THE MCAS AS A GRADUATION REQUIREMENT

FINDINGS FROM A RESEARCH-PRACTICE PARTNERSHIP

JULY 2024

AUTHORS:

JOHN P. PAPAY

ANN MANTIL

RICHARD J. MURNANE

IAN M. FERGUSON

JAMES LOPRESTI

PREEYA P. MBEKEANI

AUBREY MCDONOUGH

EMMA ZORFASS

ANNENBERG
BROWN UNIVERSITY

ABOUT THE PROJECT

Educational Opportunity in Massachusetts
Annenberg Institute at Brown University
edopportunityMA.org

Educational Opportunity in Massachusetts is a long-standing research-practice partnership between researchers at the Annenberg Institute at Brown University and the Massachusetts Departments of Elementary and Secondary Education and Higher Education. Our work analyzes how students progress through the state's K-16 education system and into the workforce, with a specific focus on providing evidence to inform policy and practice in the Commonwealth. We use rich longitudinal data to explore students' backgrounds in nuanced ways, including by race/ethnicity, first language spoken at home, immigrant status, and country of origin. Recent and ongoing lines of inquiry include the equity consequences of high-stakes exit exams, the impact of state policies and the pandemic on students' educational outcomes, how schools affect economic opportunity for students living in poverty, and the experiences of immigrant newcomers in Massachusetts.

SUGGESTED CITATION

ACKNOWLEDGMENTS

This report was designed by Robyn Hartt of RHarttGraphics.com.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Across Massachusetts, legislators, policymakers, educators, families, and communities are engaged in important conversations about whether to continue using student performance on the MCAS tests as part of the state's high-school graduation requirements. In this document, we synthesize lessons drawn from our 15-plus years of research on educational opportunity and state testing in Massachusetts. Here, we highlight the six main findings and key supporting evidence, with page numbers from the full report included for easy reference.

1 FINDING 1

Students' MCAS test scores and high-school course grades both predict long-term outcomes. In the past decade, grades have risen while test scores have fallen, raising concerns about the signals students receive about their college and career readiness.

- Even among students with the same demographic profile who earned the same GPA at the same high school, those with higher MCAS scores have better long-term outcomes, on average. *(Page 4)*

- An analogous relationship holds for high-school course grades. Comparing students with the same MCAS scores, students with higher grades have better outcomes. *(Page 7)*

- Increases in MCAS ELA scores and math scores since 2009 are not reflected on the lower-stakes National Assessment of Educational Progress (NAEP). *(Page 9)*

- Since 2011, the share of students earning an A or B has increased substantially in all core academic subjects. Grade inflation appears to have accelerated during the pandemic, when grades went up markedly while test scores and attendance both declined sharply. *(Page 11)*

2 FINDING 2

Students who score just above the competency determination (CD) threshold on the MCAS tests enroll in college at low rates and do not earn a living wage by age 30, on average.

- Among students scoring just above the passing cutoff who later enrolled in at least one college math course, only 14% earned credit in that course. In total, only one in six students scoring just above the threshold in math earned any college degree within 9 years of taking the test. *(Page 12)*

- The median annual earnings in 2022 of students scoring at the passing cutoff in 2006-08 was about $38,000, just 1.37 times the federal poverty level for a family of four. *(Page 13)*

3 FINDING 3

While most students meet the CD testing standard on their first attempt, nearly all of those who fail are English learners (ELs), students with disabilities, and/or students with inadequate course preparation.

- English learners and students with disabilities make up very large percentages of students who initially fail - 78% in math, 84% in ELA, and 72% in science. *(Page 15)*
- Students who were enrolled in a below-grade-level math course or did not pass their grade-level course make up 12% of test-takers but nearly half of students who fail to meet the CD testing standard on their first attempt. *(Page 17)*

4 FINDING 4

Passing the MCAS matters: Students who barely pass the test on their first attempt have better outcomes than those who just fail it.

- Among test-takers from low-income families in 2003-07, those who barely met the MCAS math testing standard (i.e., passing) were 3 percentage points more likely to graduate from high school than those who fell just short of the cutoff. *(Page 18)*
- Among those from higher-income families, the impact on four-year college enrollment was 6 percentage points and 3 percentage points on graduation. *(Page 18)*
- We do not know if failing hurts students or passing helps them (or both). Students who fail may become discouraged and drop out, while students who pass may be encouraged and persist at greater rates than they would have otherwise. *(Page 19)*

5 FINDING 5

While most students who initially fail go on to retake the test and pass, about 85% of those who never pass are English learners or students with disabilities. The MCAS scores of high-school ELs underpredict their later earnings relative to other students.

- Students who were English learners in 10th grade earn more at age 30 than their non-EL peers with similar test scores and attainments, suggesting that MCAS scores for ELs understate their potential. *(Page 22)*
- High-school immigrant newcomers represent 5% of those who attempt at least one of the MCAS tests but fully one third of those who never pass; this share is likely to increase as the number of newcomers grows and the new, higher passing threshold on the ELA test takes effect for the class of 2026. *(Page 23)*

6 FINDING 6

Most high schools that boost test scores also improve long-term outcomes like earnings. However, some schools, including some career and technical education (CTE) schools, improve students' long-term earnings without raising test scores, while other schools may overly focus on test preparation at the expense of broader skill development.

- We estimate how effective schools are at improving college outcomes and earnings. Similar low-income students who attended a school at the 80th percentile of the effectiveness distribution instead of a school at the 20th percentile were 60% more likely to graduate from a four-year college, and they earned 9% (or $2,500) more annually at age 30. *(Page 24)*

INTRODUCTION

Across Massachusetts, legislators, policymakers, educators, families, and communities are engaged in important conversations about whether to continue using student performance on the MCAS tests as part of the state's high-school graduation requirements. These are part of broader discussions about the best ways to provide all students with the knowledge, skills, and capacities they need to succeed when they leave high school and enter college or the labor force.

Unlike most states, the Commonwealth does not specify a set of courses that students must pass to graduate from high school.[1] Instead, it relies on scores on standardized tests of mathematics, English language arts, and science as a central part of the state's "competency determination" (CD) process. Students take these tests for the first time early in high school, and they are targeted to 10th grade content standards. Students who do not meet the CD testing standard (which we call "failing") can retake the tests repeatedly and can appeal if they do not pass on retest.

Nationally, there is mounting evidence that we need high standards for all students and, with appropriate supports, almost all students can meet these standards. Lowering academic expectations for students exacerbates inequality. However, there are clear disagreements over the best ways to ensure that educators raise expectations and how to provide the requisite supports, and open questions about whether the test-based competency determination policy accomplishes this goal.

> **To us, the key question is whether the CD policy improves and makes equitable students' educational outcomes. In other words, does the policy lead the public education system to build the knowledge, skills, and capacities that will pay off for students in the labor market and in civic life.**

One thing that is sometimes missing from these conversations is a grounding in the available evidence. We have been studying educational opportunity and state testing in Massachusetts for more than 15 years. Here, we synthesize the findings from our work to provide a fact base for the conversation. While we each come to this analysis with our own views, we have endeavored here to provide empirical evidence and not advocate for any position.

To us, the key question in this debate is whether the CD policy as implemented in Massachusetts improves and makes more equitable students' educational outcomes. In other words, does the policy lead the public education system to do a better job of building the knowledge, skills, and capacities that will pay off for students in the labor market and in civic life in the long run? Unfortunately, research evidence on high-school exit exams from across the country is inconclusive and findings are mixed, in part because of major differences in implementation from state to state.

Our research on the CD policy's impact in Massachusetts also has not produced a definitive answer. For example, in our 2020 report, *Lifting All Boats? Accomplishments and Challenges from 20 Years of Education Reform in Massachusetts,* we documented tremendous educational progress for all student groups since the early 2000s, when the Massachusetts Education Reform Act of 1993 was fully implemented. High-school graduation rates and college completion have increased substantially for low-income students, students with disabilities, and students from all racial/ethnic groups. On its face, this would suggest that the MCAS graduation requirement functioned as intended. But, of course, many other policy changes happened at the same time, including a substantial investment in K-12 education and a focus on setting rigorous educational standards in all grades and academic subjects. In short, it is difficult to distinguish between the impacts of the CD policy and the many other changes that have occurred in the state's educational landscape.

Nonetheless, our research does provide important lessons to inform these conversations. We explain these points below and often refer to our earlier reports for more detailed information.

Our work suggests six main points related to the MCAS tests and competency determination policy:

1 Students' MCAS test scores and high-school course grades both predict long-term outcomes. In the past decade, grades have risen while test scores have fallen, raising concerns about the signals students receive about their college and career readiness.

2 Students who score just above the competency determination (CD) threshold on the MCAS tests enroll in college at low rates and do not earn a living wage by age 30, on average.

3 While most students meet the CD testing standard on their first attempt, nearly all of those who fail are English learners (ELs), students with disabilities, and/or students with inadequate course preparation.

4 Passing the MCAS matters: Students who barely pass the test on their first attempt have better outcomes than those who just fail it.

5 While most students who initially fail go on to retake the test and pass, about 85% of those who *never* pass are English learners or students with disabilities. The MCAS scores of high-school ELs underpredict their later earnings relative to other students.

6 Most high schools that boost test scores also improve long-term outcomes like earnings. However, some schools, including some career and technical education (CTE) schools, improve students' long-term earnings without raising test scores, while other schools may overly focus on test preparation at the expense of broader skill development.

