Race and Ethnic Differences in College Achievement: Does High School Attended Matter?

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ABSTRACT: Using 10 years of enrollment data at four Texas public universities, this paper examines whether, to what extent, and in what ways high school attended contributes to racial and ethnic differences in college achievement. Like previous studies, we show that controlling for class rank and test scores shrinks, but does not eliminate, sizable racial differences in college achievement. Fixed-effects models that take into account differences across high schools that minority and nonminority youth attend largely eliminate, and often reverse, black-white and Hispanic-white gaps in several college outcomes. Our results, which are quite robust across universities of varying selectivity, illustrate how high school quality foments race and ethnic inequality in college performance.

Keywords: Minority students; College achievement; Texas Higher Education; High School quality.
JEL Classifications: I21; I23; J15

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I. Introduction

The No Child Left Behind Act of 2001 (NCLB) directed public attention to low average academic achievement of black, Hispanic, and native American students and promised to end the soft bigotry of low expectations. Declaring that our nation's schools have shortchanged millions of students, but minority and economically disadvantaged students in particular, the legislation imposed strict achievement standards that hold schools accountable for students' annual progress in core subjects. Claims about the success of NCLB reported by the White House and the Department of Education based on school-specific measures of annual progress are tempered by evidence from the National Assessment of Educational Progress (NAEP), which shows mixed results on achievement gains by grade and little, if any, narrowing of the gaps between minority and nonminority populations (Tough 2006; Lee 2006).

Despite voluminous social science literatures that document and evaluate the dimensions and evolution of academic achievement gaps, they remain poorly understood (Kao and Thompson 2003; Tough 2006). Even as academic researchers seek to identify the causes of low achievement and persisting gaps, school administrators immersed in the day-to-day craft of teaching seek to raise student achievement using myriad testing and classification methods in order to comply with NCLB. Both contingents agree that the achievement gap is not inevitable; that it begins at very young ages; and that it widens as students progress in their educational careers (Fryer and Levitt 2006a; 2006b; Perna and Swail 2002). The growing consensus about the value of early intervention programs is well justified (Heckman 2006), but does little to address the reality of existing gaps between minority and nonminority youth, nor their consequences for postsecondary schooling and beyond.

Unlike K-12 schooling, post-secondary education is not compulsory and disproportionately draws from the upper half of the achievement distribution; therefore, one

might expect smaller differences in academic performance at the collegiate level. Yet, there is ample evidence that racial gaps in academic achievement and graduation rates persist (Vars and Bowen 1998; Sacerdote 2001). Post-secondary achievement gaps are particularly thorny for selective institutions, where admission criteria are designed to identify applicants that are most likely to succeed. Affirmative action is often blamed for academic performance gaps between minority and nonminority students because race-sensitive admission policies downplay standardized test scores for the former. To date, few studies have linked large racial and ethnic differences in high school achievement to academic performance in college. Tracing the determinants of racial and ethnic differences in postsecondary achievement promises new insights about the necessary and sufficient conditions to narrow performance and graduation gaps (Summers and Wolfe 1977).

As an initial foray to address this gap, we examine the determinants of racial and ethnic differences in college achievement using 10 years of administrative data for enrollees at the two most selective Texas public universities—the University of Texas at Austin (UT) and Texas A&M University (TAMU)—as well as two less selective public universities, including the University of Texas-San Antonio (UTSA) and Texas Tech University. Like previous research, we find substantial racial and ethnic differences in grade point average and college persistence, which are somewhat attenuated after adjusting for observable student characteristics, including high school grades and standardized test scores. Using a fixed-effects modeling strategy, we demonstrate that taking into account the quality of high school attended largely eliminates and in some cases reverses college achievement gaps between minority and nonminority students. That students of different racial/ethnic groups who attended the same high school achieve similar college success across institutions of varying selectivity attests to the robustness of our findings and shows how pre-collegiate educational disadvantages persist through college.

The next section summarizes prior studies suggesting possible linkages between pre-collegiate experiences and post-secondary outcomes. Section III describes the administrative data analyzed and formulates an estimation strategy that builds on and extends studies of race differences in college attainment by considering whether variation in high school quality moderates the associations. Empirical results are discussed in Section IV and the conclusion considers the implications of our results in light of the school accountability standards imposed by NCLB.

