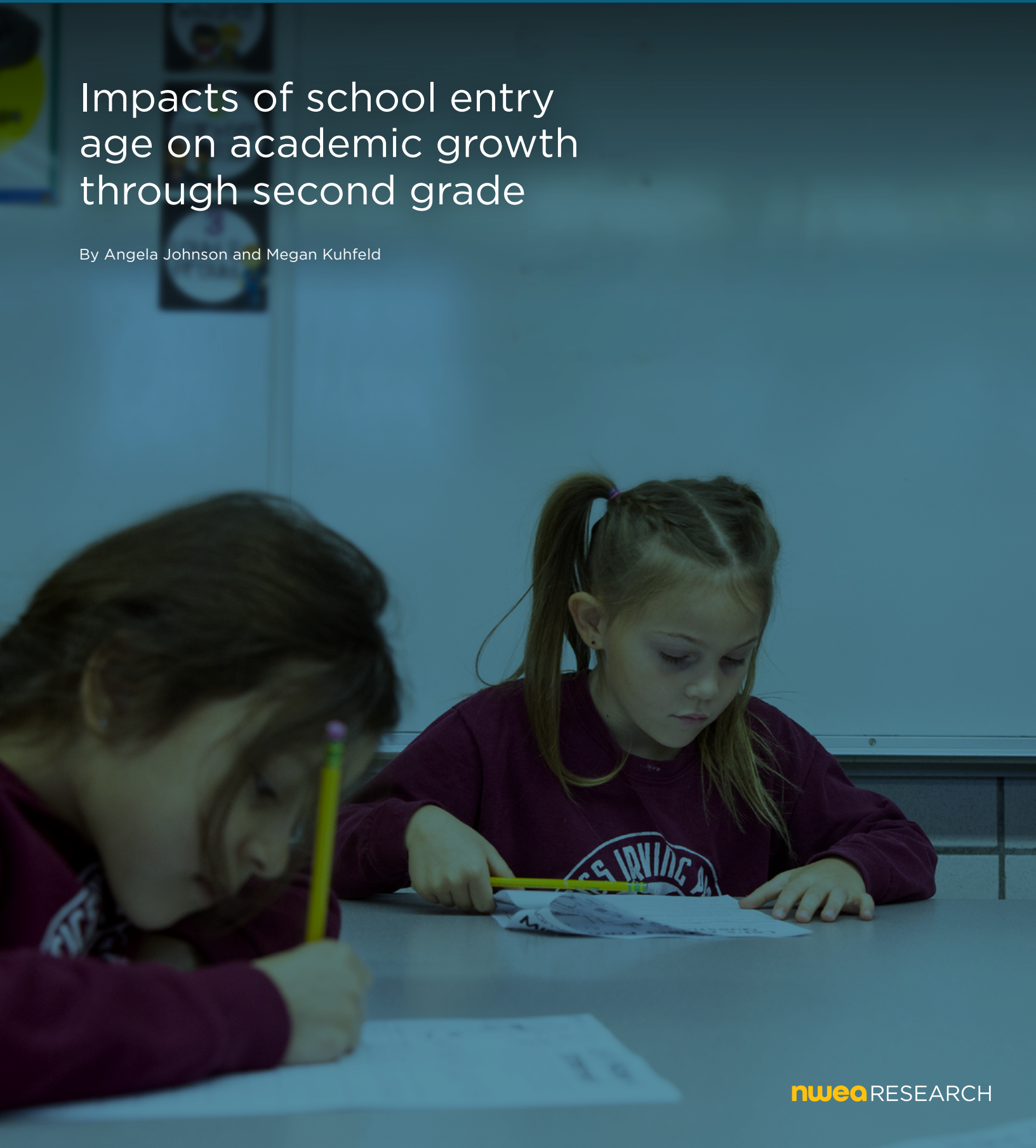


Impacts of school entry age on academic growth through second grade

By Angela Johnson and Megan Kuhfeld



KEY FINDINGS

- **Students who entered kindergarten a year older had higher initial achievement and growth in kindergarten compared to students who entered a year younger.**
- **However, older students grew more slowly than younger students in first and second grades, reducing the gap in achievement between older and younger students over time.**
- **Initial achievement gaps between older and younger kindergarten entrants were seen across subgroups, but learning rates over the first few years of school did not vary significantly by subgroup status.**

At what age should students start kindergarten? Do older kindergarten students have an advantage over younger students in their academic achievement and growth? In recent decades, the age at which children enroll in school has steadily increasedⁱ reflecting trends in policy and practice: many states have shifted cutoff dates to increase the minimum age at which children are permitted to enrollⁱⁱ and some parents are opting to hold their children who have reached these minimum ages back one or more years before they start school, a practice sometimes termed academic redshirting.

