

Trends in Children's Academic Skills at School Entry: 2010 to 2017

By Megan Kuhfeld, James Soland, Christine Pitts, and Margaret Burchinal



KEY FINDINGS

- **Students' academic skills at school entry were mostly flat between 2010 and 2014, then declined slightly from 2014 to 2017, with a larger decrease in mathematics.**
- **Racial/ethnic achievement gaps at school entry narrowed significantly from 2010 to 2017.** The Black-White gap decreased by about 0.11 standard deviation (SD) in mathematics and 0.09 SD in reading, while the Hispanic-White gap decreased by 0.09 SD in mathematics and 0.11 SD in reading.
- **Public school district pre-K program enrollment was not associated with changes in students' academic skills between 2010 and 2017.**

Children's academic skills at school entry are a critical foundation for subsequent learning and development. Research has shown both that the early math and reading skills of students as they start kindergarten are a strong predictor of their future academic achievementⁱ and earnings,ⁱⁱ and that there are substantial, troubling disparities: children from low-income families or from traditionally underrepresented minorities enter school with lower reading and math skill levels than do their more advantaged peers.ⁱⁱⁱ Because of this, recent state and federal policies have focused on promoting early care and education programs to improve academic skills in early childhood for all children, especially targeting low-income children.^{iv}

Research using Early Childhood Longitudinal Survey-Kindergarten Cohort (ECLS-K) data provides important insight into how children's academic skills at school entry have changed from 1998 to 2010. Studies found, for example, that U.S. students entered kindergarten with stronger teacher-reported math and literacy skills in 2010 than in 1998,^v and that some racial/ethnic achievement gaps in math and reading skills at school entry narrowed during this time,^{vi} but there were mixed results for changes in income-related gaps.^{vi,vii}

The world and education are far from static, though, and since 2010, myriad changes in policies, practices, and society have taken place in the U.S., many of which may impact children and the skills they have when they start school. Income inequality has widened between 2010 and 2017^{viii} and the proportion of students whose parents speak a language other than English at home increased during the last decade.^{ix} Shifts in public policies, especially increased funding for and increased enrollment in pre-kindergarten programs, many directed toward students from lower-income families or with risk factors, is another potentially important change. Thirty-three percent of 4-year-olds in the U.S. were enrolled in state pre-kindergarten programs in 2017, an increase of nine percent in a decade.^x Studies have shown that pre-K programs vary greatly in quality

and impact, but generally improve student skills at school entry.^{xi}

Given these changes, and the importance of early academic skills for long-term success for students, understanding how differences in skills at school entry by race/ethnicity and income have changed over time is critical. There are challenges to examining these changes at the national level, however. The most recent national data on kindergarten students from the ECLS-K is from 2010, and most state testing programs do not begin until students are in third grade.

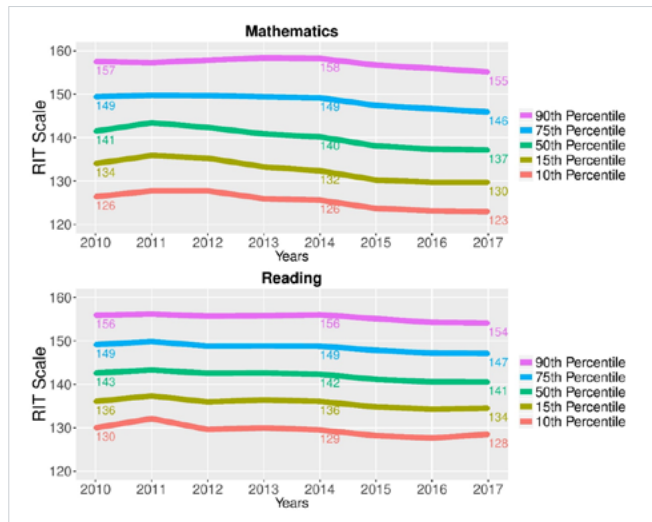
Despite the lack of federally mandated testing in early grades, school districts across the country have increasingly turned to the MAP® Growth™ assessments to measure student academic skills in kindergarten. In this study, we use reading and mathematics scores and demographic data from over two million students who entered kindergarten between the fall of 2010 and the fall of 2017. In total, the sample included students from over 10,500 schools across all 50 states, representing approximately one in five U.S. public schools serving kindergarten students. Additionally, we used school- and district-level data from Common Core of Data (CCD) and the Stanford Education Data Archive (SEDA) to weight the sample to better represent the demographics of the overall U.S. kindergarten population within each year.