II. Background

There is ample evidence that achievement gaps among racial and ethnic minorities widen over time (Schneider, et al. 2006; Kao and Thompson 2003). Despite negligible differences in measured cognitive ability between majority and minority toddlers through age two, large gaps in school readiness are already evident by the time children begin school (Fryer and Levitt 2004; 2006b); moreover, the achievement gap expands rapidly in the early grades (Fryer and Levitt 2006a). Group differences in scholastic readiness at school entry are associated with a small number of family characteristics, but variation in school quality, another obvious candidate for the widening gap, does not appear to explain differences in early school achievement beyond second grade (Fryer and Levitt 2006a). NAEP assessments based on 4^{th}, 8^{th} and 12^{th} grade performance measures show that gaps widen through elementary, middle and high school (Perna and Swail 2002; NCES 2005; Schneider, et al. 2006). Heckman and LaFontaine (2007) identify unequal school experiences and incarceration rates as additional factors that maintain racial and ethnic differences in secondary school achievement and completion, but they do not link high school achievement to post-secondary educational outcomes.

Prior research has traced race and ethnic differences in college success to family background and early academic achievements, particularly high school grades (class rank), AP

course-completion, and standardized test scores (see Rothstein 2004; Alon and Tienda 2007; Bowen and Bok 1998). Critics of affirmative action use race and ethnic gaps in standardized test scores to bolster claims that minority students are less well prepared than whites (Thernstrom and Thernstrom 1996). Even though minority students average lower scores on standardized tests, there is ample evidence establishing a positive association between college selectivity and success of minority students (Bowen and Bok 1998; Kane 1998; Rothstein 2004; Alon and Tienda 2005). A second explanation for race and ethnic disparities in college performance alleges that the benefits from distinct college environments are not uniform for minority and nonminority students. Evidence for both claims is mixed, depending on the outcome of interest, the selectivity of institutions in the study, and the timeframe of the study.

For example, Vars and Bowen (1998) show that white students achieve higher college grades than black students across five SAT strata, even after controlling for high school grades and family socioeconomic background. Yet, Light and Strayer (2000) find that blacks and Hispanics are *more likely* to graduate college (net of ability as measured by AFQT scores). Kane (1998) also finds that black students who attend more selective colleges have higher graduation rates compared with blacks that attended less selective colleges. Using a sample of 28 colleges and universities with selective to highly selective admissions, Bowen and Bok (1998) also find no evidence for the mismatch hypothesis.

[1] Their sample of universities excluded less selective institutions and their analytic strategy did not consider the selection regime that matches students to institutions according to selectivity, however.

Alon and Tienda (2005) analyze two national data sets as well as the sample of selective institutions used by Bowen and Bok and they expand their comparisons to include Hispanics and Asians along with blacks and whites. By implementing a rigorous estimation strategy that jointly modeled enrollment in and graduation from competitive postsecondary institutions, they address

criticisms wagered about the Bowen and Bok study on grounds that it was not representative of the full institutional selectivity range and disproportionately represented the most able students who were likely to graduate irrespective of college attended. Like Bowen and Bok (1998), they refute the mismatch hypothesis and attribute part of the positive association between college selectivity and graduation to the stronger academic supports available at many highly selective institutions.

Nevertheless, many analysts agree that *within* selectivity tiers minority students average lower grades and graduate at lower rates compared with nonminority students (Massey 2006; Bowen and Bok 1998; Alon and Tienda 2007). Yet, Dale and Krueger (2002) find that among students of comparable ability, those from low income backgrounds benefit more from attending selective colleges compared with students from high-income families. That minority students benefit more than nonminority students from attending a selective institution is not inconsistent with the persistence of an achievement gap at both.[2]

Some college environments may be less conducive to academic success of black and Hispanic students, even those with academic qualifications similar to those of majority students, but there is little direct evidence about how college climate influences minority students' academic performance. Massey and Fischer (2005) find some evidence that college climate is associated with academic performance. They report that minority students enrolled at selective institutions who claim having been stereotyped earn lower grades than their race counterparts that did not experience similar stereotyping. Whether their findings can be generalized to less selective institutions is unclear, however. Neither is it obvious what university attributes trigger stereotype threat or whether high school experiences with same and other race groups may be associated with campus outcomes.

Tienda and Niu (2006) report no differences in the reported salience of campus ethnic composition in college choices of freshmen enrolled at selective versus nonselective Texas

public universities. Even students who graduated from predominantly minority high schools did not indicate that the racial make-up of the student body influenced their college decision-making. By contrast, cost, the availability of financial aid, and distance from home were important considerations in the college choices of high achieving students who graduated from minority-dominated high schools. Although these authors do not relate high school attributes to college academic outcomes, there is growing evidence that quality of high school attended is a powerful determinant of students' college choice sets. McDonough (1997) notes that high school attended dictates whether selective post-secondary institutions are even envisioned as possible options. This claim is consistent with findings by Niu and associates (2008; 2006) showing that minority students attending poor or highly segregated Texas public high schools are less likely than similarly situated whites to enroll at a selective postsecondary institution, even if they are guaranteed admission under the top 10% law.