The idea driving the trend of increasing age at school entry is that being older and more mature, either in general or relative to other students in their class, helps children derive more benefit from school^{iii,iv}. The supposed advantage is potentially twofold: the additional skills children gain in the extra time before entering school may allow them to start at a higher level of achievement; and, some believe, teachers and school staff may provide more educational opportunities to the older students in their classes based on these students' achievement and behaviors relative to their younger classmates.

However, delaying the age of school entry has associated costs and may contribute to income-based achievement gaps. In the absence of public pre-kindergarten programs, families bear the cost of childcare during this additional year of out-of-school time, and the quality of childcare during this hold-out year may contribute to achievement differences at school entry between children from high- and low-income families^v. If entering school at an older age actually leads to more learning in the long run, investments in the hold-out year may be worthwhile. If, however, older children enter with higher achievement but learn at the same or lower rates once in school, then skill differences at kindergarten entry and any associated benefits would fade away over time. While research has examined how school entry age

affects short- and long-term student outcomes, results have been mixed, and limitations in data and research design have limited the findings' generalizability across multiple policy contexts. Some studies found that older kindergarten entry age is associated with better mental health and academic achievement in children as well as reductions in juvenile crime and incarceration^{vi,vii} but others found negative effects on cognitive skills^{viii,ix}. Studies that provide credible causal evidence tended to use data from a single US state, and often only included measures of academic achievement at one or two points in time. No research yet has examined the causal effect of school entry age on academic growth across states or between schools within a state.

Thus, improving understanding of the extent to which school entry age affects the rate at which students learn in each school year is immediately relevant and important to education policy. Using data from NWEA's MAP® Growth™ assessment from 30,552 students in 1,305 schools across three states who were born within 30 days of the school entry cutoff date, this study addressed two questions:

1. What is the impact of being a year older at kindergarten entry on students' academic growth during each of the first three years of school?
2. Does the impact of being a year older at kindergarten entry on academic growth vary by student characteristics like gender, race/ethnicity, or by state?

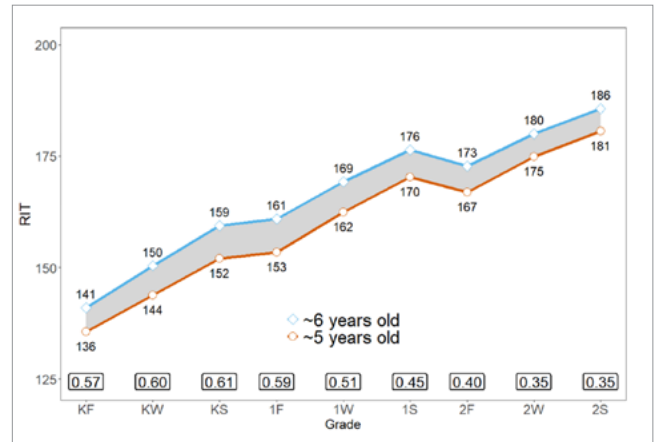
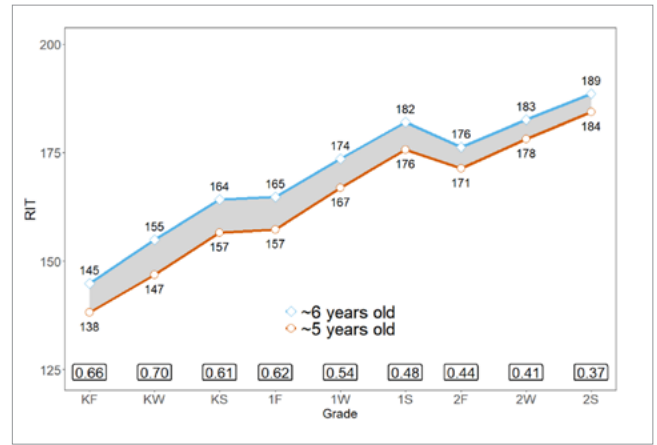
Students entering kindergarten a year older showed an early advantage in academic achievement.