THE DATA WE USE

The Massachusetts Department of Elementary and Secondary Education maintains a comprehensive database that tracks students longitudinally beginning in the early 2000s. Every record contains each student's MCAS scores, demographic characteristics, and K-12 enrollment/graduation status. We link this information to data about students' college enrollment, college success (i.e., remediation and grades), college graduation, and labor market earnings. For college outcomes, we use data from both the National Student Clearinghouse and the Massachusetts Department of Higher Education. For labor market outcomes, we use Massachusetts unemployment insurance data. We adjust the sample of students included in each analysis, depending on the outcome. For instance, we measure four-year college graduation nine years after students first take the MCAS tests in math and ELA, meaning that the most recent cohort we can study took the 10th grade MCAS tests in 2012.

Our data on earnings have several limitations. First, we only observe earnings in Massachusetts. Estimates from the Opportunity Atlas suggest that 70% of students who grew up in Massachusetts live within the same commuting zone in their early 30s; those who leave the commuting zone in which they grew up have only slightly higher earnings. Second, we do not observe earnings of workers who are self-employed, work for the federal government, or whose employers do not report employees' earnings to the state Unemployment Insurance system. Estimates from the American Community Survey (ACS) suggest that 12% of Massachusetts earners in their early 30s have some self-employment income. Third, we cannot determine whether earnings represent full-time work. Our estimates of earnings line up reasonably closely with those derived from the ACS.

In many of our analyses, we report on changes over time and on inequality. Doing so for students based on their family income is challenging because the state's measure of family income has changed over time. Until 2015, students were categorized as low-income if they qualified for a Free or Reduced Price Lunch (FRPL). From 2015-21, classification was based on participation in one or more of the following state-administered programs: the Supplemental Nutrition Assistance Program (SNAP); Transitional Assistance for Families with Dependent Children (TAFDC); the Department of Children and Families' (DCF) foster care program; and certain MassHealth (Medicaid) programs. Starting in 2022, the state included three additional groups of students: MassHealth program participants with incomes up to 185% of the federal poverty level; students identified by districts as homeless, and students that districts confirmed have met the low-income criteria through a supplemental process. We use the appropriate definition of low-income for the years we study (typically FRPL eligibility) and generally avoid making comparisons over time. We note that higher-income students include many from families with quite modest incomes that fall just above the low-income cutoffs.

Students' MCAS test scores and high-school course grades both predict long-term outcomes. In the past decade, grades have risen while test scores have fallen, raising concerns about the signals students receive about their college and career readiness.

A MCAS scores predict long-term outcomes, above and beyond educational attainments and other markers of student advantage.

As we highlight in our *Lifting All Boats?* report[2], students with higher 10th grade MCAS scores are more likely than those with lower scores to graduate from high school, enroll in college, and graduate from college. They also have higher median annual earnings at the age of 30. Our evidence suggests that students who have higher test scores indeed have better academic skills in tested subjects that pay off in the labor market.

That MCAS test scores predict long-term outcomes for students is expected, given the positive correlation between these scores and measures of family advantage. On average, students from higher-income families attend schools with more resources, including more qualified, experienced, and effective teachers, than students from low-income families. Higher-income parents also have more resources than low-income parents to invest in their children's learning outside of school. Indeed, making investments in their children's skills is one mechanism through which higher-income families pass on their advantages to their children.

We find that MCAS scores predict longer-term educational attainments and labor market success, *above and beyond* typical markers of student advantage or other measures of student performance like high-school grades. Even among students with the same demographic profile who earned the same GPA at the same high school, those with higher MCAS scores have better long-term outcomes, on average. MCAS scores *do* appear to convey important information about students' readiness for college and career, even after many background characteristics are taken into account.

These patterns are largely consistent across demographic and socio-economic groups. For example, while Black males who grow up in low-income families go on to earn much less on average than White males who grow up in low-income families, we find generally similar positive relationships between test scores and earnings for both groups. The relationship is somewhat steeper for higher-income students than for low-income students and for female students than male students, on average.

We should be clear – higher MCAS scores are not the goal; real gains in students' underlying capacities and skills are. As such, improved MCAS scores should follow from better educational opportunities and achievement for all students. Too much emphasis on the test, rather than the skills it is designed to measure, can result in higher scores without improving the academic and social skills of students in the Commonwealth.

WHY WE USE LEGACY MCAS TESTS IN OUR ANALYSIS

Defining the relationship between MCAS testing and long-term outcomes is challenging for two reasons. To examine earnings, we must wait to observe students in their early 30s because earnings for students who pursue post-secondary education tend to stabilize then. We focus on legacy MCAS tests from the early 2000s in order to follow students through college and examine their earnings when they reach their early 30s (see *Lifting All Boats?* for more detailed information about methodology). We generally show patterns using students' scores on the MCAS math test because results using ELA and science scores are similar. The Next-Generation MCAS tests, introduced in 2019 in high-school math and ELA, are somewhat different from the legacy tests and measure skills in different ways.

The CD policy has also changed over time. Here, we refer to the CD testing threshold, meaning the minimum score that students must achieve on the test to graduate from high school absent a successful appeal. On the legacy MCAS, this was 220, which in 2018 corresponded to about the 7th percentile of the test score distribution in math, 9th percentile in science, and the 2nd percentile in ELA.[3] Recently, the state Board raised the minimum passing standard to a score of 470 on the Next-Generation MCAS, beginning with the graduating class of 2026. For 2023 test-takers, this score corresponds to the 11th percentile in ELA and science and the 9th percentile in math. We use these cutoffs in many of our analyses.

Our measures of socio-economic advantage are quite limited. We rely only on students' eligibility for free or reduced-price school lunch (or, in more recent years, for other federal assistance – see *'The data we use'* on page 3), which does not capture actual household income. As a result, we highlight two pieces of relevant evidence from our analysis of the 10th grade MCAS tests given from 2003 to 2005; these findings also suggest that the tests do measure academic skills that pay off later in higher education and the labor market.

First, average later earnings are significantly higher for students whose test scores improve more between 8th and 10th grades. This is important because students from more advantaged families have higher 8th grade test scores, on average. If we compare two demographically similar students who scored at the state average in 8th grade math, a student whose 10th grade math score rose to the 75th percentile went on to have annual earnings that were 22% greater ($10,903), on average, than another student whose 10th grade score remained at the state average.

Second, we compare the earnings of demographically similar students who attended the same high school and have the same level of ultimate educational attainment. Figure 1 shows that, even among these students, those with higher 10th grade MCAS mathematics scores had much higher earnings, on average, than those with lower scores. Among four-year college graduates, earnings for a student scoring at the 75th percentile on the MCAS mathematics test were 33% higher, on average, than those for a demographically similar student from the same high school who scored at the 25th percentile.

MCAS scores predict earnings among similar students with the same education level.
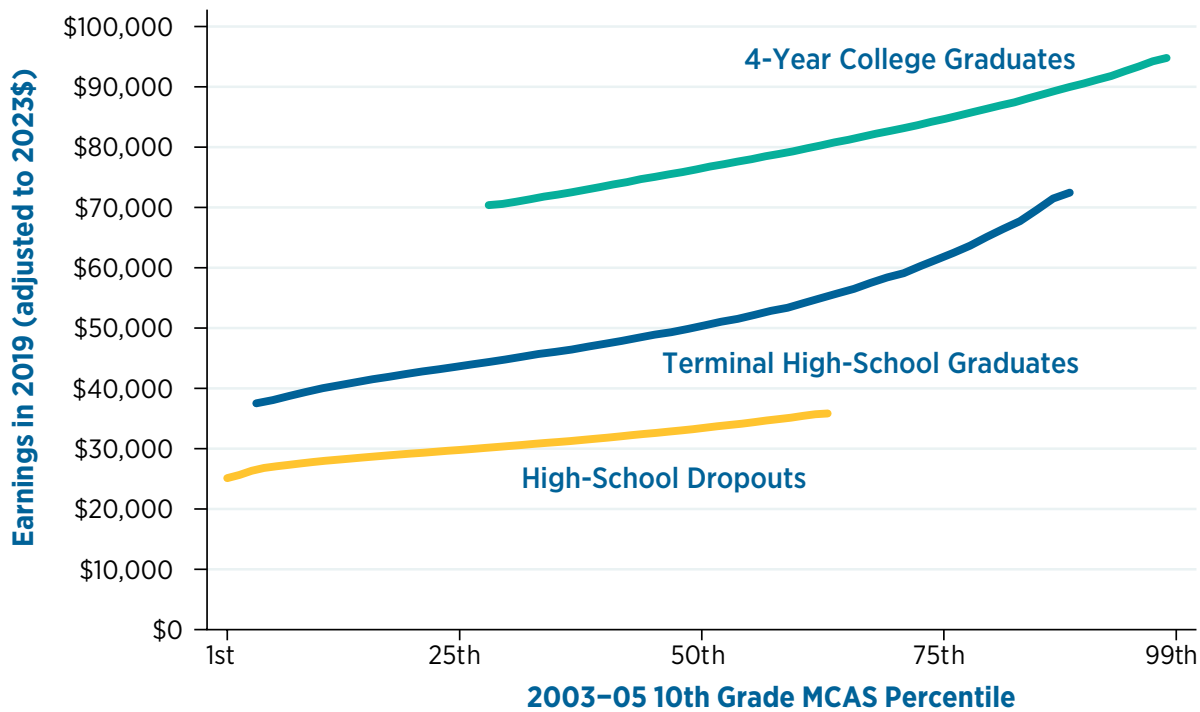
FIGURE 1. Estimated average annual earnings by MCAS mathematics score and educational attainment for demographically similar students who attended the same high school.

