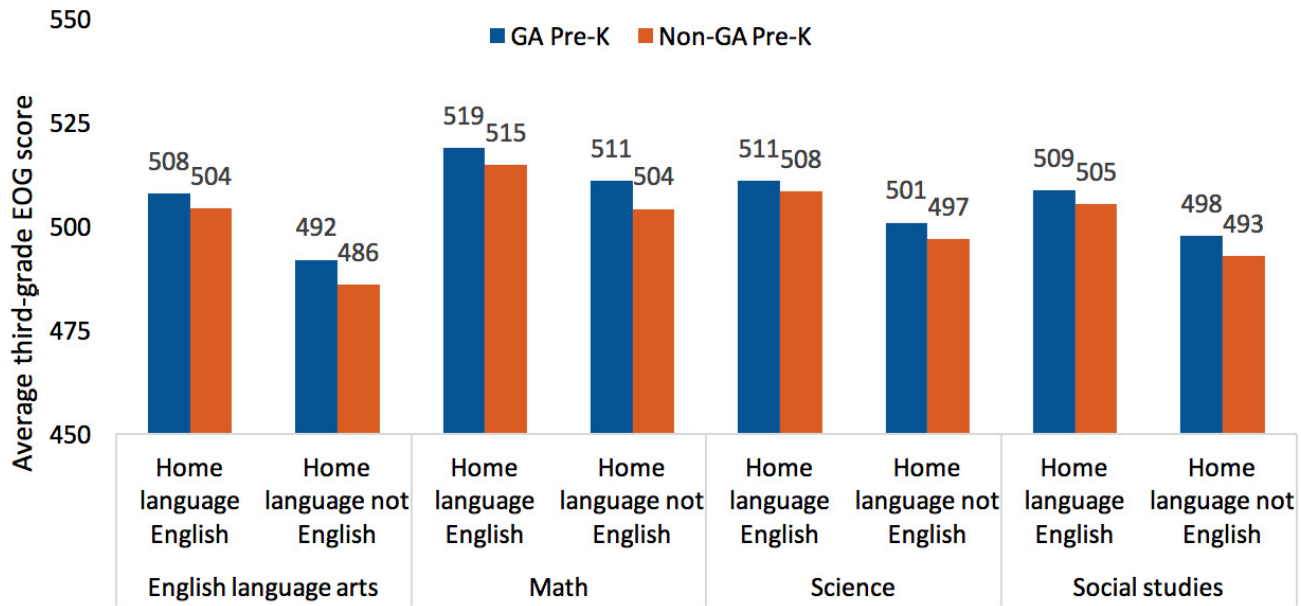
Among children enrolled in FRL, the odds of scoring proficient or distinguished were 20–30 percent higher for children who had participated in Georgia’s Pre-K than for those who had not. For children not enrolled in FRL, the odds of scoring proficient or distinguished were 6–12 percent lower for Georgia’s Pre-K participants.

**Is the link between Georgia’s Pre-K participation and third-grade test scores stronger for children whose home language is not English?**

Yes, participation in Georgia’s Pre-K was associated with higher test scores for both children whose home language was and was not English; however, the difference between those who did and did not participate in Georgia’s Pre-K was slightly larger for children whose home language was not English (see Figure 4). For children whose home language was not English, the effect sizes (Cohen’s *d*) ranged from .09 to .14. For children whose home language was English, the effect sizes ranged from .06 to .07.

**Figure 4. Average Third-grade Mathematics EOG Scores for Children Who Did and Did Not Participate in Georgia’s Pre-K, by Home Language**

Children who went to Georgia’s Pre-K scored higher than their peers who did not, regardless of home language; however, the difference was greater for children whose home language was not English.



Source: GA•AWARDS

Note: These values have been adjusted to account for child age (in years) in third grade, gender, race, Hispanic origin, FRL in kindergarten, home language in kindergarten, and identified disability in kindergarten.

Among children whose home language was not English, the odds of scoring proficient or distinguished were 21–32 percent higher for children who had participated in Georgia’s Pre-K than for those who had not. For children whose home language was English, the odds of scoring proficient or distinguished were 8–17 percent higher for Georgia’s Pre-K participants.

## Limitations

These analyses capitalize on the wealth of data collected and maintained by GA•AWARDS, including information to identify children who did and did not participate in Georgia’s Pre-K. Analysis of this sort of records data, however, has some inherent limitations.