Recent scholarship suggests that racial and ethnic college achievement gaps may result from differences in the quality of high schools minority and nonminority students attend (Summers and Wolfe 1977; Massey 2006; Schneider, et al. 2006; Niu, et al. 2006; 2008). For example, Massey (2006) demonstrates that minority students who attend selective universities hail disproportionately from high schools of lower quality on a variety of difficult-to-measure dimensions, such as levels of violence, and that these experiences carry over to their college experiences. That this potential determinant of post-secondary performance gaps has been understudied partly reflects the limited success of researchers to identify "school effects" on achievement outcomes beyond second grade, and partly reflects the lack of adequate data to establish an association between high school quality and academic performance at the post-secondary level. Growing racial and ethnic segregation in public high schools coupled with evidence that minority students are more likely than nonminority students to attend failing schools (according to NCLB criteria) underscores the importance of evaluating whether

differences in quality of high schools minority students attend are responsible for observed collegiate performance gaps.

Accordingly, we analyze administrative data on the universe of enrollees at four Texas universities of varying selectivity. The empirical analysis provides compelling evidence that high school attended substantially reduces and in several instances reverses racial and ethnic disparities in several dimensions of college achievement. Other researchers have used similar empirical designs (Rothstein 2004, Pike and Saupe 2002), but we are unaware of any previous research that has considered racial/ethnic achievement disparities using this design and none have examined these disparities across colleges of varying selectivity. Long and associates (2009) use middle school (and separately high school) fixed effects to predict racial/ethnic differences in math readiness during college, but find little evidence that school attended is responsible for these differences. Lee and Bryk (1989) claim that high school attributes can promote an equitable distribution of achievement across diverse students, but do not implement a fixed effects research design to address this hypothesis. Finally, Pike and Saupe (2002) provide evidence that high school fixed effects are as accurate in predicting college achievement as hierarchical linear models that include high school characteristics.

III. Data and Empirical Methods

We examine three indicators of college performance to ascertain whether high school attended influences post-secondary academic outcomes: college grade point average (GPA) for both 1st semester and 6th semester cumulative average; and 4th year graduation for students who enroll at four public Texas universities: University of Texas at Austin (UT); Texas A&M University (TAMU); Texas Tech (TECH) and University of Texas at San Antonio (UTSA).[3] Two types of administrative records are available. The applicant files represent the universe of student who applied for admission at each target university from the early 1990's through

2003—nearly 200,000 individuals across the four institutions. Each applicant record includes key academic and demographic variables: SAT/ACT test scores, high school class rank, gender, ethnicity, and maternal education attainment, as well as admission decisions, and conditional on acceptance, enrollment outcomes.[4] Important for our purpose, the applicant files include codes for the high school attended and geographic identifiers. For matriculants, a transcript file tracks various measures of academic progress, including persistence, cumulative GPA, choice of major, and graduation status for each semester enrolled. Table 1 summarizes the available years for cohorts of first-time freshman, campus characteristics, and the pooled numbers of student applicants for each institution.

(Table 1 about Here)

The four universities examined differ by selectivity of their admissions as well as student demographic attributes. In 1996 *Barron's Profiles of American Colleges* (1996) classified UT as very competitive, TAMU as highly competitive, TECH as competitive, and UTSA as noncompetitive. This classification corresponds with the pre-collegiate achievement of freshmen, indicated by SAT/ACT scores and high school class rank. Specifically, average standardized test scores earned by first time freshmen at UT approached 1200 during the observation period, with TAMU's average slightly below at 1156. At TECH, freshmen scored just below 1100 on their standardized tests, which is well above UTSA's average of 1000. These disparities imply that the average student at TAMU scored approximately one standard deviation higher on her SAT/ACT test compared with the average student enrolled at UTSA. High school class rankings of enrollees at UT and TAMU are 86 percent on average, which indicates that only 14 percent of students ranked above the typical freshman at the two flagship campuses. At TECH the average high school class rank of freshmen was 72 percent, compared with 67 percent at UTSA.