NOTE: We modeled log earnings in 2019 as a cubic function of standardized raw MCAS mathematics test scores, student demographics, and high-school fixed effects. Demographic controls included student gender, race/ethnicity, English learner and disability status, and family income in their MCAS year. We also included indicators for the students' ultimate educational attainment 7 years after taking the test and interact these with the cubic function of test scores. Note that students' attainments may continue to change over time; as such, our estimates of the differences may be understated.

B **At the same time, student course grades also predict outcomes. Grades and MCAS scores appear to reflect complementary but somewhat different skills.**

Both course grades and MCAS scores are strong predictors of students' long-run outcomes. For example, among 2012-14 test-takers, only a quarter of students scoring at the 25th percentile on the math MCAS graduated from a four-year college within 8 years, compared to 70% of those scoring at the 75th percentile. We see similar patterns for course grades. Only a third of students earning a C (around the 25th percentile) in their 10th grade math course graduated from a four-year college, compared to two thirds earning a B+ (around the 75th percentile).

Not surprisingly, student grades and MCAS scores are correlated with each other (in 2023, correlations range from 0.52 in ELA to 0.59 in math and 0.62 in science). At the same time, they each independently predict educational attainments. In other words, comparing students with the same MCAS scores, students with higher grades have better outcomes. It is also the case that, comparing students with the same GPA, students with higher MCAS scores have better outcomes.

We illustrate this pattern in Figure 2. In the left panel, we show average educational attainments by MCAS score for students with average course grades (i.e., holding grades constant). In the right panel, we show attainments by course grade for students with average MCAS scores. In both cases, we continue to see a relatively steep positive relationship, particularly for four-year college enrollment and completion.
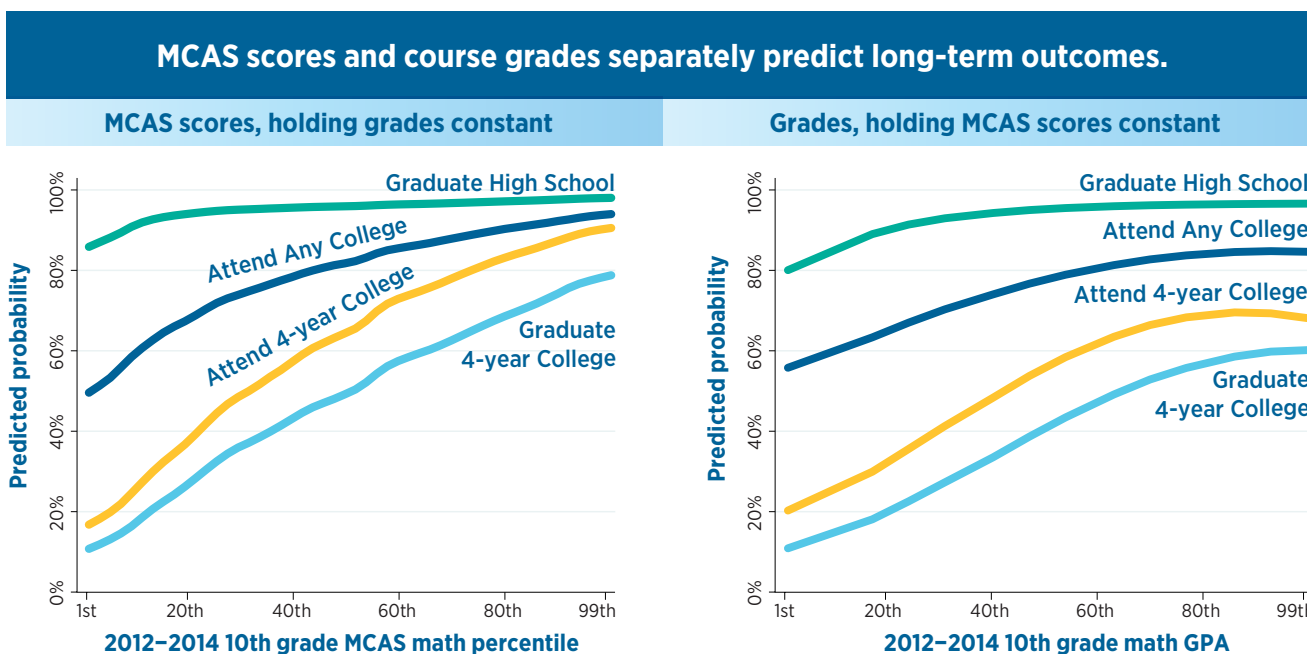
FIGURE 2. Predicted probability of high-school graduation, college enrollment, and college completion by MCAS score for students with average 10th grade math GPA (left) and course grades for students with average 10th grade math MCAS score (right).

The bottom line is that we have a "both/and" story. Both MCAS scores and high-school course grades are important predictors of long-run outcomes. While the general story they support is the same, the two measures provide distinct information about student skills. This is a common finding in the research literature.

C **Increases in MCAS scores and student course grades over time do not always appear to align with increases in students' underlying skills, raising questions about the signals students receive about their performance.**

In *Lifting All Boats?,* we noted the substantial increase in high-school MCAS scores over the first 15 years of testing. For example, in 2018, 79% of 10th graders scored proficient or better in math and 92% in ELA, compared to 52% and 61%, respectively, in 2003.[4] These gains were concentrated in the decade from 2003 to 2013, with average scores remaining flat from 2013 until the onset of the pandemic.

We see similar patterns when the state introduced science testing for the class of 2010. Fifty-seven percent of students in that graduation cohort scored as proficient or above on their first science test, compared to 73% in the graduating class of 2019. We describe these patterns in more detail in our paper on the science MCAS.[5]

These dramatic increases in average test scores could reflect improvements in the academic skills of students in the state. But they could also stem from scale drift or score inflation. The Massachusetts Department of Elementary and Secondary Education identified issues of scale drift, a technical problem with test construction and linking of MCAS scores across years, in the early high-school MCAS tests and made changes in their linking procedures in 2014 to resolve this issue. The MCAS improvements could also arise from score inflation, where test scores increase without improvements in underlying skills because, for example, of inappropriate teaching to the test.

> **These dramatic increases in average test scores could reflect improvements in the academic skills of students in the state. But they could also stem from scale drift or score inflation.**

The best available evidence comes from comparing trends in MCAS scores to the performance over time of Massachusetts students on the National Assessment of Educational Progress (NAEP), a low-stakes test with no known problems with scaling. If students' mastery of mathematics and English language skills truly increased over this time period, on average, we would expect the NAEP scores to follow a similar trend. Because the NAEP is not given in 10th grade, we use 8th grade NAEP trends as a proxy for 10th grade MCAS trends; students' MCAS scores from these two grade levels are highly correlated.

Figure 3 compares these trends in average 10th grade MCAS scores, 8th grade NAEP performance, and course grades. We show results for mathematics (top) and ELA (bottom) because the patterns are somewhat different. We see several main trends.

Increases in average MCAS scores and student course grades over time do not always appear to reflect increases in students' underlying skills.

MATH
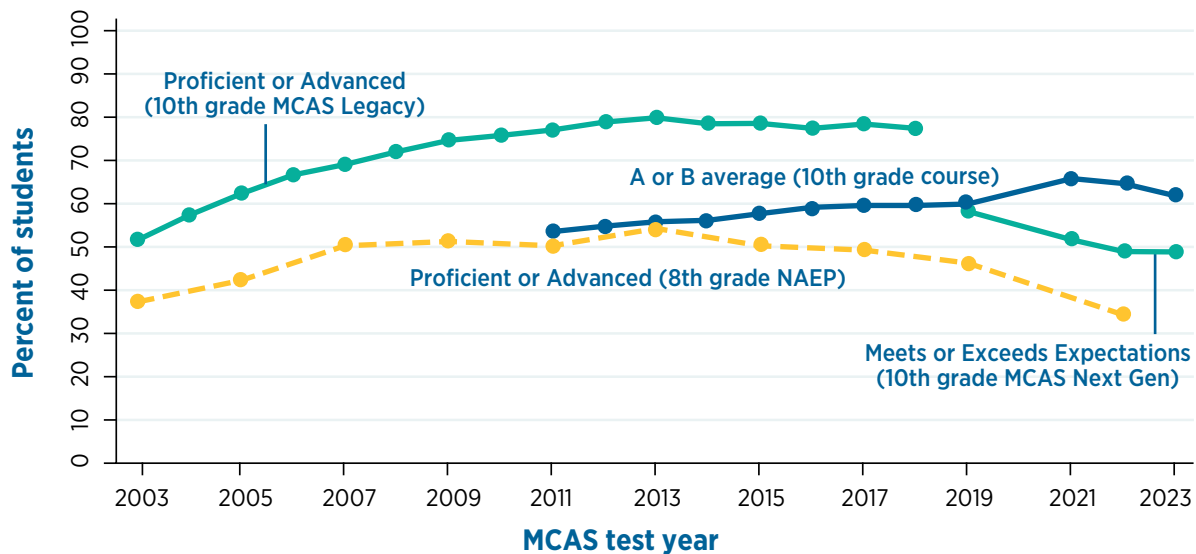
ELA
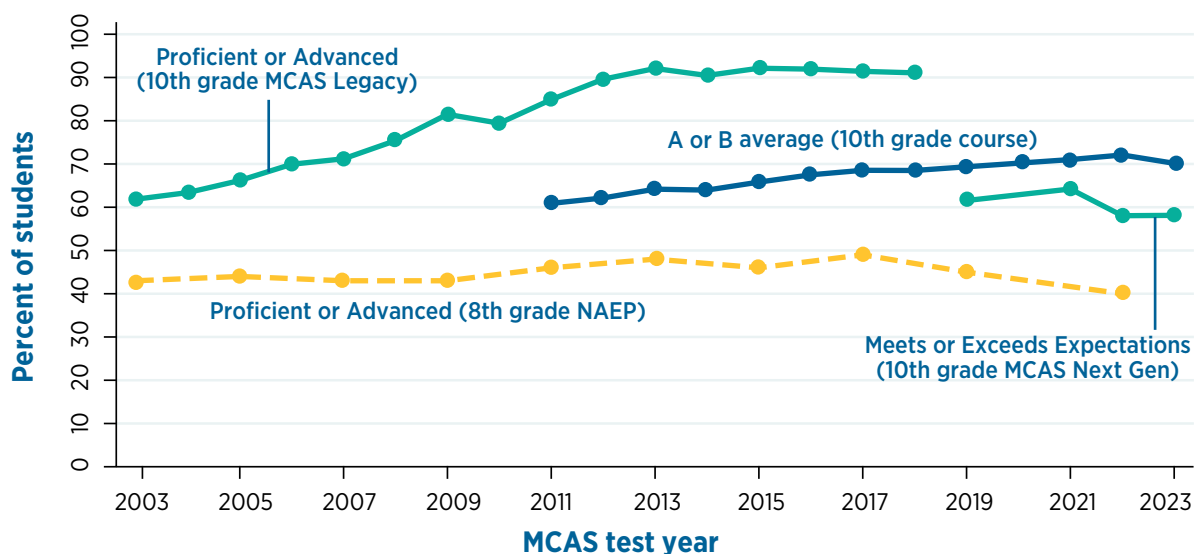
FIGURE 3. Trends in 10th grade MCAS test proficiency, course grades, and 8th grade NAEP proficiency from 2003 to 2023, in mathematics (top) and ELA (bottom).

