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Increasing Diversity in Boston's Exam Schools

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Executive Summary

Nearly a quarter of 7th-12th-graders in the Boston Public Schools (BPS) attend one of three exam schools, considered among the highest quality schools in the district. The exam schools' student bodies do not, however, reflect the city's diversity. Black and Hispanic students comprise nearly 75% of Boston's student age population but represent only 40% of enrollment at the three schools and only 20% of enrollment at the most selective Boston Latin School (BLS). In this brief, we attempt to identify contributors to the lack of diversity in exam school enrollment, as well as potential solutions to that problem. We use data provided by BPS to measure racial gaps at each stage of the exam school admissions process and determine which interventions could improve exam school diversity while maintaining rigorous academic standards. We conclude that many commonly discussed interventions, though helpful,would have relatively small benefits for diversity. MCAS scores in 5th-grade identify a substantial number of high-skilled Black and Hispanic students who currently do not enroll in exam schools. Assigning students to exam schools based on such scores could increase the number of Black and Hispanic students at BLS by up to 50%, though less so if the highest-scoring students maintained preferences for other schools.

Background

Nearly a quarter of 7th- to 12th-grade students in the Boston Public Schools (BPS) attend one of the district's three exam schools, which require students to take a specialized exam to be eligible for admission. These schools are perceived as being among the highest quality schools in the district, and their elite status is seen as strengthening students' college applications and longer-term outcomes. As such, there is substantial competition to gain admission to these schools, with many students and parents investing significant time, effort and money to improving the odds of admission.

The exam schools' student bodies do not reflect the diversity of the wider district. Nearly 75% of BPS students are Black or Hispanic, a proportion not much changed when charter and private school students are included in the calculation. Yet only about 40% of students enrolled at the exam schools are Black or Hispanic. At Boston Latin School, the largest exam school and the largest public high school in Boston, only 20% of students are Black or Hispanic. In 2016, student reports of racial bias at

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BLS brought the racial gaps in exam school enrollment to the forefront of Boston politics. An official investigation into racial bias at BLS was launched in early 2016 and, later that year, the Boston School Committee approved an "Opportunity and Achievement Gap Policy" highlighting racial equity at the exam schools as a priority for policy action.

In this brief, we attempt to identify contributors to the lack of diversity in exam school enrollment, as well as potential solutions to that problem. We use data provided by BPS to explore each stage of the process through which students enroll in the exam schools in 7th-grade. We measure racial gaps at each stage of this process in order to determine where BPS might intervene to most successfully improve diversity of the exam schools while maintaining rigorous academic standards. We then use the data to ask what would happen to the racial composition of these student bodies if BPS altered the current admissions process in a variety of ways. We conclude that many commonly discussed interventions, though helpful, would have relatively small benefits for diversity. MCAS scores in 5th-grade identify a substantial number of high-skilled Black and Hispanic students who currently do not enroll in exam schools. Assigning students to exam schools based on such scores could increase the number of Black and Hispanic students at BLS by up to 50%, though less so if the highest-scoring students maintained preferences for other schools.

Many questions on the ISEE require knowledge of concepts, such as algebra, not taught by the start of 6th grade in most schools and thus accessible only to students who have prepared for the exam outside of school.

The Admissions Process

Applications for admission to the exam schools in 7th-grade consist of three components. First, students must take a privately developed admissions exam called the Independent School Entrance Exam (ISEE). The ISEE is optional for students to take and is offered on a Saturday in early November of 6th-grade. The exam covers a variety of topics in math and literacy, only some of which are covered by the typical BPS elementary school curriculum. Many questions on the ISEE require knowledge of concepts, such as algebra, not taught by the start of 6th-grade in most schools and thus accessible only to students who have prepared for the exam outside of school.

Second, students' schools report their year-end 5th-grade and first semester 6th-grade academic performance as measured by math and English GPA (on a 12 point scale). Students' ISEE scores and GPAs are then given equal weight when constructing an admissions rank. Third and finally, students rank the three exams schools in order of preference. BPS then determines how many slots are available in each school and extends invitations to students who expressed a preference for a given school and whose combination of ISEE scores and GPAs rank them sufficiently highly. After receiving an invitation, students can choose to accept or reject the offer. There is no waitlist, as BPS over-invites students to the exam schools knowing that a fraction of them will reject the invitation.