Partly owing to location and partly to their historical legacies, the four institutions also differ in the demographic composition of their student bodies: Hispanics comprised nine percent of freshmen enrollment at TECH, 11 percent at TAMU, and 15 percent at UT, but at UTSA they made up 43 percent of the freshman class, on average. Black students represent between three and five percent of freshmen at the four institutions, which is similar to the Asian average at all universities except UT, where they comprise 17 percent of first-time enrollees. UT, the most diverse, is located in the capital city, which itself is highly varied ethnically, politically and socially. TAMU, Texas's first public post-secondary institution, is situated within a triangle formed by three U.S. Interstate Highways linking the State's largest cities—Houston, Dallas, and Austin. A nonmetropolitan location combined with its original focus on agricultural fields historically attracted white applicants to TAMU. Texas TECH, likewise, is located in one of the world's largest cotton-growing regions; the Lubbock area's population is predominantly white. By contrast to the two public flagships and TECH, whites make up less than half of first time freshmen over the observation period at UTSA. Often described as a Hispanic-serving institution, UTSA is an urban campus that draws students from both its predominantly Hispanic local population and South Texas.[5]

The academic performance outcomes of interest also differ across institutions, but for first semester and sixth semester cumulative GPA the major divide is between institutions with selective admission criteria (i.e., the public flagships and TECH) and UTSA, which is practically an open admission system for applicants who received high school diplomas. Fully appreciating the significance of the GPA disparities requires some attention to attrition because cumulative grades are based on the subset of students still enrolled, who are likely a selective subset of the initial cohort. Attrition varies inversely with institutional selectivity, with 80 percent of UT's freshmen persisting through their 6th semester compared with just over one-third of UTSA

freshmen.[6] Further, less than half of the freshmen graduated within four years of matriculating at UT, but this is approximately three times higher than UTSA freshmen.[7]

In summary, the four public institutions represent considerable variation in college climate, defined by geography, demography, and selectivity of admissions. Existing studies indicate that the minority achievement gaps will be largest at the most selective institutions, but whether and how much variation in high school quality contributes to these differences is an empirical question.

Modeling Strategy

Our empirical models build on standard production functions, where educational outcomes are assumed to be the product of various inputs at the individual, family, and school levels. In particular, we specify the following linear relationship between college achievement outcomes and educational inputs:

$$outcome_{iut} = \beta X_{ist} + \alpha U + \tau_t + \varepsilon_{iut} \qquad (1)$$

where an educational outcome for student *i* at university *u* at time *t* is determined by the student's demographic and background characteristics (*X*), university characteristics (*U*) and an idiosyncratic error term. In order to control for secular trends in the freshman class, university grading standards, etc., we also control for year fixed effects, τ_t. Analyzing results separately for each of the four universities obviates the need to control for institutional characteristics, *U*. For all specifications, the estimated β coefficients for student racial background represent institution-specific racial disparities in college achievement:

$$outcome_{iut} = \beta_u X_{ist} + \tau_t + \varepsilon_{iut} \qquad (2)$$

To evaluate whether high schools attended influence race and ethnic differences in college achievement, we estimate variants of (3),

$$outcome_{ist} = \beta X_{ist} + S_s + \tau_t + \varepsilon_{ist} \quad (3)$$

This specification models all time-invariant characteristics about each student's high school (*s*) to control for school-specific differences ("fixed effects"). Results for equation (3) indicate whether racial disparities in college achievement exist for students who attended the same high school. That is, we use a within-high-school-of-origin estimator for racial gaps in college achievement, where our coefficient of interest is only identified by within-high school disparities in college achievement between individuals of different race/ethnicity who attended the same high school.[8]

IV. Results

Table 2 reports estimates of college achievement based on a variant of equations (2) and (3) for students enrolled in each of the four universities. The first specification, which includes students' gender and racial background as well as year fixed effects, reveals large performance differences among freshmen at all institutions. At UT, for example, black students earn a first semester GPA 0.4 points below that of white students and the average Hispanic-white GPA gap is 0.23 grade points. Similar gaps obtain for TAMU, TECH and UTSA, except that the magnitudes differ.

(Table 2 About Here)

The second specification includes covariates known to influence freshman academic performance, namely high school class rank and SAT/ACT score.[9] Adding these control variables reduces the UT black-white GPA gap by 75 percent, to 0.09 grade points, which represents a 1/10 standard deviation difference in first semester GPA. The Hispanic-white GPA disparity at UT shrinks by over 70 percent, to 0.04 grade points among students with comparable high school grades and test scores. This model accounts for about a quarter of the variance in freshman GPA at UT, largely due to individual differences in high school achievement.

