The Predictive Power of Standardized Tests

Middle-school scores preview college and career outcomes

STANDARDIZED TESTS form the bedrock of school accountability systems and are a primary source of information for the public and policymakers alike. Over the past two decades, these tests also have come to define whether students are on track to being "college and career ready" at the end of high school, in line with state standards for what students should know and be able to do by the spring of each school year.

But many parents and educators have grown skeptical of standardized testing and the relevance of a student's scores to their long-term success—especially tests given when children are still in elementary or middle school. Some question the typical practice of classifying students into different proficiency levels based on the scores they earned—such as below basic, basic, proficient, and advanced—to help parents and the public understand the results. What can a 14-year-old's test scores and proficiency levels tell us about college readiness? We decided to find out and designed a study to assess the degree to which middle-school test performance and proficiency level predicts postsecondary success.

Middle-school test scores tell us quite a lot. Students with high scores on reading, math, and science tests in 8th grade are dramatically more likely to earn a bachelor's degree within five years of finishing high school. We analyzed nine years of data for 260,000 students in Missouri, starting with their 8th-grade scores and following them through high school and the next five years to see which students graduated high school, attended college, and earned a degree. We looked at each subject test separately and in combination, and we looked at students as a whole and grouped by race and gender. Every analysis found the same trend: The higher a student's middle-school test scores, the more likely they are to graduate high school, attend college, and earn a college degree.

The differences are especially stark among students in the highest- and lowest-score categories. Fewer than 1 percent of students who score below basic in 8th-grade reading go on to earn a four-year college degree compared with almost 23 percent of students who score proficient and 43 percent of students with advanced scores. Put another way, the strongest readers in 8th grade are about 62 times more likely to earn a bachelor's degree than the students with the lowest reading scores.

We also investigate what we would expect to happen if every student had earned at least a proficient score on all three tests—a goal set by the federal Every Student Succeeds Act and mandated under its predecessor, No Child Left Behind. We simulate these test-score improvements and find substantial, positive impacts on postsecondary outcomes. Overall, the number of students earning four-year college degrees would jump by 55 percent. The number of Black students who earn four-year degrees would nearly triple, with increases of 189 percent for males and 182 percent for females. Among Hispanic students, four-year degree holders would almost double, with increases of 94 percent for males and 86 percent for females.

Standardized testing invites controversy; however, our analysis shows that test results provide relevant and predictive insights about academic achievement and the likelihood of a student's postsecondary success. On one hand, states typically use test-score data along with other information, including