MCAS test scores in both subjects increased substantially from 2003 to 2013. However, the patterns in Figure 3 suggest that only the increases in math until approximately 2009 were mirrored in 8th grade NAEP score gains (through 2007). The very large increases in ELA, and the modest gains in math after 2009, were not reflected in NAEP gains, suggesting they arose from scale drift, score inflation, content differences, or other inconsistencies.

There are important concerns about whether MCAS scores are giving students accurate signals about their preparation for college and career. For example, in 2018, the last year of the legacy 10th grade tests, nearly 80% of students scored Proficient or above in mathematics and 91% in ELA.

Scores on the Next-Generation MCAS tests, which were introduced to align with revised statewide curriculum frameworks, might provide more accurate information about skill levels. This change led to a large drop in the share of students scoring at Meets Expectations, beginning in 2019. In 2022, for example, only half of 10th graders scored at Meets Expectations or above in math, reflecting a post-pandemic decrease in performance that was also seen in NAEP scores.

For good reason, score inflation is one often-cited issue with high-stakes tests. However, there appears to have been substantial inflation of students' course grades in the state's public high schools as well. Since 2011, the first year of consistent statewide data on course grades, the share of students earning an A or B has increased substantially in all core academic subjects. This increase in grades is not reflected in other recent measures of student learning, such as test performance on the MCAS or the NAEP. In fact, grade inflation appears to have accelerated during the pandemic, when grades went up substantially while test scores and attendance both declined sharply. All told, the share of students earning an A in their high-school courses has close to doubled since 2011.

Taken together, these patterns raise important questions about the accuracy of the information students and their families are receiving about their preparation for college and careers. If families interpret a high-school diploma as a signal of college readiness, they may be mistaken.

For good reason, score inflation is one often-cited issue with high-stakes tests. However, there appears to have been substantial inflation of students' course grades in the state's public high schools as well.

Students who score just above the competency determination (CD) threshold on the MCAS tests enroll in college at low rates and do not earn a living wage by age 30, on average.

Overall, 92% of first-time 10th grade test-takers passed the mathematics test in 2023, 95% passed the ELA test, and 83% passed one of the science tests. However, for test-takers in the 2026 graduating cohort (which includes most students who took the tests in the spring of 2024), the passing threshold will change. An additional six percent of 2023 test-takers would not have passed the ELA test had the new cutoffs been in place.

Many students who pass are not demonstrating success on other short-term or long-term measures of skills. For example, among 2023 test-takers, 68% of students who failed their 10th grade mathematics course met the passing standard on the 10th grade math MCAS. We document the relationship between course grades and MCAS scores in section 3(b). We can also compare outcomes for samples of students who take multiple different tests in the same year – namely, English learners who take the state's ACCESS and MCAS tests, and students who take the MCAS and the SAT.

First, in our *Rising Numbers, Unmet Needs* report, we compare performance for immigrant newcomers who took the 10th grade ELA MCAS test and the ACCESS test in the same year from 2019 to 2022.[6] The ACCESS is a yearly standardized assessment of reading, writing, listening and speaking administered in January/February to all ELs enrolled in public schools in Massachusetts. Immigrant newcomers whose MCAS scores fell at the original ELA cutoff (455 on the Next-Gen test) had an average ACCESS literacy level of 2.4, still in the lowest level of English proficiency (DESE's Foundational category). At the new cutoff of 470, the mean ACCESS literacy level of students was 3.4, substantially higher but still below 3.9, the criterion to exit English learner services.

> **Many students who are not demonstrating success on other measures of skills still pass the MCAS. Among 2023 test-takers, 68% of students who failed their 10th grade mathematics course met the passing standard on the 10th grade math MCAS.**

Second, we see similarly low performance on other measures for students scoring near the passing thresholds. For instance, only 30% of the students scoring 220 or 222 on the 2013 math MCAS also took the SAT at some point during high school (and 15% of students scoring in this range in ELA). Fewer than 1% of these SAT takers reached the SAT College and Career Readiness benchmarks. Also, of students scoring in this range who later enrolled in at least one college math course, only 14% earned math credit in that course (the rest failed or withdrew from their course, or enrolled only in developmental courses). In all, only 15% of students scoring at the passing cutoff in math earned any college degree within nine years of taking the test, and only 10% graduated from a four-year college.

In Figure 4, we show median earnings at around age 30 by legacy MCAS score for 2006-08 test-takers, with the passing cutoff marked as a dotted line. (Note that we exclude individuals with unreported earnings here.) The median student scoring at the cutoff earned only $37,952 in 2022, which is just 1.37 times the federal poverty level for a family of four. For reference, an MIT study estimates that a living wage in Massachusetts translates to annual earnings of $63,530 for individuals in a family with two working adults and two children, and $48,807 for a single working adult with no children.[7]

Students scoring near the passing cutoff have relatively low earnings at age 30.
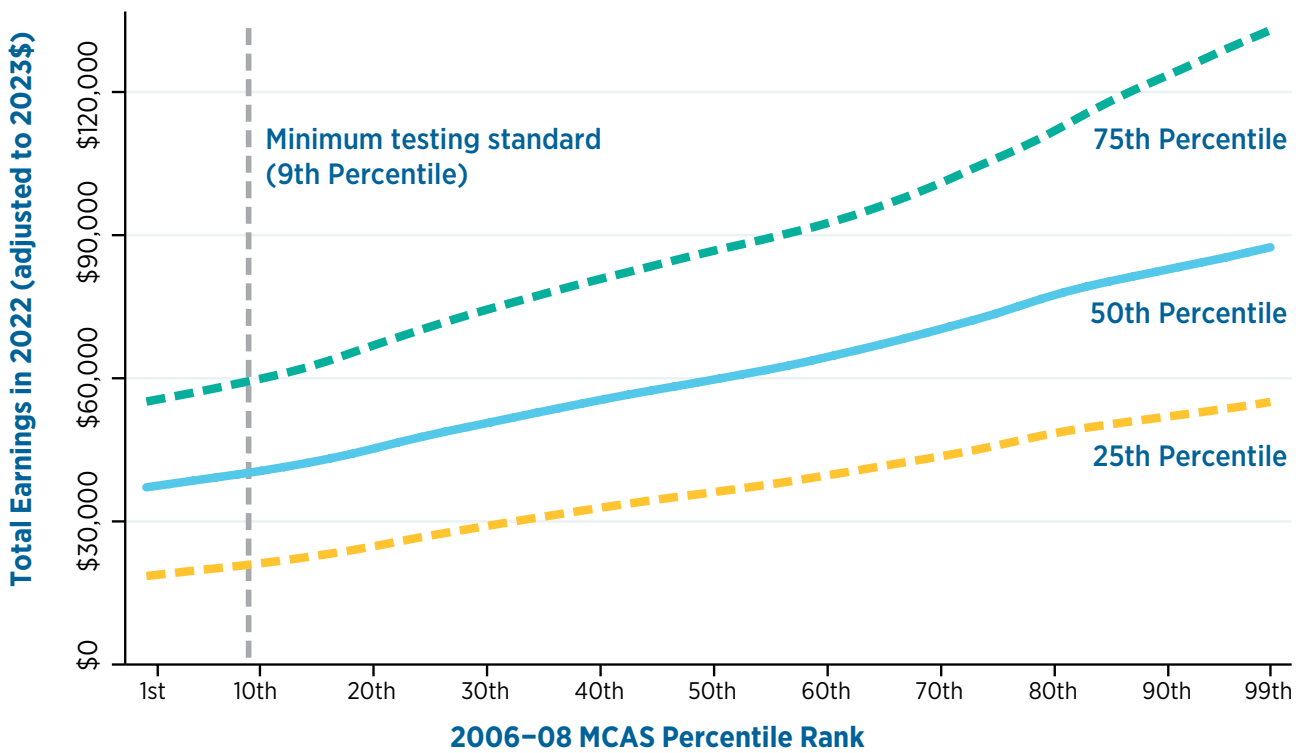
FIGURE 4. 2022 earnings by MCAS mathematics score percentile for 2006-08 first-time 10th grade test-takers.