Inclusion of high school achievement measures also shrinks the black-white first semester GPA gap at TAMU and TECH, but somewhat less than at UT. The expanded specification reduces the black-white GPA gap at TAMU by .29 points (from .39 to -.10), and the Hispanic-white gap by .15 points (from -0.33 to -0.18). The point estimates for TECH students imply that black students earn 0.13 points below whites who arrived with similar high school class rank and SAT scores (versus -.031 points), and the Hispanic-white GPA gap drops from -0.20 to -0.13 points among students with comparable pre-collegiate achievements. For UTSA, the least selective institution considered, controlling for students SAT scores and class rank eliminates the black-white GPA gaps and reduces the Hispanic-white gap from -0.18 to -0.11 points. Probably due to lack of information about parental education for TAMU, TECH and UTSA students, the expanded model accounts for approximately 20 percent of the variance in first semester GPA, with a slightly better fit at the selective institutions (where SAT scores are used for admissions).

The consistency of results across institutions that differ in the selectivity of their admissions implies that other factors are responsible for the college achievement gap. A contending explanation that has not been systematically examined is high school quality, which we model using a high school fixed effects specification (Model 3 above). Substantively, this approach captures those characteristics of high schools that are shared by graduates of the school, which could include similar curricula, teachers, college preparatory training, distance to college, and other measures of high school quality and access to college. However, any differences in experiences of individuals who attended the same high school (such as racial discrimination by teachers) would not be adequately captured with this method. Point estimates for the fixed effects models changes the comparison groups from all whites, blacks and Hispanics who were freshmen at one of the four institutions in a particular year to freshmen in a particular year who *attended the same high school.*

One caveat is in order before interpreting the results, namely the coefficients are only identified based on high schools that send multiple students to a particular institution and where the students are of different racial or ethnic backgrounds. This occurs because the specification compares, for example, white and black students who attended the *same high school*. If a particular high school sends no black students to a university, an estimate of the black-white gap in college success cannot be generated for this high school. Consequently, the analysis samples for the fixed effects specification change because some schools lack race variation in their enrollees at a university in a given year.[10] Given the pervasive segregation of Texas high schools (Tienda and Niu 2006), we re-estimated the analysis restricting the sample to high schools that send students from multiple race groups and show that the basic results are robust (See Appendix Table 1A).[11]

The fixed effects results reveal substantial changes in the black-white and Hispanic-white performance gaps, indicating that differences in college preparedness associated with high school quality carry over to college careers, although the impacts appear to depend on institutional selectivity. For example, at UT the black-white and Hispanic-white first semester performance gaps change from deficits of .09 and .04 points, respectively, to a .03 point advantage for both groups. The Asian GPA advantage, evident across all estimates, shrinks once they are compared with their same high school classmates.

The racial gap in first semester GPA also is reversed at TAMU in the fixed effects specification, indicating that black students who attended the same high school outperformed their white counterparts. Hispanic students attending TAMU do not outperform their white high school classmates, but the achievement gap is only half as large as the institution-wide average for all white and Hispanic students. The different outcomes for blacks and Hispanics at TAMU reflect several circumstances. First, black students comprise only three percent of TAMU students over the observation period compared with 11 percent for Hispanics (see Table 1),

which suggests less heterogeneity among blacks. Second, TAMU has a more difficult time attracting minority students compared with UT, partly because of its location (over an hour from a large metropolitan area) and partly because of its reputation as being less hospitable to minority students (Tienda and Sullivan 2009).

At Texas Tech, the school fixed effects specification eliminated the black-white first semester GPA gap, but not that for Hispanics. Still, when Hispanic freshmen are compared with white classmates from the same high school, the GPA gap is roughly 40 percent smaller relative to the specification that only considers pre-collegiate academic achievements. On average black students comprise only three percent of freshmen cohorts at TECH, compared with nine percent for Hispanics, suggesting greater heterogeneity among the latter. Yet, at UTSA, where Hispanics comprise over two-fifths of the freshman cohorts and blacks comprise an additional five percent, the fixed effects model indicates that both minority groups outperform their white counterparts who attended the same high school (although the black coefficient is imprecisely estimated).

By many accounts, the first year of college serves as a sifting and sorting period as students acclimate to the demands of higher education. Those unable to handle the academic load, either for personal or academic reasons, withdraw along the way. By the end of the third year, however, the more successful students remain.[12] Appendix Table 2-A, which reports 6th semester attrition probabilities for each institution, confirms that students with higher GPA's were more likely to persist (and therefore be in the 6th semester GPA analysis). Nevertheless, attrition differs by demographic group, institution, and semester.[13]

Success begets success, therefore it is conceivable that the performance gap between minority and nonminority students has narrowed because the cohort "survivors" will exclude students who withdrew or were dropped for academic reasons. Table 3 considers this proposition by examining whether the racial and ethnic differences in college performance persist through

students' college careers using sixth semester cumulative grade point average as the performance outcome.