We therefore study various parts of the admissions process where racial gaps might arise: the decision to take the ISEE and thus apply; ISEE scores among those who do take it; 5th- and 6th-grade GPAs; preference ranking of exam schools; and decision to accept an invitation to one of the exam schools. Because exam schools are intended for academically elite students, we often compute both raw racial

Table 1: Exam School Testing and Application Rates, 2007 - 2013

	Count	Took ISEE	Invited to any exam school	Enrolled at any exam school	Enrolled at any if invited
All	24,062	0.354	0.168	0.146	0.869
White	3,115	0.604	0.410	0.343	0.838
Asian	2,070	0.785	0.530	0.500	0.944
Black	9,606	0.264	0.080	0.070	0.864
Hispanic	9,271	0.266	0.098	0.081	0.827

gaps and gaps among only students who have 5th-grade MCAS scores that place them in the top 25% of the district.

We restrict most of our analysis to students who were enrolled in 5th-grade in BPS for two reasons: first, 5th-grade state test scores are the most recent measure of student achievement available when students take the ISEE in 6th-grade. Second, since students take the ISEE early on in 6th-grade, 5th-grade is likely to be the most reasonable time for the district to intervene to change application behavior or admissions outcomes. Our data spans the BPS 5th-grade classes of 2006-07 through 2012-13, which allows us to observe students for a few years after entering exam schools. The data therefore do not account for more recent interventions BPS has using to attempt to improve exam school diversity.

Overall Racial Gaps in Exam School Enrollment

We observe large racial gaps in exam school application behavior, as seen in Table 1. Across the entire district from 2007-13, 35% of students began the application process by taking the ISEE. This average looks quite different by race. Over 60% of White students and nearly 80% of Asian student took the ISEE, compared to a little more than 25% of Black and Hispanic students. Ultimately, 17% of BPS students received an invitation to one of the exam schools, an average that also contains large racial differences. Over 40% of White students and over 50% of Asian students were invited, compared to fewer than 10% of Black and Hispanic students.

Nearly 35% of White students and 50% of Asian students ultimately enrolled in an exam school, compared to 7% of Black students and 8% of Hispanic students.

As a result of these racial gaps in exam school invitations, we also observe large racial gaps in exam school enrollment. Nearly 35% of White students and 50% of Asian students ultimately enrolled in an exam school, compared to 7% of Black students and 8% of Hispanic students. The vast majority (87%) of students who received an invitation to an exam school chose to enroll in that school, a rate that does not differ much by race. Enrollment rates among students who received an invitation are 84% for White students, 86% for Black students and 83% for Hispanic students. Only Asian students showed a higher likelihood to accept an invitation, with 94% of invited students enrolling in an exam school.

These results show that the exam school enrollment gap between White students and Black and Hispanic students is driven entirely by differences in the likelihood of invitation. We now explore more closely where racial gaps

Table 2: Summary Statistics

Panel A: All 5-th grade BPS Students, 2007 - 2013					
	MCAS percentile	GPA	ISEE percentile	N	N in top 25% of MCAS
White	65.8	-	-	3,115	1,449
Asian	72.8	-	-	2,070	1,187
Black	43.2	-	-	9,606	1,441
Hispanic	45.4	-	-	9,271	1,629
Panel B: BPS ISEE-Takers, 2007 - 2013					
	MCAS percentile	GPA	ISEE percentile	N	N in top 25% of MCAS
White	79.6	10.0	59.8	1,882	1,270
Asian	79.4	10.0	57.1	1,625	1,108
Black	63.5	8.4	37.0	2,539	947
Hispanic	66.2	8.7	40.0	2,466	1,051
Panel C: Private/Charter School ISEE-Takers, 2007 - 2013					
	MCAS percentile	GPA	ISEE percentile	N	N in top 25% of MCAS
White	-	9.8	60.1	2, 371	-
Asian	-	9.6	66.1	543	-
Black	-	8.1	37.5	1,744	-
Hispanic	-	8.8	43.3	775	-

in the likelihood of invitation arise. We begin by documenting racial achievement gaps that explain part of this but then show that, even comparing students with similarly high 5th-grade MCAS scores, there are clear racial gaps in the exam school admission pipeline.