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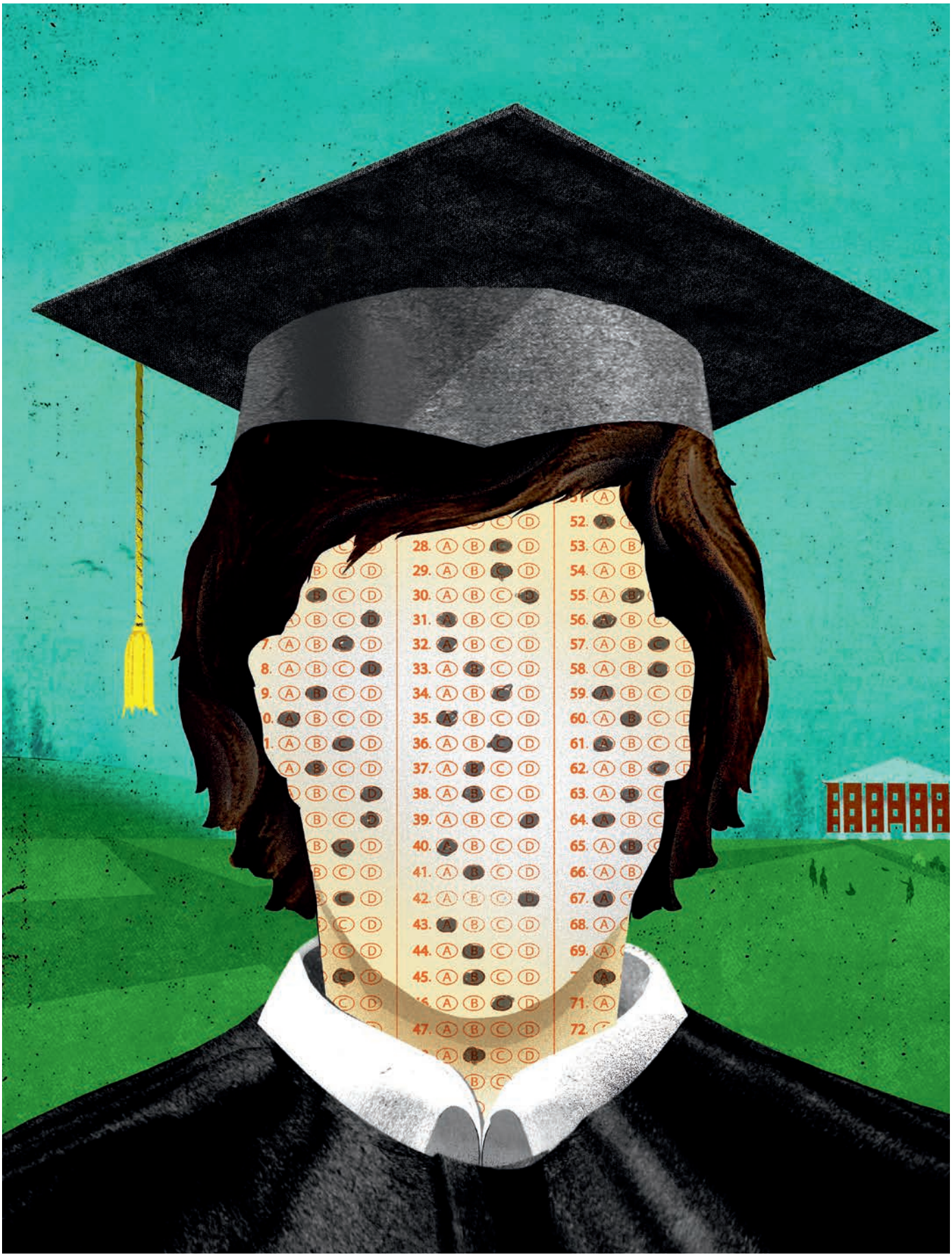

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attendance and grades, to identify students "at risk," and this is important to prevent failure and support students. On the other hand, we focus on predicting students' long-run success based on academic achievement before high school. Our simulation illustrates the potential impacts of ensuring all students finish middle school with grade-level skills and knowledge in reading, math, and science. A stronger start in high school gives students a far greater chance of earning a college degree.

A Longitudinal Approach

Tracking student outcomes over the longer term is typically the province of dogged and well-resourced academics. Increasingly, state agencies can ask and quickly answer these sorts of questions as well. About three dozen states have built statewide longitudinal data systems, or SLDS, which connect individual-level data from agencies in charge of early childhood and preschool programs, K–12 education, higher education, and the workforce. These so-called "P20W" data systems have grown with the support of a federal grant program and philanthropic investment and as a result of the relatively lower-cost capabilities of open-source code and cloud-based computing. Policymakers are in the early days of using SLDS to assess program effectiveness at the systems level.

We analyzed nine years of data for 260,000 students in Missouri and found that the higher a student's middle-school test scores, the more likely they are to graduate high school, attend college, and earn a college degree.

That includes Missouri, which has an SLDS dating back to 2006 that is maintained by the state's Department of Elementary and Secondary Education. Our study uses this system to examine the postsecondary outcomes of 264,590 Missouri students who started high school as first-time freshmen between fall 2009 and fall 2012. Each cohort includes approximately 70,000 students attending 545 public high schools. In all, our study sample is 78 percent white, 18 percent Black, and 4 percent Hispanic.