The results showed that in the fall of kindergarten, there was a sizable gap in initial test scores in reading and math favoring students who entered school a year older over students who entered around age five (0.66 standard deviations [SD] in math and 0.57 SD in reading). These gaps mostly held steady in kindergarten, and even widened in reading.

This early advantage narrowed in grades 1 and 2, as older entrants grew more slowly in these grades.

However, the early advantage for older students in achievement narrowed during first and second grades. By the end of second grade, the advantage of being older almost halved in math (to 0.37 SD) and shrunk considerably in reading (to 0.35 SD), though both gaps remained sizable.

Examining growth of younger and older kindergarten entrants in each grade revealed how the early advantage narrowed in first and second grades. Using a growth model, monthly growth rates were estimated for students born on each day within 30 days of the cutoff (0 = day after cutoff). The figures to the right show monthly growth rates for students born on each day before/after the cut off. Values to the left of the black, vertical dashed lines represent students born on or before the cutoff, who would enter kindergarten at age 5, while values to the right represent students born after the cutoff, who would enter kindergarten just before turning age 6, if their parents follow their state's age cutoff.

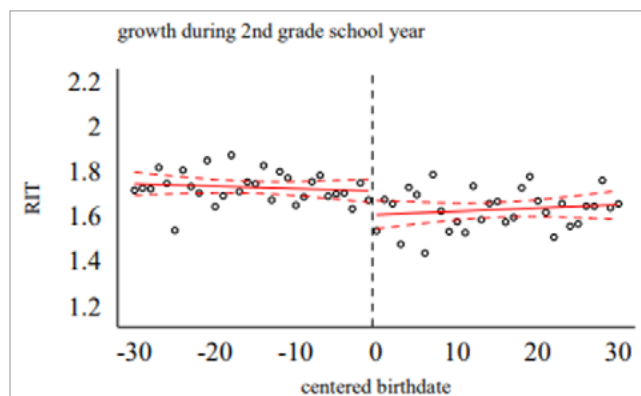
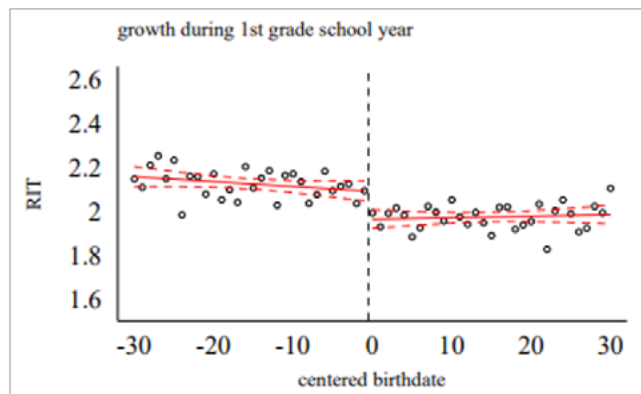
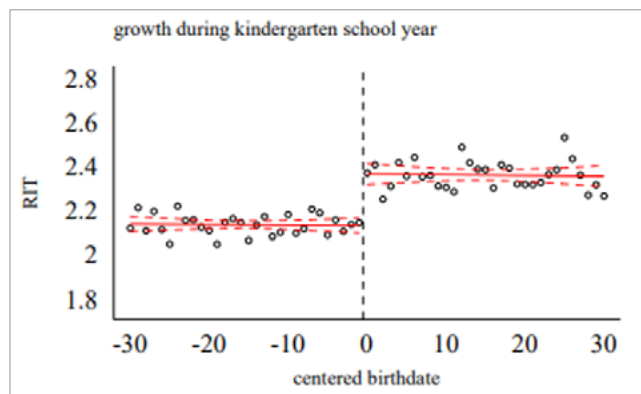


Average K-2 trajectories in math (top panel) and reading scores (bottom panel) (pooled across states and cohorts) of students with birthdates within 30 days prior to cut date (circles) and students with birthdates within 30 days after cut date (diamonds). Group means (rounded) are next to the lines, and standardized mean differences between the groups each term are at the bottom of each figure.