Achievement Gaps

One source of racial gaps in exam school invitation comes from differences in academic achievement. Table 2 contains three panels: panel A describes all BPS students, for whom the only academic achievement measure we observe is 5th-grade MCAS scores; panel B describes BPS exam school applicants, for whom we can also observe GPA and ISEE scores; and panel C describes exam school applicants coming from private schools, for whom we can observe GPA and ISEE scores, but not MCAS scores. We measure MCAS and ISEE scores by the percentile in the distribution of Boston test-takers, so that all students are being compared only to other Boston students who took that exam.

BPS students exhibit substantial baseline achievement gaps by race. Panel A shows that, on average, Black and Hispanic students score about 20 percentiles below and Asian students 7 percentiles above White students on the 5th-grade MCAS. One consequence of this is that, although Black and Hispanic students comprise the vast majority of BPS, there are relatively similar overall numbers of each group in the top 25% of MCAS scorers in the district. In total, Black and Hispanic students in the top 25% of MCAS scorers outnumber White and Asian students with such high scores. This

result suggests that racial gaps in exam school application and enrollment cannot be fully explained by achievement gaps in BPS. We highlight such top scorers because, as we will show, exam school invitations are heavily concentrated among this group.

Among students who choose to take the ISEE, as shown in panel B, racial gaps in MCAS scores are smaller but still substantial. We also see substantial racial gaps in GPA and ISEE scores. Black and Hispanic students have 5th- and 6th-grade GPAs about 1.5 points lower (on the BPS 12-point scale) than White and Asian students. Black and Hispanic students score nearly 20 percentiles lower on the ISEE than do White and Asian students. Given these lower GPAs and ISEE scores, Black and Hispanic students' exam school applications will on average be weaker than those of White and Asian students.

The final panel of Table 2 describes one additional set of students, those who attend private or charter schools in 6th-grade when applying to exam schools. Racial gaps in GPA and ISEE scores resemble gaps within this private school applicant pool as in the public school applicant pool. Also important is that private school applicants are more likely to be White than public school applicants, making the overall applicant pool to the exam schools less diverse than the public school applicant pool would suggest.

Comparing Students with Similarly Strong Academic Achievement

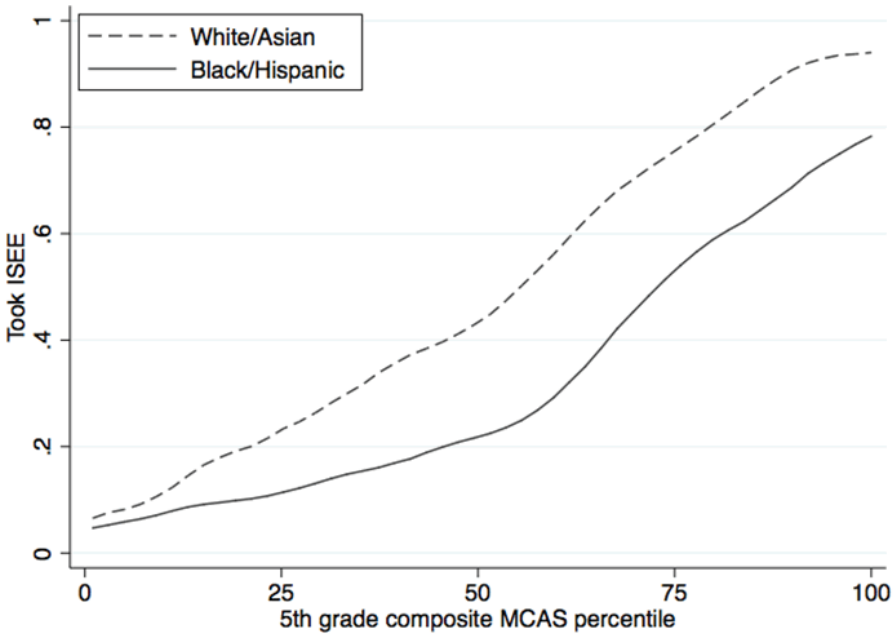
We have documented two primary sets of facts. First, Black and Hispanic students are less likely to apply and be invited to exam schools than White and Asian students. Second, Black and Hispanic students as a group have lower academic achievement than White and Asian students, as measured by MCAS scores, ISEE scores, and GPAs. One major question that arises is the extent to which these differences in academic achievement can explain differences in exam school enrollment rates. Put another way, is there necessarily a tradeoff between improving diversity of the exam schools and maintaining their current admissions standards for academic achievement?