We track these students over nine years, until their fifth year after leaving high school—roughly from ages 14 to 23. We start with each student's 8th-grade scores on the Missouri Assessment of Progress, which assesses reading, math, and science. We then match that information with high-school graduation data, also housed at the education department. Finally, we use a data link that connects to the National Student Clearinghouse, which provides three other outcomes of interest: college attendance, whether a student earns any postsecondary degree (which includes two- and four-year degrees), and whether they earn a four-year college degree.

Our analysis groups students by 8th-grade test performance, based on the four score categories reported to families and used in state accountability systems: "below basic" and "basic," which are below grade level, and "proficient" and "advanced," which meet or exceed grade-level standards. Roughly half of students earn passing scores on the three tests: in reading, 52 percent score proficient or advanced compared with 51 percent in math and 49 percent in science.

We look at test scores by race and gender and find broad differences. For example, in math, 56 percent of white males earn proficient or advanced scores compared to 42 percent of Hispanic males and 23 percent of Black male students. In reading, girls are more likely to score proficient or advanced than boys in all racial groups. Some 25 percent of white females score advanced in reading compared with 13 percent of Hispanic females and 7 percent of Black female students. Black male students have the largest shares of scores in the below basic category: 37 percent in math and 15 percent in reading.

The College Connection

We then link test performance to our target postsecondary outcomes and calculate rates of high-school graduation, college attendance, earning any postsecondary degree, and earning a four-year degree for each score category. We find clear and positive associations between student performance in 8th grade and whether they successfully graduate from high school and college. Across the board, students' likelihood of postsecondary success lines up with the strength of their reading and math scores at the end of middle school.

In looking at students who earn advanced math scores in 8th grade, 74 percent go on to attend college, 51 percent earn any degree, and 45 percent earn a four-year degree (see Figure 1). Those who score proficient in math also attend and graduate from college, but at far lower rates: 58 percent attend, 32 percent earn any degree, and 22 percent earn a four-year degree. Student performance in reading is similarly predictive. Some 43 percent of 8th graders wh o score advanced go on to earn a four-year degree compared with 23 percent of proficient readers, 6 percent of students who score at the basic level, and fewer than 1 percent of students in the below basic category.

The differences in college attainment are driven by lower rates of college attendance and weaker persistence to degree completion by students with lower 8th-grade scores. For example, about one in three students who score basic in