(Table 3 about Here)

Results parallel those observed for first semester academic achievement in that the average black-white and Hispanic-white gaps in sixth semester GPA are reduced by approximately 50 percent when controls for test scores, class rank and maternal education (UT only) are modeled. The expanded model explains over one-quarter of the variance in 6th semester GPA for UT and TAMU matriculants, nearly one-third among TECH students, but only about 20 percent at UTSA. These differences reflect the low dispersion of test scores at UTSA compared with selective institutions that use this criterion for admissions (see Table 1).

Sixth semester grade disparities between minority and nonminority students are sizeable, often in excess of 1/5 of a standard deviation after high school performance indicators are considered. At UT, for example, the black-white and Hispanic-white gaps for cumulative 6th semester GPA are .39 and .21 points, respectively, which is relatively similar to those based on first semester GPA. Thus, selective attrition does not appear to attenuate UT minority achievement gaps. At TAMU, however, the unadjusted Hispanic-white GPA gap increases over time, but at TECH the performance gap based on 6th semester cumulative GPA drops is smaller than the first semester grade average (.16 vs .20 points).

Results from the fixed effects specification were less powerful for 6th semester GPA differentials in that controls for high school attended did not reverse any of the point estimates and reduced only one to zero (black-white differential at UTSA). That all the 6th semester GPA point estimates reported in Table 3 shrink when school-specific differences are modeled, by 50 percent or more in many instances, suggests that quality differences in the high schools minority and white students attend impact not only early collegiate achievement, but also continue through post-secondary careers.[14] Despite the reduction in the GPA gaps based on the fixed-

effect specification, significant differences remain. At UT, for instance, black students earn a 6th semester GPA .12 points below their white counterparts when compared with white students that attended the same high school, versus a .19 differential when compared with all white students who completed six semesters of coursework. Average GPA for Hispanic juniors was only .04 points below that of white juniors who attended the same high school, however.

There are several potential explanations for the persistence of these achievement differences, including racial and ethnic variation in choice of majors, course selection, peer influences, employment status while enrolled, or other unmeasured factors (such as whether students live on or off campus). The administrative data allows us to examine only the first explanation, namely whether variation in choice of major is a possible mechanism maintaining achievement differences after six semesters. By this point in their post secondary training, most students have declared their academic major.

Results reported in Table 4 include controls for choice of major in predicting sixth semester cumulative GPA. Here, the data for academic major are characterized by the academic department (e.g. Finance, Psychology) containing the major reported by each student by the sixth semester of college. For the two most selective institutions, UT and TAMU, we find little evidence that black and Hispanic students are sorting into majors that are systematically related to cumulative GPAs. For less selective universities (TECH and UTSA), there is slightly more evidence that choice of major is one potential channel through which racial GPA differences are generated. Furthermore, the direction of the coefficients suggests that minority students are *more* likely to choose "more difficult" majors or courses (as measured by GPA) compared with similarly situated white students.

(Table 4 about Here)

Analyses of 4-year graduation parallel the GPA results inasmuch as the fixed effect specifications narrow the ethnic gaps. In our baseline specifications, we find large racial/ethnic

differences in four year graduation rates for three of the more selective universities; UTSA is an exception. Black students have lower rates of graduation than white students at UT (18 percentage points), TAMU (13 points), and TECH, (15 points). The extended control variables reduce these disparities by 20-50 percent. Likewise, Hispanic students have lower rates of graduation than white students at the three selective institutions: UT (12 points), TAMU (11 points), and TECH (11 points). Similar to the results for black students, the extended control variables reduce these disparities by 10-40 percent. Finally, we narrow our comparisons to examine students who attended the same high school by modeling high school fixed effects. The school-level controls shrink the black-white disparities in graduation rates by 40 to 50 percent. Like the results for black students, introducing school-level controls also shrinks the Hispanic-white disparities in graduation rates around 40-50 percent. Similar to the estimates for blacks, the fixed effects specification fails to eliminate the Hispanic-white disparities in 4-year graduation rates. These results are consistent with our findings for sixth semester cumulative GPA and warrant additional research to explain why racial/ethnic academic performance gaps widen during college.

(Table 5 About Here)

That the empirical estimates are highly consistent across institutions that differ in the selectivity of admissions, from very selective to open admissions based on the Barron's classification, attests to their robustness. Overall, our empirical analysis provides strong evidence that high school attended has long-lasting effects on human capital accumulation, as measured by college success, even for the select group of students who attend selective public institutions.