Black and Hispanic students at every achievement level are less likely to take ISEE than their White and Asian counterparts of the same achievement level.

To answer this, we show in a series of figures below racial gaps at various stages of the exam school enrollment pipeline as a function of students' 5th-grade MCAS scores. This allows us to compare the decisions of all public school applicants to the exam schools with other such students of the same academic achievement (as measured by MCAS). In particular, we will focus our analysis on students whose 5th-grade MCAS scores place them in the top 25% of the district, as this population is primarily where the exams schools draw their students from.

We start by examining the decision to take the ISEE and thus apply to the exam schools. Figure 1 shows that Black and Hispanic students at every achievement level are less likely to take the ISEE than their White and Asian counterparts of the same achievement level. Among the top 25% of MCAS scorers, Black and Hispanic students are about 20 percentage points less likely to take the ISEE than White and Asian students with similar MCAS scores. This means that differences in academic achievement cannot fully explain racial gaps in ISEE-taking rates. It also means that there are substantial numbers of high-achieving Black and Hispanic students who

Figure 1



fail to take the ISEE even though they would likely do well on it. Such students may not take the ISEE for a number of reasons: they do not find the exam schools appealing; they are not aware of the requirement to take the ISEE as part of the admissions process; they find the timing or locations of the exam sites inconvenient; or because they do not realize the exam is free to take.

Among those who choose to take the ISEE, Black and Hispanic students on average score worse than White and Asian students with similar 5th-grade MCAS scores, as seen in Figure 2. Among the top 25% of MCAS scorers, Black and Hispanic students score 12 percentiles lower on the ISEE than their White and Asian counterparts with similar MCAS scores. This discrepancy may be driven by the fact that the curriculum covered on the ISEE is substantially different from that covered on the MCAS and in BPS more generally. Black and Hispanic students may attend schools that, on average, are less likely to cover ISEE-specific topics. There is also significant anecdotal evidence that many students receive out-of-school tutoring to help prepare for ISEE. Black and Hispanic students may receive less additional exam preparation than White and Asian students.

Just as racial gaps in ISEE scores exist even when comparing students with similar 5th-grade MCAS scores, we also observe substantial racial gaps in schools' reported 5th- and 6th-grade GPAs. Black and Hispanic students on average have lower GPAs than White and Asian students with similar 5th-grade MCAS scores, as seen in Figure 3. Among the top 25% of MCAS scorers, Black and Hispanic students have GPAs one point lower on average (on a 12-point scale) than those of White and Asian students. Such differences in GPA, even comparing students with similar MCAS scores, are hard to interpret. They may reflect real differences in academic performance, differential grading standards in schools that Black and Hispanic students attend, or implicit or explicit discrimination by teachers. Parents