There are two important points to note about this figure. First, while MCAS scores predict later outcomes, they are not determinative – at each MCAS score, students have a wide range of later outcomes. Some students who fail the MCAS on their first attempt go on to earn quite high salaries. However, among students scoring in the failing range in the figure, only the top seven percent of earners went on to earn as much as the average student scoring at the 75th percentile.

Second, although the figure is limited to students taking the MCAS in 2006-2008, we observe relatively low levels of educational attainment for students scoring at these same percentiles of the test-score distribution in more recent years. Therefore, these patterns have demonstrated some stability over time.

In summary, the available evidence shows limited economic opportunity and lack of post-secondary success for students scoring at the minimum passing threshold. These findings speak to the need for schools to develop better systems and structures to ensure that all high-school graduates have acquired sufficient skills to succeed in college and career. About three quarters of students who fail the MCAS tests are English learners and/or students with disabilities; we return to these groups below. But across all groups, if students do not build sufficiently strong academic skills in high school, there can be serious consequences: lack of enrollment in college, remedial classes that cost students money to learn skills that the K-12 system should have taught, and difficulties with post-secondary coursework that lead many students to drop out without earning a credential, limiting their career options.

These findings speak to the need for schools to develop better systems and structures to ensure that all high-school graduates have acquired sufficient skills to succeed in college and career.

While most students meet the CD testing standard on their first attempt, nearly all of those who fail are English learners (ELs), students with disabilities, and/or students with inadequate course preparation.

A　Around three fourths of students who fail their first test are English learners or students with disabilities.

English learners, students with disabilities, students living in poverty, and students from historically marginalized racial/ethnic groups are much more likely to score below the MCAS passing thresholds. And they are the groups of students most likely to be prevented from graduating because they failed to achieve the testing standard, even after repeated retest attempts.

In Table 1, we show passing rates for different groups of students on their first attempt at each test in 2023. We use cutoffs that will be in place for the class of 2026. We see large differences across groups. For example, 98% of Asian students pass in mathematics, compared to just 82% of Hispanic students. Differences are even starker in science.

Students from historically marginalized groups are much less likely to pass the MCAS on their first attempt.			
	MATH	**ELA**	**SCIENCE**
English Learners	64%	36%	36%
Newcomer	60%	19%	30%
Non-Newcomer	67%	49%	41%
Students with Disabilities	79%	74%	64%
Asian	98%	95%	94%
Black	86%	84%	74%
Hispanic	82%	74%	65%
Mixed Race	93%	92%	86%
Native American	90%	82%	77%
White	96%	95%	92%
Overall	**92%**	**89%**	**83%**

Note: While most first-time test-takers in 2023 will be subject to the legacy thresholds, we present implied passing rates based on new thresholds taking effect for the class of 2026.

TABLE 1. Passing rates on 10th grade MCAS tests for first-time test-takers in 2023, using thresholds for the class of 2026.

Passing rates are particularly low for English learners (nearly half of whom are recent immigrant newcomers) and students with disabilities. Taken together, most students who do not pass their first test are either English learners and/or students with disabilities – 78% in mathematics, 84% in ELA, and 72% in science. Of course, many of these students do go on to retest and pass; we return to this in section 5.

B Students taking below-grade-level courses or earning low grades in their courses are much more likely to fail the MCAS tests.

In an upcoming report, we will examine student course-taking and course grades in the Commonwealth over the past decade. One clear pattern is that students who take developmental or below-grade-level coursework in high school are much more likely to fail the MCAS tests. This pattern is easiest to see in mathematics, where the 10th grade MCAS test includes content from Algebra I and Geometry classes that students have typically taken by 10th grade.

In 2023, 93% of first-time 10th grade test-takers had enrolled in both Algebra I and Geometry (or a higher-level math class) by their test year. Only six percent of these students failed the math MCAS test. By comparison, among students who had only taken lower-level math courses and had not yet been exposed to all the tested math content, 29% failed.[8] Indeed, it is surprising that nearly three quarters of students enrolled in below-grade-level courses did meet the passing threshold on the 10th grade test.

Course grades also relate to MCAS performance. In Table 2, we show 2023 MCAS pass rates by course grades in the same subject and year, among students with any graded course record in that subject area. As above, we show the percentage of students who would pass given the new passing cutoff of 470. Nearly all students earning an A pass the corresponding test, while many students who fail their course do not. The relationship between course grades and MCAS performance is steeper in science than in the other subjects.

	MATH	ELA	SCIENCE
Nearly all students earning an A pass, while many students who fail their course do not.			
A	98%	97%	97%
B	96%	92%	90%
C	91%	83%	77%
D	83%	75%	64%
F	68%	60%	40%

TABLE 2. Passing rates on 2023 MCAS tests by students' course grades in same subject/year.

These patterns in course-taking and course grades also intersect. As we show in Figure 5, students enrolled in on-grade-level math courses are more likely to pass the MCAS than students earning similar grades but taking below-grade-level courses. And students at each course level with higher grades are more likely to pass. Indeed, 98% of students earning an A or B in an on-grade-level math class pass their first 10th grade MCAS test. Taken together, students who enrolled in a below-grade-level course or did not pass their grade-level course make up 12% of test-takers but nearly half of students who failed. Interestingly, fully half of students who failed their below-grade-level math course still passed the MCAS math test on their first try.

Nearly all students succeeding in grade-level courses pass the MCAS.
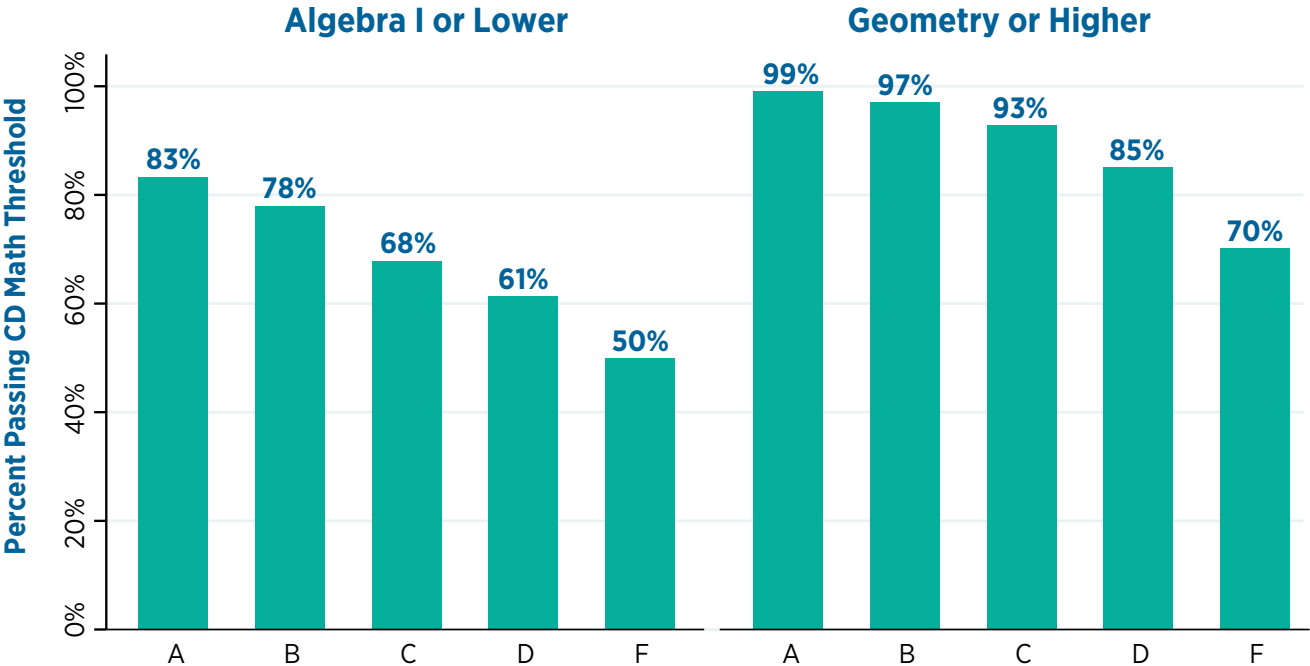
FIGURE 5. Share of students passing the 10th grade MCAS math standard by 10th grade math course enrollment and grades, 2023.

Passing the MCAS matters: Students who barely pass the test on their first attempt have better outcomes than those who just fail it.

One important question about the MCAS graduation requirement is whether it increases student learning. We have only limited evidence on this question. A second is whether passing a particular 10th grade MCAS test (instead of failing it) improves student outcomes. Here, we have stronger evidence because we can compare students who have similar test scores but score on either side of the passing cutoff, using what is known as a regression-discontinuity design. This design allows us to draw causal inferences about the effects of barely passing the MCAS test, instead of barely failing it, on students' later outcomes. An important note is that these inferences apply *only* to test-takers scoring close to the cutoff.