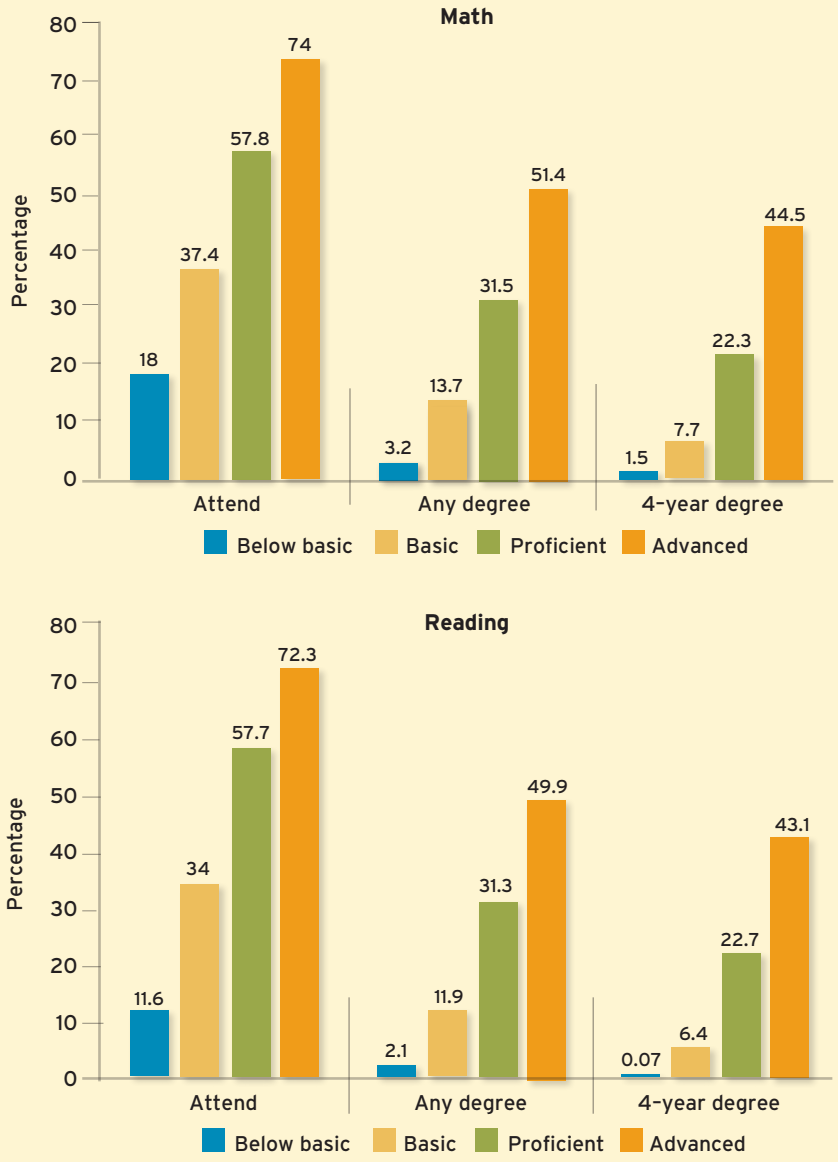
8th-grade reading go on to attend college. Of those, just 35 percent earn any postsecondary degree and about 19 percent earn a bachelor's within five years of leaving high school. Students who score proficient in reading are more likely both to attend and to complete college: 58 percent attend and 48 percent of those students earn a four-year degree. Those rates jump again when looking at students who score in the advanced category on the 8th-grade reading test: Almost three-quarters attend college and 60 percent of those students earn a bachelor's degree within five years.

Another way to illustrate these differences is by comparing the likelihood of attaining each milestone by middle-school score category. For example, students with advanced math scores are about four times as likely to attend college as students who score below basic. When it comes to earning a four-year degree within five years of leaving high school, advanced math students are 30 times as likely to succeed as students with below basic math scores in 8th grade. Those comparisons are even starker when looking at 8th-grade reading. Compared to students with below basic scores, students with advanced scores are 6 times as likely to attend college, 24 times as likely to earn a postsecondary degree, and 62 times as likely to earn a bachelor's degree.

We conduct these same analyses by student race and gender, which show that on average, female and white students are more likely to attend college and earn a degree than male and Black and Hispanic students at all score-category levels, even among the highest-scoring middle schoolers. For example, among girls with advanced math scores in 8th grade, 54 percent of white students earn a four-year degree compared with 39 percent of Hispanic students and 38 percent of Black students. Among boys with advanced math scores, 39 percent of white students earn a four-year degree

Higher 8th-Grade Scores, Better College Outcomes *(Figure 1)*

The higher a student's scores are on 8th-grade standardized tests, the more likely they are to attend college and earn a degree. Some 44.5 percent of students with advanced math scores earn a bachelor's degree within five years of high-school graduation compared with less than 10 percent of students who score basic or below. While 57.7 percent of students who score proficient in reading attend college, just 22.7 percent earn a bachelor's degree.



SOURCE: Authors' calculations

compared with 27 percent of Hispanic students and 23 percent of Black students.

These differences in outcomes by race and gender among students with similar test scores are an important reminder of the many factors beyond test scores that influence students' postsecondary success. However, they do not imply that test scores are less predictive for certain subgroups. Our study separately calculates outcomes for every student subgroup, and we find that in every subgroup and on every test, students in higher-score categories have far better long-term education outcomes than students in lower-score categories. Across the board, strong standardized test scores in 8th grade are associated with much higher rates of postsecondary success. And with each downward shift in score category, the likelihood of a student graduating from high school and completing a college degree sharply declines.