Figure 2

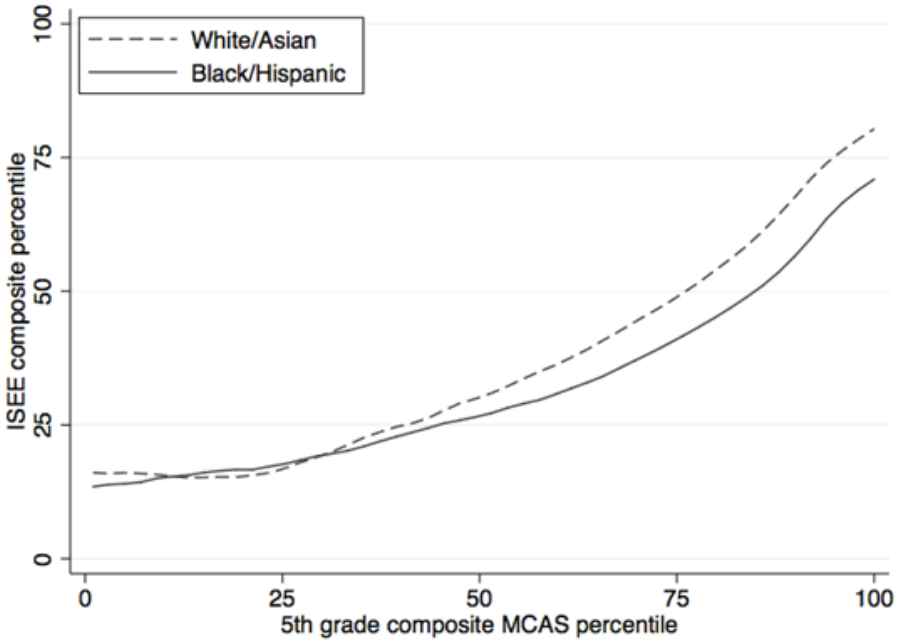


Figure 3

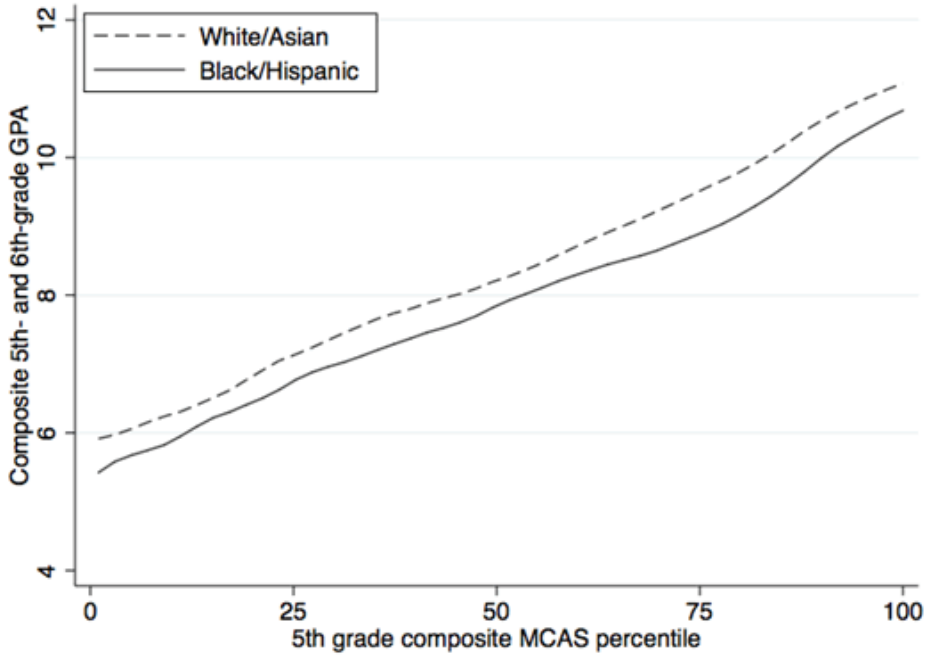
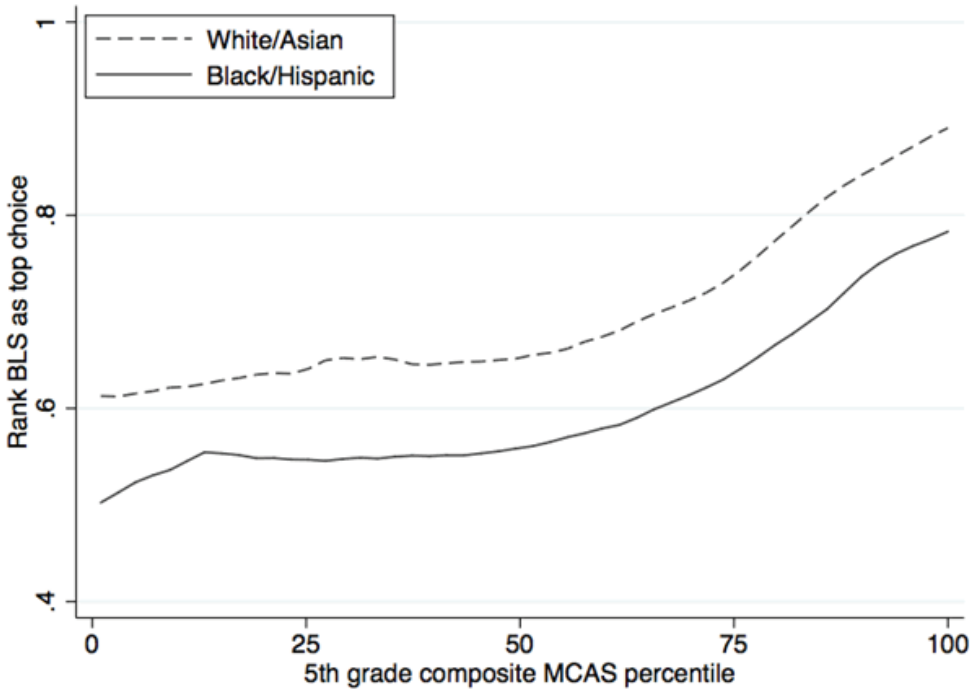