This study addressed three questions:

1. What are the trends in children's math and reading achievement at school entry between 2010 and 2017?
2. How have achievement gaps at school entry by race/ethnicity, gender, and school poverty level changed over the last eight years?
3. Are changes across time in school districts' pre-K enrollment associated with trends in students' math and reading skills at school entry?

Students' achievement levels at school entry declined slightly from 2010 to 2017.

Students' achievement levels at school entry were mostly flat in the first half of the decade, but slightly decreased between 2014 and 2017 in both mathematics and reading. The median kindergarten student's score dropped approximately four RIT points, or 0.24 standard deviations (SDs), in mathematics and two RIT points, or 0.14 SD, in reading during the eight-year time span. This trend was consistent across low-, middle-, and high-achieving students.

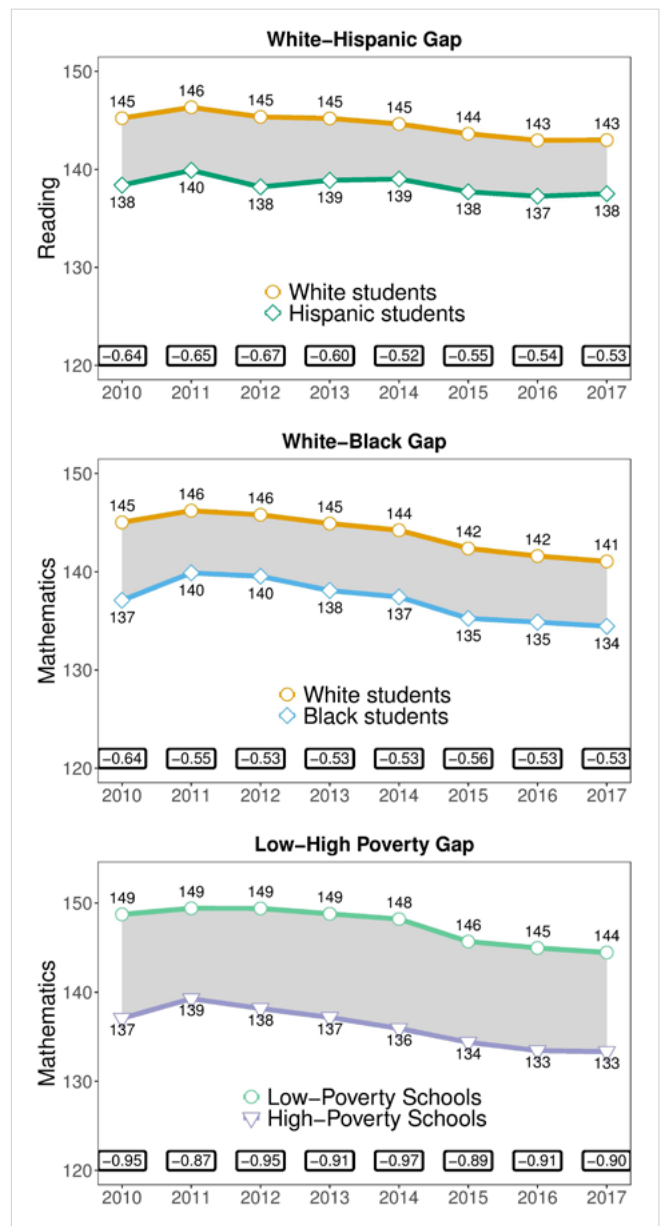


Trends in mathematics and reading scores at school entry between 2010 and 2017 by score percentile.

Racial/ethnic achievement gaps at school entry narrowed significantly, but modestly, from 2010 to 2017.

Racial/ethnic achievement gaps between Black and White and Hispanic and White children at school entry narrowed modestly over the last eight years. In 2010, the average mathematics score for White kindergarteners was 0.64 SD higher than for their Black peers, significantly larger than the 0.53 SD difference between Black and White students in 2017. In reading, the Black-White gap narrowed from 0.51 to 0.42 SD over the eight-year span. The Hispanic-White gap at school entry also narrowed, dropping from 0.68 to 0.59 SD in mathematics and from 0.64 to 0.53 SD in reading. The Asian-White gap fluctuated somewhat over time but lacked a clear overall trend.