We find clear evidence that passing matters for students near the score threshold. In Figure 6, we show the average outcomes for students at each MCAS mathematics score near the cutoff. Here, we look at first-time test-takers from 2003 to 2007.[9] The jump in outcomes for students at the cutoff shows the impact of barely passing the test. In the top-left panel, we show that for low-income students, barely passing the test increases the probability of graduating from high school by more than 3 percentage points. There is no corresponding impact on high-school graduation for higher-income students scoring near the threshold (top-right panel). However, for higher-income students, barely passing increases the probability of four-year college enrollment by six percentage points (not shown) and that of four-year college graduation by three percentage points (bottom-right panel). There is no impact on college graduation for low-income students (bottom-left panel).

These figures clearly show that barely passing the test matters for students. However, there are several mechanisms that could be at play here, and determining the explanation for these impacts is difficult. Barely failing the test might lead students to become discouraged and drop out of school, which could create the effect seen in Figure 6. Indeed, despite many opportunities for retesting (described below), 10-15% of students who failed an MCAS subject test in 2017 never retested, and 15-30% retested at least once but never passed.

However, the patterns in the figure could also stem from students who barely pass being encouraged *because* they pass, leading them to stay in school and graduate when they otherwise would have dropped out. It is important to note that, from the 2017 MCAS administration, only 77% of low-income students who barely passed the math test and 58% who barely passed the ELA test went on to graduate from a Massachusetts public high school within a year of their expected date. This pattern suggests that factors other than the MCAS tests contribute to students' decisions to drop out of high school.

Also, these impacts might not result from student responses to their test performance, but from teacher or school responses. Students who fail may be placed in remedial courses that lead them to disengage from school, or students who pass may now be seen as "skilled" in a way they were not before, promoting more academic success.

Barely passing the MCAS test affects educational attainments.

High-school graduation within three years of taking math test.

Low−Income Students / Higher−Income Students
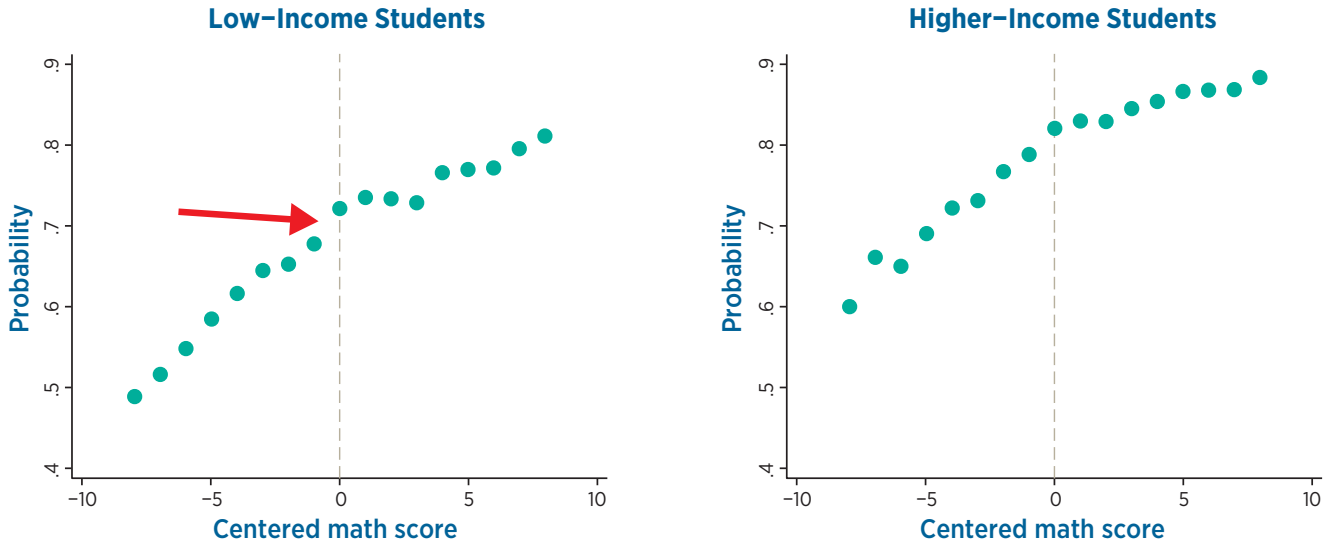
Graduated from four−year college within seven years of taking math test.

Low−Income Students / Higher−Income Students
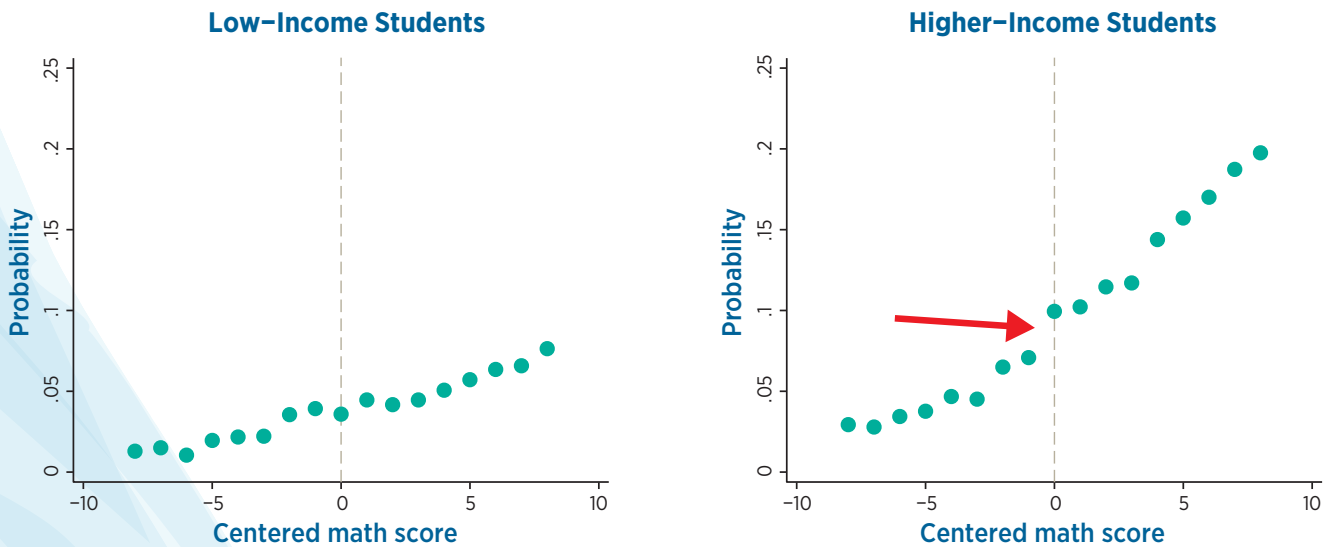
FIGURE 6. Probability of high-school graduation (top panel) and four-year college graduation (bottom panel) for MCAS math test-takers in 2003-07, by family income.

We cannot satisfactorily test these alternative explanations. However, our best efforts suggest that the impacts arise from encouragement rather than discouragement effects. In other words, the evidence we are able to bring to bear suggests that the positive impacts of barely passing outweigh the negative impacts of barely failing. But we cannot know for sure. And, in many ways, the more important question is how schools can support all students – including those who initially fail – to succeed.

While most students who initially fail go on to retake the test and pass, about 85% of those who never pass are English learners or students with disabilities. The MCAS scores of high-school ELs underpredict their later earnings relative to other students.

A **Most students who initially fail go on to retake the test, and most appeals are successful.**

Of first-time testers in the spring of 2023, approximately 11,200 students failed an MCAS science test, while 5,800 failed the MCAS math and 3,600 failed the ELA test (under the new passing cutoff, the ELA number would have been approximately 8,000). Retest opportunities are offered three times per year in math and ELA and twice in science.

The state also has an appeals process for students who retest multiple times but do not pass the tests. Districts have the option to submit a cohort or portfolio appeal for such students.[10] DESE notes that these appeals allow students to "demonstrate through their coursework that they have the knowledge and skills to meet or exceed the passing standard." In a cohort appeal, a student's grade point average and MCAS scores are compared to those of other students in the same course in the same school. The portfolio appeal involves the submission of student work samples.

> **Districts filed appeals for relatively few students. Most appeal attempts were successful.**

In Figure 7, we show retest and appeals patterns for first-time test-takers in 2016 who failed their first mathematics test.[11] Ninety-two percent of these students retested. Just under half passed on their first retest attempt, and another third needed multiple retest attempts but eventually did achieve a passing score. The appeals process was activated for relatively few students; districts filed an appeal for just one quarter of students who retested but never passed (of course, some of these students may have dropped out or transferred before an appeal could be filed). Most appeal attempts were successful.