Figure 4



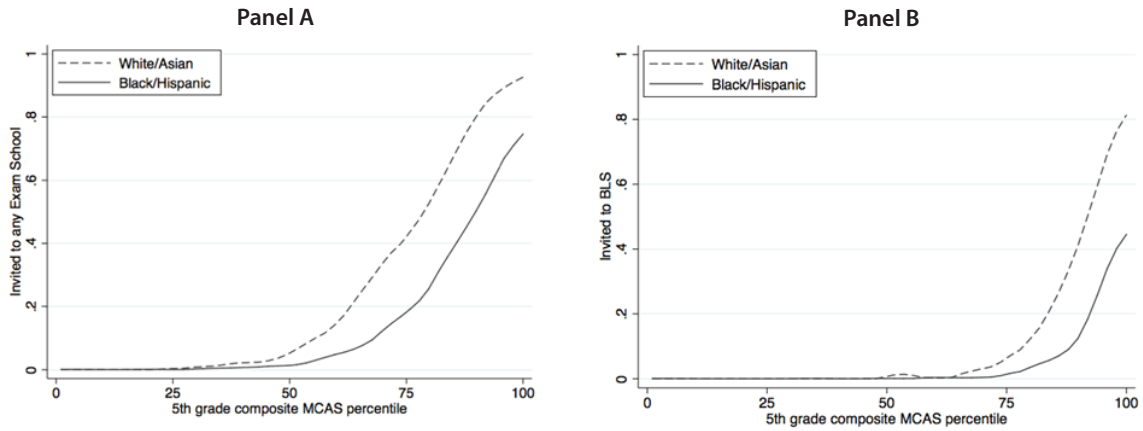
of White and Asian teachers may also have better information about the importance of GPA in the admissions process and may thus communicate with teachers about grading concerns more frequently.

The final racial gap we observe in the application choices that students make involves the ranking of which exam school is most preferred. Black and Hispanic applicants are substantially less likely to rank BLS as their first choice, and Figure 4 shows that this is not driven by differences in academic achievement. Even among the top 25% of MCAS scorers, Black and Hispanic students are about 13 percentage points less likely than White and Asian students to rank BLS as their first choice. That BLS is less appealing to the highest-achieving Black and Hispanic students contributes to the disparities in enrollment rates.

We have now shown that substantial racial gaps exist in ISEE-taking rates, ISEE scores, 5th- and 6th-grade GPAs, and listing BLS as a first choice. More importantly, we have shown that underlying differences in academic strength can not fully explain these facts, as racial gaps exist in each of these dimensions even when examining only the academically strongest BPS students (as measured by MCAS). How do these differences affect

Underlying differences in academic strength can not fully explain these facts, as racial gaps still exist in all of these application parts even when examining only the academically strongest BPS students.

Figure 5



which students receive exam school invitations?

Figure 5 shows the cumulative effect of these gaps at each stage of the pipeline on the likelihood that students are ultimately invited to the exam schools. Overall, Black and Hispanic students are 32 percentage points less likely than White and Asian students to be invited to any exam school. As Panel A shows, when we focus on the top 25% of MCAS scorers and control for MCAS scores, the racial gap in invitations to any exam school shrinks slightly, but remains a large 26 percentage points. This means that high-achieving Black and Hispanic students are substantially less likely to be invited to exam schools than their White and Asian peers of similar academic strength as measured by MCAS.

Focusing on the most selective of the exam schools, Black and Hispanic students are 21 percentage points less likely to be invited to BLS than their White and Asian peers. As panel B shows, when we focus on the top 25% of MCAS scorers and control for MCAS scores, the racial gap in invitations to BLS is an even larger 26 percentage points. Again, this means that high-achieving Black and Hispanic students are substantially less likely to be invited to BLS than their White and Asian peers of similar academic strength. These gaps in invitation rates stem from a combination of gaps in application rates, ISEE scores, GPA, and school preference rankings.

When we focus on the top 25% of MCAS scorers and control for MCAS scores, the racial gap in invitations shrinks slightly but remains a large 26 percentage points.