Older students showed significantly higher monthly learning rates within kindergarten (0.14 RIT points per month in math, 0.24 RIT points per month in reading), but the advantage seemed to flip after kindergarten, with older students showing significantly lower average monthly learning rates in reading and math in both first and second grades. For example, in first grade, the average student with a birthdate before the cutoff (younger at entry) gained 2.34 RIT points per month in math, and the average student born after the cut date (older at entry) learned at a rate 0.15 RIT lower per month than the younger students. Additional analyses showed the significantly lower growth rates for older entrants continued through third grade, further shrinking their initial advantage.

Learning rates for older and younger entrants do not vary significantly by subgroup status, though initial achievement gaps exist.

Because research has shown that different groups of students may experience different benefits or disadvantages from starting kindergarten older^{vii,viii}, differences in initial achievement and growth each year for older and younger entrants was examined by student gender, race/ethnicity, and by state. The results showed that the initial impact of starting kindergarten was greater for some subgroups. For example, the effect of being older at school entry on initial test scores is slightly larger for girls than boys (0.59 RIT points in math, 0.93 RIT points in reading), and for initial test scores for Hispanic students, but, there were no differences by subgroup on growth rates in kindergarten through second grade.



Reading test score growth by year. Each circle represents 350-700 students with a shared birthdate. Younger students are on the left, and older on the right of the dashed vertical line. Confidence intervals are shown as dashed red lines around the solid linear fit line. See [working paper](#) for figures showing initial test scores in reading and results for math.

RECOMMENDATIONS

Before adopting policies and practices that raise children’s school entry age, policymakers and families should consider the fade-out of initial advantages.

The results of this study suggest that the initial advantages of entering kindergarten a year older fade as older students grow at significantly lower rates during the second and third years of school. Other research has also shown an initial early advantage^{x,xi} for an older entry age with its edge shrinking for older students in later grades^{xiii}.

Because delaying schooling comes at a cost both to families and the public, policymakers and families should consider the short-lived nature of these initial advantages before adopting policies and practices that raise children’s school entry age. In other words, this may be a yellow light for the current trends toward academic redshirting and increasing age at school entry.

These findings also beg future research to understand why the initial benefit fades. There are multiple possible explanations for the initial advantage: high-quality early education in that time may better prepare children to enter school, or an extra year of development may result in improved executive functioning and behavior and a higher ability to focus on assessments in the early grades. Many factors may also be narrowing the advantage over time: teachers may focus more attention on helping to catch up younger students, or maturational advantage in kindergarten may narrow in later grades since, for example, developmental differences are larger between five and six-year-olds than between seven and eight-year-olds. It is also possible that younger students benefit from having older peers who are higher-achieving and better-behaved. More research to explore the mechanisms behind the causal link between age and growth trajectories is needed.

Educators and policymakers should monitor students’ academic growth and socioemotional development within and between school years.

Student achievement should be monitored within and across grades through formal or informal assessments. Examining growth trajectories by grade level may have important implications for equity in education. A few prior studies have investigated variation in the effects of school entry age by gender and race, but none has been able to identify the grade level(s) in which the differential effects manifest. For instance, a study^{xiii} that examined test scores in third grade found that practices that increased students’ age at school entry differentially benefitted low-income students but disadvantaged non-White students. From this, some might conclude that that low-income students should be redshirted at higher rates since, judging from third grade test scores, they benefit more from older entry age than higher-income students. However, it is possible that older age only has a positive differential effect on low-income students’ growth during kindergarten but has a negative differential effect in the years that follow, so that in the long run the benefits disappear. Without observing the subgroups’ growth trajectories within and across years, the varied effects on achievement measured at one point in time should be interpreted with caution.

Research is also needed to improve measurements of academic engagement and socioemotional development. For example, some research has shown that entering school a year older resulted in lower levels of inattention and hyperactivity at ages 7 and 11. Establishing more reliable and comparable measures will allow the tracking and modeling of these important outcomes across time to further understand the effects of policy and practices.