Pushing for Proficiency

We then explore what would happen if students with basic or below basic scores had instead scored proficient. What would the potential impacts be if more students finished middle school with grade-level knowledge and skills?

We first look at students in the middle of the pack, who score either proficient or basic, and are therefore either at or just below grade level. A comparison of likely postsecondary outcomes for these students shows consistent, positive impacts from moving to proficient from basic for students of all races and genders.

Fewer than 1 percent of students who score below basic in 8th-grade reading go on to earn a four-year college degree compared with almost 23 percent of students who score proficient and 43 percent of students with advanced scores.

Overall, the odds of earning a postsecondary degree roughly double for a student who moves from basic to proficient on any of the exams. The odds of earning a four-year degree roughly triple for the same achievement gain. In particular, white males experience slightly larger gains: They are 1.7 times as likely to go to college if they score proficient instead of basic and 3.1 times as likely to earn a four-year degree. Black females are relatively less affected: They are 1.4 times as likely to attend college and 2.6 times as likely to earn a four-year degree.

Finally, we investigate the potential for improving academic achievement such that every student scored at least proficient on every subject test. Getting all students to at least the proficient level is a major goal of state and federal accountability systems and, as evidenced above, a powerful lever to expand postsecondary success. Given the positive associations we find in our analysis, what might the outcomes be?

We simulate this scenario and estimate its impact across the entire student group and by race and gender. If test scores for all students below grade level were to improve and reach proficient, our analysis shows the number of students earning a postsecondary degree growing by 52 percent and number of students earning a four-year degree growing by 55 percent (see Figure 2). We find very large impacts for Black and Hispanic male students, who have higher rates of students scoring at basic or below basic. We show that the number of Hispanic males earning bachelor's degrees within five years of finishing high school would nearly double, with 94 percent growth. Our calculations also show the number of Black males with four-year degrees would nearly triple, with 189 percent growth.

Testing for the Future

We find a clear and consistent link between middle-school test scores and postsecondary outcomes in early adulthood. The 8th graders with the highest test scores are far more likely to attend and successfully complete a college degree, and the lower a student's test score, the less likely they are to earn a degree.