Potential Interventions

How might different interventions by BPS or changes to the admissions system affect minority enrollment in the exam schools and BLS in particular? In Table 3, we outline how minority enrollment at BLS might change under different scenarios. We simulate changes in enrollment at BLS based on assumptions that existing patterns in the data would still hold even as we change one individual part of the pipeline. For example, our simulations

Table 3: Possible Interventions

If we intervened so that...	Black & Hispanic enrollment at BLS would rise from 21% to ....
Black/Hispanic students to ISEE at the same rate as White students	23%
All students were required to take ISEE	23%
Invitations were based purely on ISEE and not GPA	23%
Ignore ISEE-takers' rankings and just assign highest to BLS	24%
Black and Hispanic students scored the same as Whites on ISEE	26%
Assignments made purely on the basis of 5th grade MCAS scores (eliminate ISEE for BPS; ignoring student preferences; predict MCAS from ISEE for private students)	30%

do not incorporate the possibility that more minority students would choose to enroll at exam schools if rising diversity leads to a more welcoming environment for such students. Our goal here is to isolate the extent to which each part of the pipeline contributes to the ultimate enrollment gaps that are of most interest to policymakers and parents. All enrollment changes can be compared to the fact that 21% of current BLS students are Black or Hispanic.

We first model what would happen to enrollment if ISEE-taking rates of Black and Hispanic students could be raised to the level of White students. This might occur through information campaigns or changing test times and locations to be more convenient to students. We assume, in this model, that any additional ISEE-takers would score similarly to other students with their same 5th-grade MCAS scores so that actual ISEE performance would not change (i.e., no one is being given extra academic support or test preparation). Our estimates suggest that, in this scenario, minority enrollment at BLS would rise a small amount, from 21% to 23%.

A stronger intervention would be to make ISEE-taking mandatory. We again model this assuming no other aspect of the process has changed, including existing levels of test preparation. Making ISEE mandatory would induce additional Black and Hispanic students to take the exam but would also induce additional White and Asian students to take the exam. As a result, we estimate that this intervention would also increase minority enrollment at BLS by a small amount, from 21% to 23%.

Our estimates suggest that using 5th-grade MCAS scores for admissions would result in 30% of BLS students being Black or Hispanic, a substantial increase in diversity over current levels.

Concerns about racial gaps in GPA might suggest eliminating GPA as a part of the admissions process and basing invitations purely on ISEE scores. We estimate that this too would have a small effect, increasing minority enrollment at BLS to 23%. Ignoring students' preferences and simply assigning the highest ranked students to BLS, but changing nothing else about the process, would increase minority enrollment at BLS to 24%. A somewhat larger change would occur if

BPS could somehow get Black and Hispanic students to earn the same ISEE scores as their White and Asian counterparts with similar MCAS scores. Though it is not clear how much or what types of additional academic support or test preparation would accomplish this, doing so would increase minority enrollment at BLS to 26%.

All of the interventions or changes in the admissions process discussed above have relatively small impacts on diversity at BLS or, in the case of improving minority ISEE scores, cannot necessarily be accomplished without substantial investments. One reason for these small changes in results is that each intervention affects only one isolated part of the admissions process, but every part of that process exhibits substantial racial gaps. We therefore model one simpler but more transformative approach to admissions that would eliminate many of the process's racial gaps, particularly among high-achieving students.

Specifically, we ask how enrollment at BLS would change if assignments were based purely on 5th-grade MCAS scores, ignoring student preferences. Given that the exam is mandatory, test-taking rates would no longer exhibit racial gaps. The MCAS also aligns more closely than the ISEE with the curriculum being taught in BPS elementary schools, likely reducing the scope for racial gaps in scores given students' underlying school performance. Eliminating GPA and school preferences would remove additional sources of racial gaps. However, ignoring student preference would likely be highly controversial. The MCAS is capable of identifying even the most high-achieving students given that the 95th percentile of BPS' average MCAS scores (across math and ELA) is a scaled score of about 260, well below the 280 that characterizes a perfect score.

This plan has the advantage of identifying high-achieving students based on an arguably objective measure of achievement that is available for all students.