V. Conclusions

Our examination of the college achievement gap between white and under-represented minority students sought to establish a link between pre- and post-collegiate outcomes using a

unique administrative dataset for the universe of enrollees at four Texas public universities over a 10-year period. We consider three academic outcomes—first and sixth semester GPA and 4th year graduation. Empirical results confirm prior studies that narrow collegiate achievement gaps by controlling for observable pre-college achievements (e.g. test scores, class rank based on high school GPA). Yet, substantial gaps persist.

Our main hypothesis—that differences in the quality of high schools attended by minority versus majority students contribute to the collegiate achievement gaps—finds considerable support. Using fixed-effects specifications to model differences in the quality of schools attended by entering freshmen, we show that the racial and ethnic disparities reverse, suggesting that black and Hispanic students perform better than their white high school classmates. This inference is particularly strong for first semester GPA. Empirical estimates are also quite robust across institutions that differ in the selectivity of their admissions. For later college achievement, our fixed-effects specifications explain some, but not all, of the gaps in 6th semester GPA, even after taking into account differences in choice of major.

On balance, our analyses reveal the dynamic human capital consequences stemming from differences in high school quality across racial groups and also suggest the need for future research to examine mechanisms that sustain moderate racial and ethnic differences in later college achievement. This consideration highlights the importance of NCLB in holding schools accountable for student academic performance. Many studies have concluded that high school quality does not explain group differences in post-collegiate achievement, partly because post-secondary enrollment is a voluntary decision that selects from the most accomplished students and partly because analysts have not clearly specified which high school inputs carry over to college. Our findings suggest a pressing need to further specify the mechanisms that maintain race and ethnic differences in collegiate achievement as an adjunct to designing policy interventions that can eliminate disparities.

Narrowing output differences across high schools, even within a single state like Texas, is a long-term undertaking. Whether NCLB has narrowed achievement differences among Texas high schools is highly uncertain, but our findings suggest that narrowing achievement gains across schools is an important accountability metric for under-performing campuses in addition to the goals explicitly required by the original legislation. Unless the achievement gaps are narrowed across high schools, particularly those highly segregated by race and ethnicity, it is unlikely that differentials in college performance will be closed. In the short run, however, the testing requirements of NCLB might be used to identify weaknesses in students' mastery of core academic subjects as a way of targeting the substantive areas that need improvement. Whether remediation programs are best administered by universities or community colleges is unclear, but bolstering academic deficiencies before students enroll at a university could result in significant cost-savings and even reduce attrition due to failure.

NOTES

[1] The mismatch hypothesis was originally dubbed the "fit" hypothesis (e.g., see Bowen and Bok 1998), but in fact the claim is that minority students admitted under affirmative action policies are not a proper "fit" at selective institutions. Rather than use the term "misfit," Alon and Tienda (2005) coined the term "mismatch" hypothesis, which is now more widely used.

[2] This finding is not inconsistent with the mismatch hypothesis, which requires comparisons between comparable minority students who attended more versus less selective institutions.

[3] These data were collected under the auspices of the Texas Higher Education Opportunity Project (THEOP). THEOP is a longitudinal study of post-secondary behavior among two cohorts of Texas high school students which is designed to understand the consequences of changing admissions regimes after 1996. The description of this project is available at www.THEOP.Princeton.edu.

[4] Only UT-Austin includes information on maternal education.

[5] Over 60 percent of San Antonio's population is Hispanic, which is over four times the national average (American Community Survey, 2005-07).

[6] It is important to note, though, that our measure of attrition includes transfers to other universities, which are much higher at UTSA compared with the other universities in our sample.

[7] To minimize the extent of right censoring, we examine 4-year graduation rates rather than the more customary 6-year rates.

[8] A complementary approach to the method of using high school fixed effects would be to measure and examine the predictors of school specific race gaps (Stiefel et al. 2007). This is a promising direction for future research using these data.

[9] For UT, we also control for maternal education, but this information is not available for other institutions.

[10] The modest change in R-sq is an artifact of STATA's calculation of the partial R-sq, which does not include the school fixed effects in the "xtreg" program.

[11] Results for sixth semester GPA and 4th year graduation are available upon request.

[12] Because sixth semester GPA outcomes are censored some students (namely those who enrolled in after 2001 or those who left college before the sixth semester), we re-estimated the models after dropping the censored observations. These results (available from authors) show that our estimates for first semester GPA are similar if censored observations are dropped. TAMU has no students who are right censored.