Of students who fail their first test, most retest and eventually pass on retest.
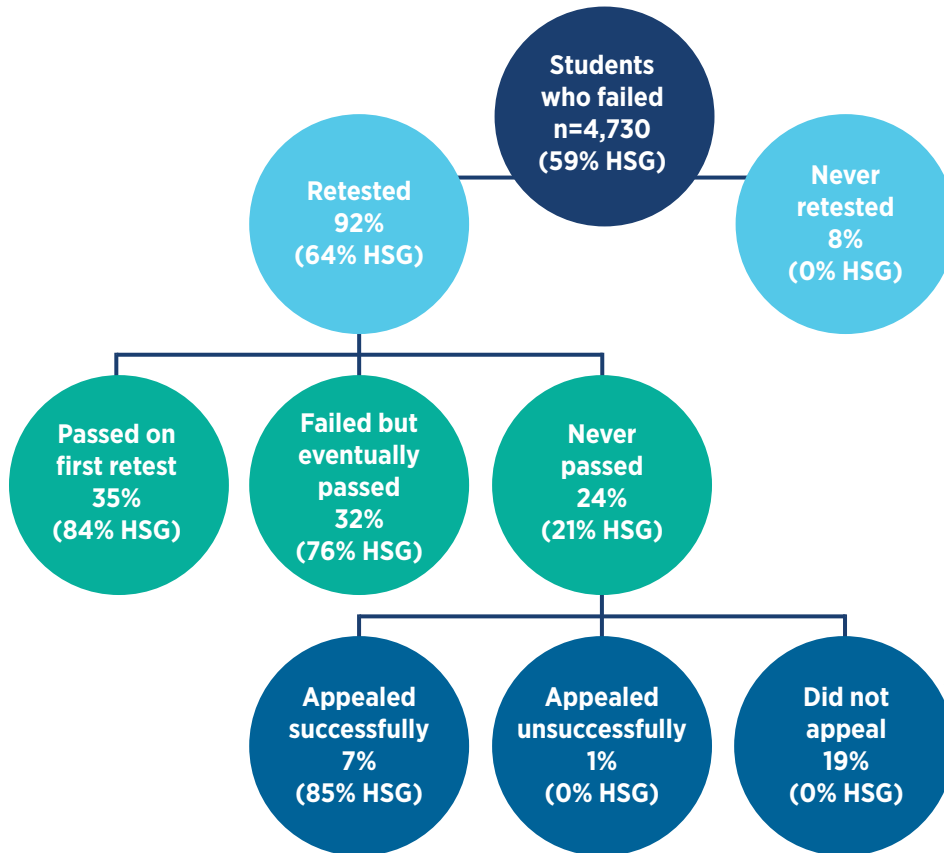
FIGURE 7. Retest and appeal behavior and success rates for first-time test-takers who initially failed the MCAS math test in 2016.

Note: HSG = high-school graduation rate within 3 years of taking the mathematics test. Percentages may not add up exactly due to rounding.
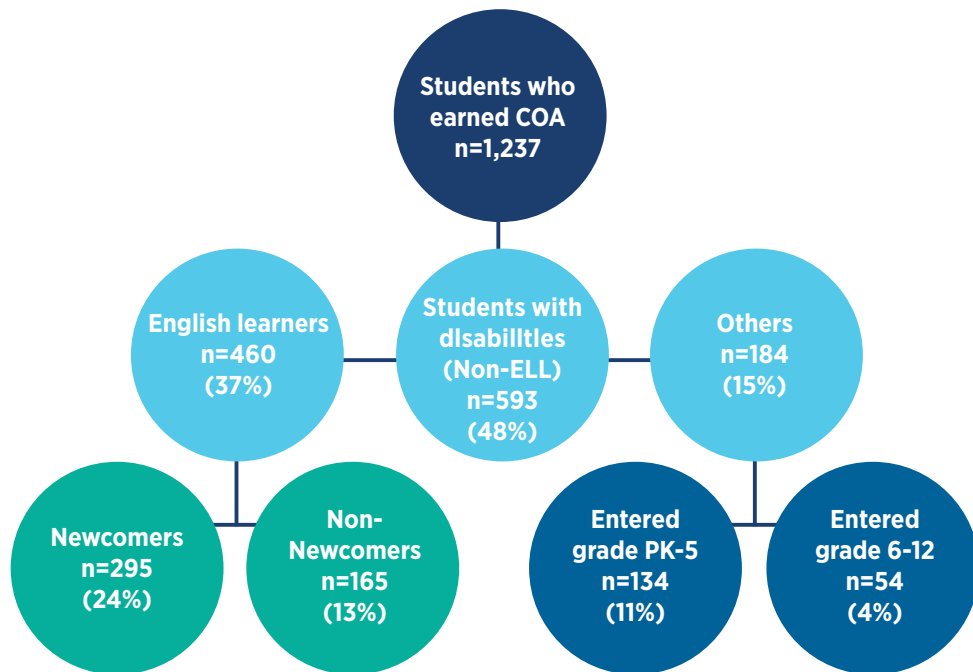
Students who passed on retest and those who were granted an appeal went on to graduate from high school at approximately the same rate as their peers who scored just above the minimum passing score the first time they took the 10th grade MCAS math test.

Appeal rates differ substantially by school district. Twenty-one districts had at least 10 students who first failed the MCAS math test and never passed it on retest. In seven of these districts, appeals were filed for at least half of these students. However, in eight of the districts, appeals were filed for less than 10% of the failing students, and of those districts, four filed no appeal attempts at all. This suggests that some districts may be leveraging the appeals process more consistently on behalf of students who repeatedly fail.

B **Most students who never pass but receive a Certificate of Attainment are English learners or students with disabilities.**

Among the 69,488 students who completed all local graduation requirements in 2019, only 1,237 students (1.8%) did not eventually pass all three MCAS tests or have a successful appeal. Instead of a diploma, these students earned a Certificate of Attainment. As shown in Figure 8, nearly all students who received a Certificate of Attainment were English learners or students with disabilities. Only 134 students, or less than 0.2% of high-school completers, were non-EL students without disabilities who entered the Massachusetts public school system before 5th grade.

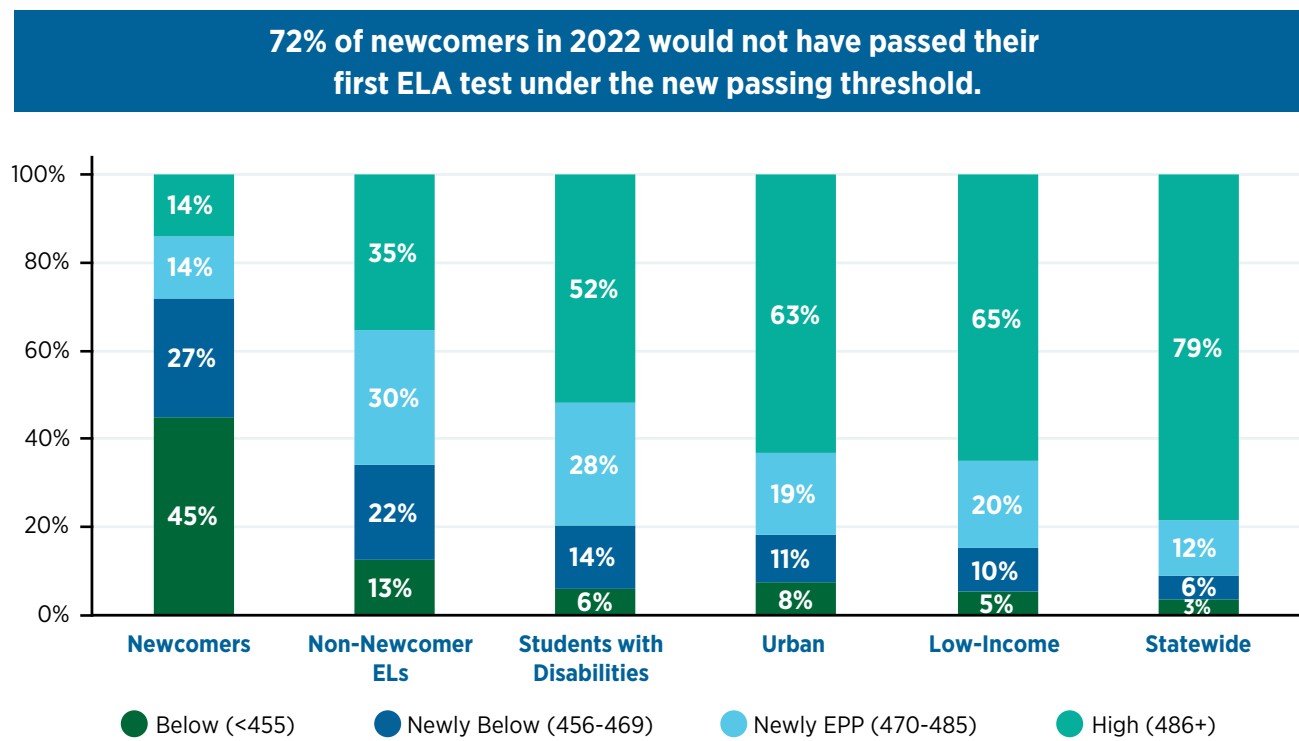**Very few students who receive a COA are not ELs or students with disabilities.**

Students who earned COA
n=1,237

English learners
n=460
(37%)

Students with disabilities
(Non-ELL)
n=593
(48%)

Others
n=184
(15%)

Newcomers
n=295
(24%)

Non-Newcomers
n=165
(13%)

Entered grade PK-5
n=134
(11%)

Entered grade 6-12
n=54
(4%)

FIGURE 8. Breakdown of students who earned a Certificate of Attainment (COA) in 2019.

The CD policy's impact on students who are not yet proficient in English when they attempt the MCAS is of particular importance, given that their language proficiency is likely to improve over time. In *Lifting All Boats?*, we showed that earnings differences across groups were largely (and in some cases completely) accounted for by differences in 10th grade MCAS scores and educational attainments. However, students who were English learners in 10th grade earned *more* at age 30 than their non-EL peers with similar test scores and attainments. The likely explanation is that 10th grade MCAS scores for students who were English learners understated their latent academic skills, leading to an underprediction of their later earnings.

We have done a deep dive into immigrant newcomers who are English learners in Massachusetts high schools. Our recent [report,](#) *Rising Numbers, Unmet Needs,* documented the large rise in the number of such students across the state. Here, we highlight two important findings for this group.