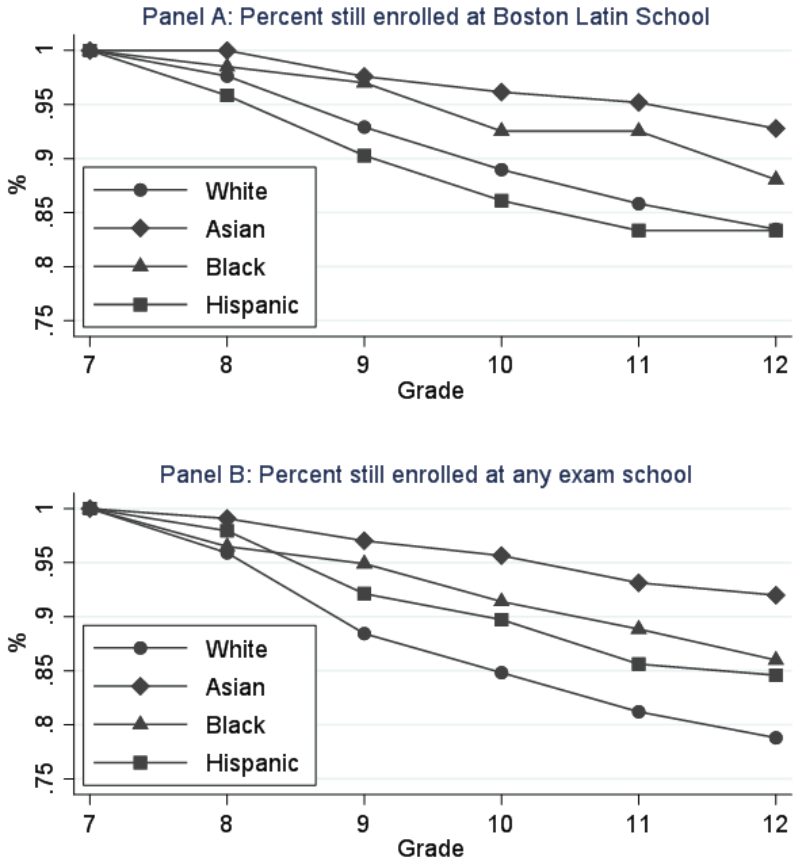
This plan has the disadvantage of making the 5th-grade MCAS higher stakes than it already is, so that parents might react by investing in MCAS-focused test preparation. It also requires that private school applicants, who are forbidden by state law from taking MCAS, to still take ISEE and have those scores transformed by BPS into their MCAS equivalents prior to ranking students. Nonetheless, the impact of this plan would be meaningful. Our estimates suggest that using 5th-grade MCAS scores for school assignment would result in 30% of BLS students being Black or Hispanic, a substantial increase in diversity over current levels. Regardless of the political feasibility of this plan, this number is an upper bound on the extent to which diversity can be improved at BLS while using current measures of academic achievement to determine admissions.

It is also worth noting that admitting a more diverse set of students to BLS, if done using 5th-grade MCAS scores, is unlikely to result in any change in academic outcomes of exam school enrollees. In Figure 6, we plot the percentage of students remaining enrolled at the exam schools in each grade after 7th-grade. By 12th-grade, we see no evidence that Black and Hispanic students are less likely than White students to still be enrolled at those schools and thus on track to graduate.

Conclusion

Our simulations suggest possible responses to low minority enrollment at the exam schools, but the data is limited when it comes to answering questions like how we might increase minority students' ISEE scores or get more students to take the exam. It is also not

Figure 6



always clear how to account for out-of-district students who apply to the exam schools, some of whom may be applying from charter schools in Boston. The policy responses we present here are not an exhaustive set of options, nor are they necessarily the best options available.

Our results suggest, however, that many talented Black and Hispanic students in BPS do not enroll at the exam schools due to various factors that make it more difficult for them to succeed in the admissions process. In our most effective simulation, the number of minority students enrolled at BLS would increase by nearly half. Even if assignment based on MCAS scores were not feasible given the challenges of ignoring student preferences, our simulations suggest that somehow incorporating MCAS scores into the admissions process has the potential to improve diversity. We believe this could be accomplished while maintaining the high academic requirements of the current admissions process, given that invitations would still be determined by a measure of academic achievement. In short, there appears to be little tension between substantially improving diversity at BLS and maintaining the school's rigorous academic standards. That said, even if the most effective option we study were implemented, Black and Hispanic students would still remain significantly underrepresented at Boston's exams schools. To make even greater progress likely requires substantial efforts by BPS to close racial achievement gaps that appear prior to exam school applications.