- i. Deming, D., & Dynarski, S. (2008). The lengthening of childhood. *Journal of Economic Perspectives*, 22(3), 71-92.
- ii. Education Commission of the States. (2018). Kindergarten entrance age. Retrieved from <http://ecs.force.com/mbdata/MBQuest2RTanw?rep=KK3Q1802>
- iii. Meisels, S. J. (1999). Assessing readiness. In R. Pianta & M. J. Cox (Eds.), *The transition to kindergarten* (pp. 39-66). Baltimore: Paul H. Brookes.
- iv. Fortner, C. K., & Jenkins, J. M. (2017). Kindergarten redshirting: Motivations and spillovers using census-level data. *Early Childhood Research Quarterly*, 38, 44-56.
- v. Elder, T. E., & Lubotsky, D. H. (2009). Kindergarten entrance age and children's achievement. *Journal of Human Resources*, 44(3), 641-683. Retrieved from <http://jhr.uwpress.org/content/44/3/641.abstract>
- vi. Dee, T. S., & Sievertsen, H. H. (2018). The gift of time? School starting age and mental health. *Health Economics*, 27(5), 781-802. doi:10.1002/hec.3638
- vii. Depew, B. & Eren, O. (2016). Born on the wrong day? School entry age and juvenile crime. *Journal of Urban Economics* 96, 73-90.
- viii. Suziedelyte, A. & Zhu, A. (2015). Does early schooling narrow outcome gaps for advantaged and disadvantaged children? *Economics of Education Review*, 45, 76-88.
- ix. Zhang, S., Zhong, R., & Zhang, J. (2017). School starting age and academic achievement: Evidence from China's junior high schools. *China Economic Review*, 44, 343-354.
- x. Datar, A. (2006). Does delaying kindergarten entrance give children a head start? *Economics of Education Review*, 25(1), 43-62. doi:10.1016/j.econedurev.2004.10.004
- xi. Cook, P. J., & Kang, S. (2018). The School-Entry-Age Rule Affects Redshirting Patterns and Resulting Disparities in Achievement. *National Bureau of Economic Research Working Paper Series*, No. 24492. doi:10.3386/w24492
- xii. Bedard, K. & Dhuey, E. (2006). The persistence of early childhood maturity: International evidence of long-run age effects. *The Quarterly Journal of Economics*, 121(4), 1437- 1472. doi:10.1093/qje/121.4.1437
- xiii. Jenkins, J. & Fortner, C. K. (2019). Forced to redshirt: Quasi-experimental impacts of delayed kindergarten entry. (EdWorkingPaper: 19-120). Retrieved from Annenberg Institute at Brown University: <http://www.edworkingpapers.com/ai19-120>

This brief describes research documented in:

Johnson, A., & Kuhfeld, M. (2020). Impacts of school entry age on academic growth through 2nd Grade: A multi-state regression discontinuity analysis. (EdWorkingPaper: 20-203). Retrieved from Annenberg Institute at Brown University: <https://doi.org/10.26300/d4kt-nv59>

Suggested citation:

Johnson, A., & Kuhfeld, M. (2020). Impacts of school entry age on academic growth through second grade. (The Center for School and Student Progress at NWEA Research Brief).

ABOUT THE AUTHORS

Dr. Angela Johnson is a Research Scientist for the Center for School and Student Progress at NWEA. She specializes in experimental, quasi-experimental, and mixed methods research designs. Her current research focuses on education policies and practices that impact learning and opportunity for English Learners. She has a decade of experience in language teaching and assessment. Johnson holds a PhD in education policy from Stanford University and master's degrees in economics and teaching English to speakers of other languages (TESOL) from the University of Southern California.



Dr. Megan Kuhfeld is a Research Scientist II for the Collaborative for Student Growth at NWEA. Her research seeks to understand students' trajectories of academic and social-emotional learning (SEL) and the school and neighborhood influences that promote optimal growth. Kuhfeld completed a doctorate in Quantitative Methods in Education and a masters' degree in statistics from the University of California, Los Angeles (UCLA).



ABOUT THE CENTER FOR SCHOOL AND STUDENT PROGRESS

The Center for School and Student Progress partners directly with schools and districts across the country to engage in collaborative research on issues that are most relevant to educators' work with their students. The Center provides expert consultation to NWEA partner schools and districts to help make assessment data actionable to improve outcomes for students and applicable to address myriad policy questions. Researchers in the Center also collaborate with schools to create new reports and data visualizations and advise on best practices for assessment integrity.



NWEA is a not-for-profit organization that supports students and educators worldwide by providing assessment solutions, insightful reports, professional learning offerings, and research services. Visit [NWEA.org](https://www.nwea.org) to find out how NWEA can partner with you to help all kids learn.

© 2020 NWEA. NWEA and MAP are a registered trademarks, and MAP Growth is a trademark, of NWEA in the US and in other countries.

MAY20 | KAP5295