First, newcomers represent 5% of those who attempt at least one of the high-school MCAS tests but fully one third of those who never pass. We predict that this percentage will be higher in future years once the ELA testing standard increases. For example, as shown in Figure 9, about 27% of newcomers testing in 2022 attained the required ELA score but would have fallen below the new, higher passing standard for the class of 2026, had it been in effect. This is a much higher percentage of students affected than for non-newcomer ELs, low-income students, and students with disabilities.

72% of newcomers in 2022 would not have passed their first ELA test under the new passing threshold.

Legend: Below (<455), Newly Below (456-469), Newly EPP (470-485), High (486+)

FIGURE 9. 2022 MCAS ELA score distributions for newcomers and other key student groups.

Second, these patterns are not surprising in light of other research demonstrating that students need six years to become proficient in English. Newcomers' rates of English language acquisition are generally not rapid enough to reach proficiency before they leave high school. In fact, a quarter of 2019 newcomers showed no progress towards the EL exit criteria after their first full year in a Massachusetts public high-school. Only 28% met their individual growth targets for year-over-year improvement in their English proficiency.

Most high schools that boost test scores also improve long-term outcomes like earnings. However, some schools, including some career and technical education (CTE) schools, improve students' long-term earnings without raising test scores, while other schools may overly focus on test preparation at the expense of broader skill development.

One of the goals of any state policy is to improve practice across the state. How educators respond matters. For the testing policy, schools and educators do appear to be responding. For example, likely as a response to the introduction of the science test for the class of 2010, science course offerings have shifted substantially in the state. Today, 56% of students take the 9th grade biology test, compared to 37% in 2010.

In a recent working paper, we show that some high schools serving large shares of low-income students promoted educational opportunity and socio-economic mobility much more effectively than others did. Because we examine earnings at age 30, we focus on students who enrolled in high school in the early 2000s. Similar low-income students who attended a school at the 80th percentile of the effectiveness distribution instead of a school at the 20th percentile were 60% more likely to graduate from a four-year college (14% vs. 9%), and they earned 9% (or about $2,500) more annually at age 30.

The schools that are effective in producing strong longer-run outcomes for low-income students tend to be those that improve students' MCAS test scores. The correlation between schools' estimated impacts on 10th grade test scores and earnings is 0.43. We illustrate this pattern in Figure 10. Each dot in the figure represents a high school; those at the top of the figure improve earnings more, while those to the right improve 10th grade MCAS scores more.

> **The schools that are effective in producing strong longer-run outcomes for low-income students tend to be those that improve students' MCAS test scores.**
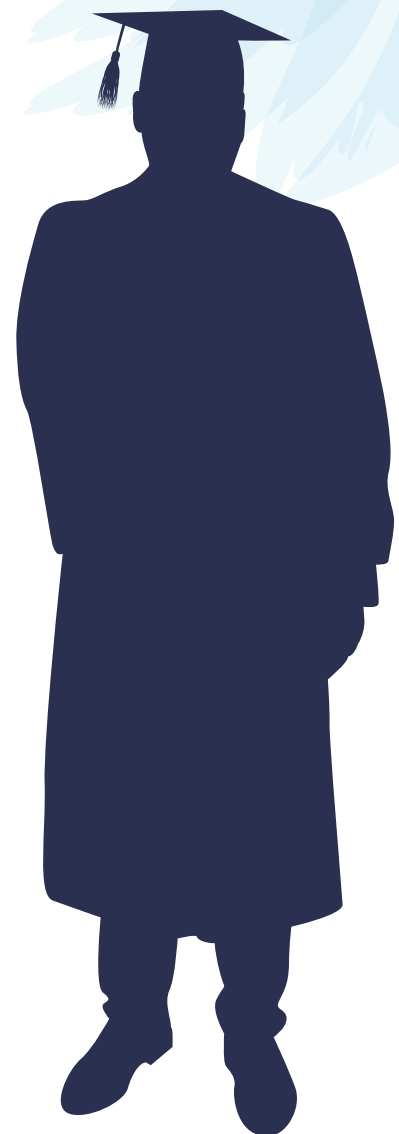
Schools that increase test scores more tend to increase earnings more.
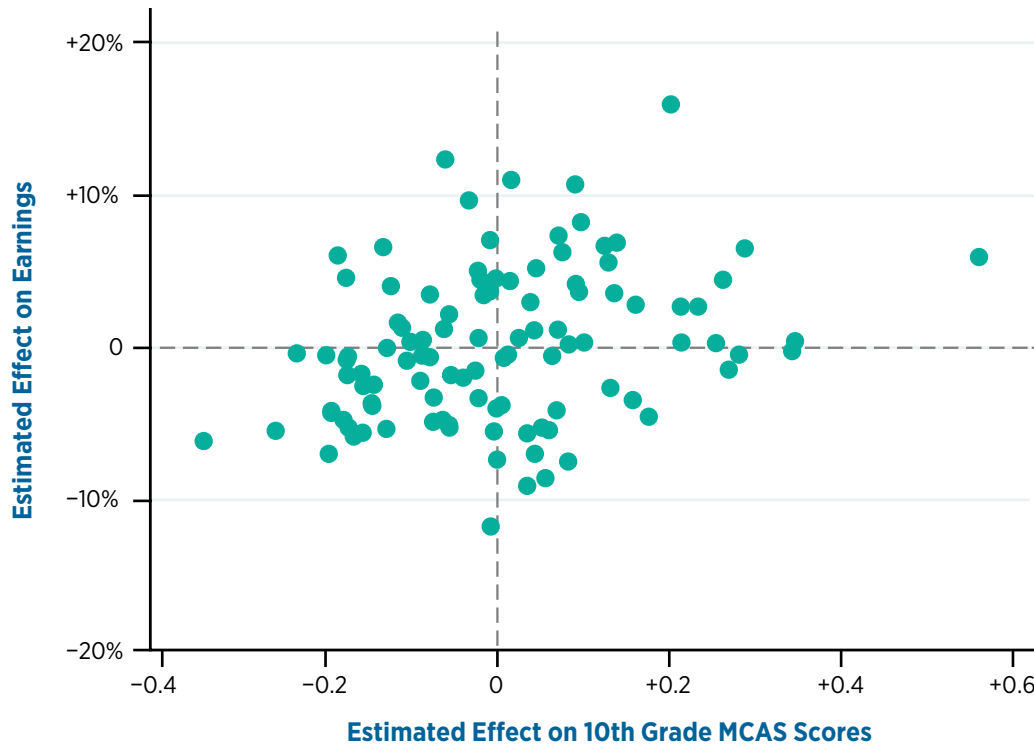
FIGURE 10. School effects on the MCAS math scores and later earnings of low-income 10th graders who tested in 2003-05.

There are two important caveats to this pattern. First, the schools in the top left quadrant improved students' earnings without improving test scores as much. This group includes some CTE schools and suggests that there are pathways to improving earnings that do not include improving test scores. Second, the group of schools in the bottom right quadrant is particularly concerning. These are schools that improved student test scores more than average, but not later earnings. One hypothesis is that these schools may be investing resources and attention to teaching to the test rather than building students' knowledge and skills in ways that generalize to other contexts.

1   The state does describe a recommended set of courses that students should take, known as MassCore, but districts are not required to follow these recommendations. See Voices for Academic Equity's 2024 report, *The Courses They Take: The Impact of the MassCore High School Program of Study on Student Success,* for more information.

2   Papay, J.P., Mantil, A., Murnane, R.J., An, L., Donohue, K., & McDonough, A. (2020). *Lifting All Boats? Accomplishments and Challenges from 20 Years of Education Reform in Massachusetts.* Providence, RI: Educational Opportunity in MA, Brown University.

3   Beginning with the class of 2010, the CD policy required students scoring in the Needs Improvement range on the legacy test (220 to 238) to complete an Educational Proficiency Plan (based on coursework) to meet the CD standard. We focus on the testing standard of 220.

4   The switch to the Next-Generation tests complicates the trend over time past 2018.

5   Mantil, A., Papay, J.P., Mbekeani, P.P., and Murnane, R.J. (2022). *Increasing High School Students' Preparation and Interest in STEM Fields: Does a Graduation Requirement Make a Difference?* (EdWorkingPaper: 22-645). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/9e56-3074.

6   Mantil, A., Papay, J.P., Ferguson, I.M., Mbekeani, P.P., & Murnane, R.J. (2023). *Rising Numbers, Unmet Needs: Immigrant Newcomers in Massachusetts High Schools.* Providence, RI: Educational Opportunity in MA, Annenberg Institute at Brown University.

7   Glasmeier, A.K. (2024). Living Wage Calculator. Massachusetts Institute of Technology. Retrieved May 13, 2024 from https://livingwage.mit.edu/states/25.

8   Understanding whether students are taking grade-level courses or not is challenging. We exclude from the analysis 8% of students whose courses include algebra and geometry content but may not be equivalent to full courses in those topics. Many of these students are likely taking on-grade-level courses recorded under non-standard course codes, and the MCAS results presented here do not change if we include these students in the on-grade-level group.

9   We draw here from Papay, J.P., Mantil, A., & Murnane, R.J. (2022). On the Threshold: Impacts of Barely Passing High-School Exit Exams on Post-Secondary Enrollment and Completion. *Educational Evaluation and Policy Analysis 44*(4), 717-733. We find similar evidence in science in our 2022 working paper, which examines students who first tested in the graduating cohorts of 2010-12.

10 A third type of appeal is the transcript appeal, which is only for students who transfer to a Massachusetts public high school late in their senior year.

11 We show this for 2016 testers because waivers of the MCAS testing requirement during the pandemic affected the classes of 2020-23.

ANNENBERG
BROWN UNIVERSITY