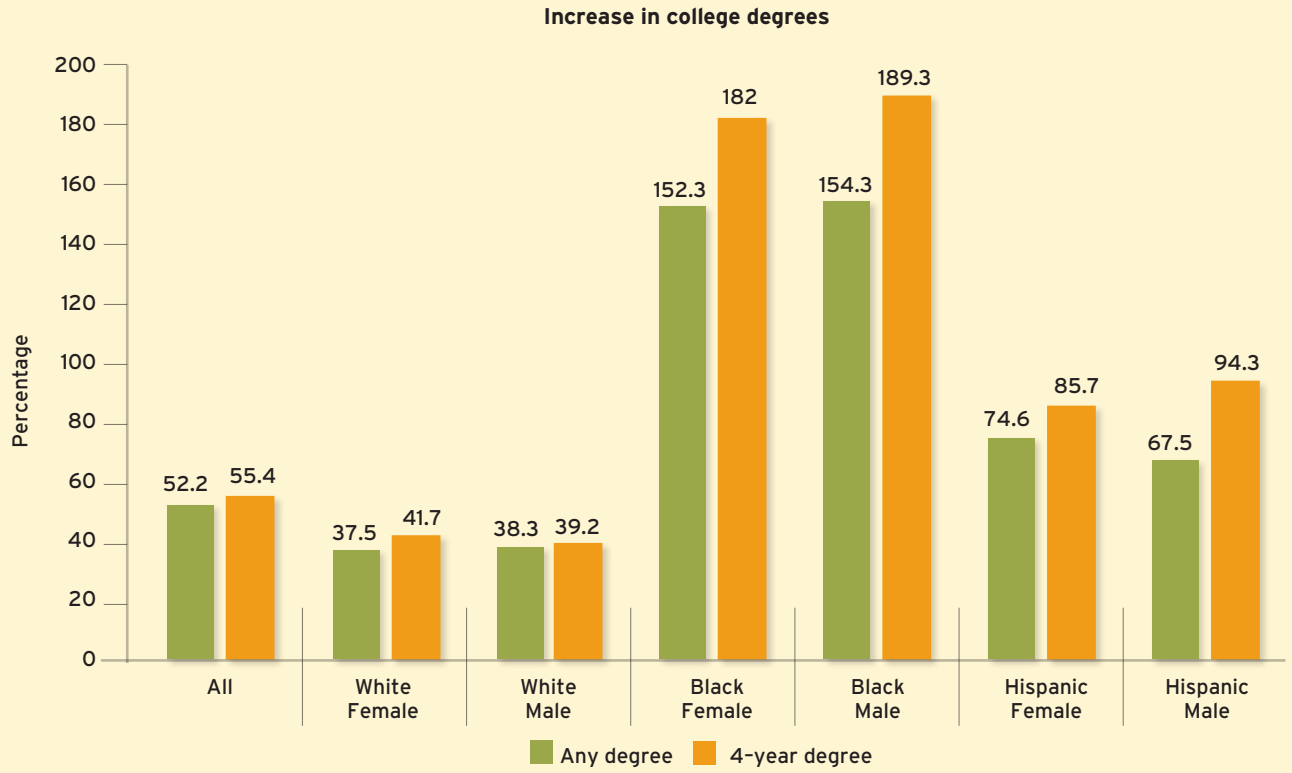
Our analysis also shows the power of moving students in the middle of the pack over the grade-level finish line, from scoring basic to the proficient level. Compared to scoring basic, a student scoring proficient on any of the 8th-grade assessments is roughly twice as likely to earn a postsecondary degree and three times as likely to earn a four-year degree. Interventions targeted to "at risk" students, which is a common application of accountability data of this kind, can have major, lifelong impacts by supporting all students below grade level.

There is considerable controversy about the role of standardized tests in state accountability systems, and critics have argued that the tests are inadequate measures of school performance. However, our examination of more than a quarter-million Missouri students finds that federally mandated assessments in 8th grade can provide vital insights for individual students and their families, in addition to more traditional audiences of researchers and policymakers looking at the state or systems level.

Consider the relatively large shares of low-scoring students who attend college but do not earn a degree. Many students who do not score proficient in middle school go on to attend college—for example, among students who score basic in math, 37 percent attend college. But far too many students struggle and do not complete a degree—a phenomenon that has left upward of 40 percent of enrollees with debt but no degree

Major Boosts in College Attainment from Universal 8th-Grade Proficiency *(Figure 2)*

Improving student performance such that every student scored proficient or better in 8th grade would substantially improve postsecondary outcomes, with particularly large gains for Black and Hispanic students. The number of students with four-year degrees would grow by 55.4 percent overall. The number of Hispanic males with four-year degrees would nearly double, at 94.3 percent projected growth, and the number of Black males with four-year degrees would nearly triple, at 189.3 percent projected growth.



NOTE: Effects of simulated scenario where all students scoring below grade level (below basic or basic) instead score at the proficient level. Impacts are for students earning any postsecondary degree or a four-year college degree within five years of finishing high school.

SOURCE: Authors' calculations

within six years. Amid widespread questions about "college for all," understanding the clear through-line from middle-school performance to postsecondary education could help families and schools intervene and support students to reach their post-high-school goals.

Our findings also highlight the critical importance and real-world relevance of data from standardized tests. While every student is unique and no one test can predict the whole of the future, a student's scores shine a light on a likely pathway. Across race and gender, we find that test scores in middle school line up clearly with that student's odds of education success after high school. Our study amounts to a nine-year sneak peek at what may be ahead—empowering students, families, teachers, and school leaders with the power to make positive change.

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