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. 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. 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. 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.