After accounting for school-level poverty, Black-White and Hispanic-White achievement gaps substantially decreased, with an average reduction in gaps of about 0.18 SD in mathematics and 0.16 SD in reading. However, even after controlling for school poverty, racial/ethnic gaps at school entry remained statistically significant across all years in both math and reading, and the pattern of narrowing of these gaps remained consistent.



Selected trends in achievement gaps at school entry in mathematics and reading, 2010-2017. White-Hispanic gap trends in reading (top panel), White-Black gap trends in mathematics (middle panel), and low-high poverty gap trends in mathematics (bottom panel) are shown. Gaps in a standardized metric are reported as boxed numbers at the bottom of each chart. See the paper for the full figure.

Less change was seen in gender gaps: female students scored higher than male students in both mathematics and reading at school entry each year in this study, and the 2017 reading achievement gap between male and female kindergarteners, 0.16 SD, was unchanged from 2010. The mathematics male-female gap favoring female students narrowed slightly, declining from 0.09 SD in 2010 to 0.05 SD in 2017.

Lastly, as we did not have an individual measure of socioeconomic status for the students in our sample, we examined achievement gaps between low and high-poverty schools. The low-high school poverty gap in math declined from 0.95 SD in 2010 to 0.90 SD in 2017, and the gap in reading narrowed from 0.88 SD in 2010 to 0.77 SD in 2017. In both math and reading, the primary years in which achievement gaps narrowed (2013–2017) corresponded to the same period in which the trends for both groups are negative.

Public school district pre-K program enrollment was not associated with changes in students' academic skills.

Analysis of variation in scores between districts showed that a sizable amount of the variation in math and reading scores of children at school entry in 2010 was between districts, rather than between schools within districts (47 percent of variation in reading and 48 percent in math). However, the degree to which district scores decreased from 2010 to 2017 did not significantly vary by percent pre-K enrollment in the district (calculated based on district-level pre-K enrollment counts from the CCD). Rather, districts with high pre-K enrollment showed similar overall drops across time as districts that did not offer pre-K programs.

RECOMMENDATIONS

More exploration is needed to understand factors driving changes in children's skills at school entry.

The results of this study present a somewhat mixed picture of the state of students' academic skills at school entry. On one hand, academic achievement at school entry slightly declined in the past few years, and this negative trend was not associated with the percent of students enrolled in district pre-K programs. On the other, achievement gaps by race/ethnicity and school poverty showed modest, but promising, reductions during the same period. Although no other large-scale studies have yet examined kindergarten trends during this past decade, these recent drops are mostly consistent with recent results in fourth-grade students on NAEP. Between 2011 and 2013, U.S. fourth graders showed small increases on NAEP, followed by small declines between 2015 and 2017.^{xiii} While this descriptive study cannot determine whether the drops that the two tests show reflect the same underlying phenomena or identify potential policy and practice mechanisms underlying the differing trends in achievement and gaps, additional investigation into potential policy and practice mechanisms underlying these trends is warranted.

Policy makers, education leaders, and researchers should work together to better understand, support, and evaluate high-quality pre-K programs.

This study also examined whether trends in math and reading skills were associated with changes in districts' pre-K enrollment across time. The results showed that public school district pre-K program enrollment was not associated with the observed changes in students' academic skills. These findings are consistent with other research^v that found that their measures of preschool participation within ECLS-K did not account for any of the changes seen in teacher-reported math or literacy skills between 1998 and 2010.

This apparent lack of connection between pre-K experiences and entry-to-school reading and math skills may raise important questions about the current policy focus on pre-K programs to address inequities in our society. Pre-K programs are diverse, with over 60 programs in 43

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RECOMMENDATIONS (CONTINUED)

states and D.C. that vary dramatically in quality according to widely accepted standards.^x The most promising results for children in pre-K programs often come from high-quality programs that include evaluation of the program's impacts on students. Generalizing these promising findings to programs across the country that vary so widely may be questionable.

Research can provide important insights, but the fragmented context of early learning programs can create challenges in comparing programs across districts and states and in private and public programs. Policies should encourage evaluation of programs and expand practices that make it easier to compare programs across diverse settings. In this way policymakers, education influencers, and researchers can better identify and influence the critical levers for improving quality programming and build from successful approaches to direct resources and leverage assets to better support all children's early learning.

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