First, and most importantly, we cannot draw causal conclusions from these analyses. We do not know that the higher test scores for children who participated in Georgia’s Pre-K were due to their participation. Other factors, such as family supports, may both cause children to participate in Georgia’s Pre-K and cause their scores to be higher. To the extent possible, we have addressed this concern using propensity score matching and control variables, but it is never possible to account for all differences between children who do and do not take part in a voluntary program.

Second, these analyses only compare third-grade test scores for children who did and did not participate in Georgia’s Pre-K four years earlier. It is possible that some children in the non-Georgia’s Pre-K group actually participated in Georgia’s Pre-K five years earlier, but were retained or held back in pre-kindergarten or early elementary school. Likewise, some children who participated in Pre-K four years earlier may have been excluded from our analyses because they were retained and did not yet have third-grade test scores. Depending on which children were retained, this omission could bias results in either direction.

Third, we do not have information about the preschool experiences of children who did not participate in Georgia’s Pre-K. Some of them likely went to high-quality private preschools, while others were likely in family child care homes or cared for exclusively by a parent or relative. Including children who attended other high-quality programs may be attenuating the strength of the findings.



Finally, we do not have information about these children's early elementary experiences. Clearly, third-grade test scores result from the accumulated learning that occurs prior to school and during the early elementary grades. We did match children on the school they attended for kindergarten, which partially addresses this problem by ensuring that we do not have systematic differences in school quality from the start. However, collecting and incorporating information about the quality of elementary schools would greatly strengthen our understanding of these test scores.

## Conclusions

The findings indicate that, on average, third graders who participated in Georgia's Pre-K scored higher than those who did not, in all subjects included on the EOG. The differences were small in statistical terms<sup>12</sup> but we think they are meaningful. According to Georgia Milestones, children's odds of being ready for fourth grade were 10–18 percent higher when they had participated in Georgia's Pre-K than when they had not. The effect sizes are roughly comparable to those seen in Texas,<sup>13</sup> but smaller than those from New Jersey.<sup>14</sup> We think these effects matter, despite their small size, for several reasons. The tests used in these analyses were administered four years after the children left Georgia's Pre-K. This is a long time for any intervention to have an effect, and the children had many experiences that affected their test scores after participation in Georgia's Pre-K. Likewise, Georgia's Pre-K is a broad intervention designed to serve many purposes in addition to promoting academic achievement, such as improving social skills, smoothing the transition to kindergarten, and engaging families in their children's education. EOGs are not designed to test the effects of pre-kindergarten, so they may not align well with the goals of Georgia's Pre-K. Further, we used careful statistical techniques to guard against bias, but those techniques also tend to decrease the size of effects. When less stringent controls are used, the effects appear larger. Despite these factors, students who attended Georgia's Pre-K scored significantly higher on all EOGs at the end of third grade.



Test scores were slightly lower for non-FRL children who participated in Georgia's Pre-K than for those who did not, but the effects were less than half as large as the positive pre-kindergarten effects for children enrolled in FRL. One possible explanation is that non-FRL children who did not participate in Georgia's Pre-K were more likely to attend high-quality private preschools than their counterparts who were enrolled in FRL. Unfortunately, there are no data available about the preschool experiences of non-participating children to help us test this hypothesis.

The findings were stronger for children enrolled in FRL or whose home language is not English, relative to their peers. Given that these two groups are especially at risk for academic difficulties, it is particularly promising that participation in Georgia's Pre-K is linked to a higher likelihood of leaving third grade with the skills needed for success in the fourth grade.

In sum, although the findings must be interpreted with caution, they provide evidence of the benefits of Georgia's Pre-K in early elementary school.

<sup>12</sup> Cohen, J. (1992). *A power primer*. *Psychological Bulletin*, 112(1), 155.

<sup>13</sup> Andrews, R. J., Jargowsky, P., & Kuhne, K. (2012). *The effects of Texas's targeted pre-kindergarten program on academic performance* (No. w18598). Cambridge, MA: National Bureau of Economic Research.

<sup>14</sup> Frede, E., Jung, K., Barnett, W. S., & Figueras, A. (2009). The APPLES blossom: Abbott preschool program longitudinal effects study (APPLES), preliminary results through 2nd grade. *NJ: National Institute for Early Education Research*. Retrieved from <https://pdfs.semanticscholar.org/fce1/1efb4f8943c07f207a545dae8dd0f58f4278.pdf>