

## Associations between the qualifications of middle school Algebra I teachers and student math achievement

Success in advanced math courses gives students access to a wider variety of college and career options.<sup>1</sup> Because students who fail Algebra I are less likely to enroll and succeed in advanced math courses, it is considered a gateway course for advanced math.<sup>2</sup> To increase the opportunity for students to take more-advanced math courses in high school, there has been a trend toward enrolling students in Algebra I in middle school. That has created a need for middle school teachers with more-advanced knowledge of math content, because prior research suggests that teachers' knowledge of math content plays an important role in students' math achievement.<sup>3</sup> The current study examined associations between the qualifications of middle school Algebra I teachers (certifications to teach math, education background, and performance on math certification exams) and their students' Algebra I achievement. This study can inform efforts to ensure that students have access to teachers who can support their success in Algebra I.

### Key findings

*Teacher performance on math certification exams and years of experience teaching math were the teacher qualifications most strongly associated with middle school students' Algebra I achievement.* Overall, performance on the Praxis II Middle School Mathematics exam was the teacher qualification with the strongest association with middle school students' Algebra I achievement. Years of experience teaching math and performance on the Praxis II Mathematics exam had the second and third strongest associations. These results suggest that gateway assessments are not merely a compliance feature of the teacher certification process but may meaningfully differentiate teachers' ability to support students' Algebra I achievement.

*Teacher performance on math certification exams and years of math teaching experience were also strongly associated with Algebra I achievement for students in under-represented and disadvantaged subgroups.* The Praxis II Middle School Mathematics exam was the teacher qualification with the strongest association with Algebra I achievement for students receiving special education services and students eligible for the national school lunch program. Teacher performance on the Praxis II Mathematics: Content Knowledge exam (which covers knowledge of high school math) was strongly associated with Algebra I achievement for Black students. Performance on the Missouri Educator Gateway Assessments Middle School Education: Mathematics exam was associated with Algebra I achievement for Hispanic students. Years of experience teaching math was strongly associated with Algebra I achievement for Hispanic students and students eligible for the national school lunch program. This finding suggests that when selecting Algebra I teachers, districts and schools—especially schools with large populations of under-represented or disadvantaged students—might give preference to teachers with higher certification exam scores or more experience teaching math.

1. National Mathematics Advisory Panel. (2008). *Foundations for success: The final report of the National Mathematics Advisory Panel*. Washington, DC: U.S. Department of Education. Retrieved August 28, 2019, from <https://www2.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf>.

2. Star, J. R., Caronongan, P., Foegen, A., Furgeson, J., Keating, B., Larson, M. R., & Zbiek, R. M. (2015). *Teaching strategies for improving algebra knowledge in middle and high school students* (NCEE 2015-4010). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. Retrieved August 28, 2019, from <https://ies.ed.gov/ncee/wvc/PracticeGuide/20>.

3. National Mathematics Advisory Panel. (2008). *Foundations for success*.