[13] At UT, for example, blacks were no more likely to attrite than whites with comparable achievement, but they were more likely than their white classmates from the same high school to remain enrolled by the 6th semester. Hispanics were less likely than whites to remain enrolled, but these average differences disappear when restricted to students who attended the same high school.

[14] In results reported in appendix Table 2A, we predict attrition between first and sixth semesters. We find some evidence that black students are less likely to attrite, which may imply that part of the black-white gap in sixth semester GPA could be the result of less-able black students remaining in college.

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Table 1.
Summary Statistics for Analysis Samples: Means or Proportions
(standard deviation)

Institution Years	UT-Austin 1990-2003	TAMU 1992-2002	Texas Tech 1991-2003	UTSA 1992-2004
Composition [a]				
Hispanic	0.15	0.11	0.09	0.44
Black	0.04	0.03	0.03	0.05
White	0.64	0.81	0.86	0.46
Asian	0.17	0.04	0.02	0.05
Test Score ($\bar{x}$) (s.d)	1197.1 (142.7)	1156.3 (138.7)	1088.7 (137.9)	998.1 (133.8)
Percentile Class Rank (s.d)	85.7 (13.5)	86.1 (12.4)	72.3 (19.6)	66.9 (21.6)
1st Semester GPA ($\bar{x}$) (s.d)	2.90 (0.90)	2.71 (0.80)	2.85 (0.08)	2.11 (1.10)
6th Semester GPA ($\bar{x}$) (s.d.)	3.01 (0.60)	2.95 (0.50)	2.99 (0.50)	2.52 (0.70)
4 Year Graduation Rate	0.46	0.31	0.25	0.15
4th Semester Attrition	0.15	0.15	0.29	0.59
6th Semester Attrition	0.21	0.19	0.33	0.65
N	77219	61546	31157	21287

Source: THEOP Data. Authors' compilation
a. Other category comprises less than 1% if student body at all institutions except TAMU. This category is not reported, but observations are retained in the analysis sample.

Table 2
Determinants of First Semester Grade Point Average: Four Texas Public Universities

Institution	UT-Austin [a]			TAMU			Texas Tech			UTSA		
Years	1992-2003			1992-2002			1996-2003			1995-2003		
Specification	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects
Male	-0.150***	-0.179***	-0.118***	-0.109***	-0.110***	-0.043***	-0.222***	-0.156***	-0.097***	-0.174***	-0.157***	-0.055***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)	(0.016)	(0.015)	(0.015)
Black	-0.406***	-0.090***	0.031**	-0.386***	-0.098***	0.071***	-0.314***	-0.133***	0.008	-0.235***	-0.026	0.033
	(0.016)	(0.014)	(0.015)	(0.018)	(0.016)	(0.018)	(0.031)	(0.028)	(0.030)	(0.034)	(0.032)	(0.033)
Hispanic	-0.228***	-0.039***	0.026***	-0.331***	-0.182***	-0.094***	-0.203***	-0.132***	-0.082***	-0.197***	-0.100***	0.047***
	(0.009)	(0.008)	(0.009)	(0.010)	(0.009)	(0.011)	(0.018)	(0.017)	(0.018)	(0.017)	(0.016)	(0.018)
Asian	0.152***	0.096***	0.014*	0.072***	0.017	0.001	0.053	0.024	-0.025	0.184***	0.186***	0.059*
	(0.008)	(0.008)	(0.008)	(0.017)	(0.015)	(0.015)	(0.038)	(0.034)	(0.035)	(0.036)	(0.033)	(0.034)
Other	-0.229***	-0.149***	-0.096**	-0.118***	-0.078***	-0.044*	-0.096	-0.065	-0.005	-0.268**	-0.179*	-0.053
	(0.049)	(0.043)	(0.042)	(0.029)	(0.026)	(0.026)	(0.075)	(0.068)	(0.069)	(0.116)	(0.106)	(0.105)
Class Rank		0.020***	0.029***		0.017***	0.026***		0.014***	0.021***		0.013***	0.022***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Test Score (SAT/ACT)		0.184***	0.114***		0.170***	0.109***		0.113***	0.059***		0.199***	0.104***
		(0.002)	(0.002)		(0.002)	(0.002)		(0.004)	(0.004)		(0.006)	(0.006)
Constant	2.807***	-1.004***	-0.962***	2.741***	-0.733***	-0.849***	2.904***	0.654***	0.687***	2.090***	-0.697***	-0.491***
	(0.008)	(0.031)	(0.031)	(0.012)	(0.030)	(0.030)	(0.018)	(0.041)	(0.042)	(0.034)	(0.061)	(0.061)
Observations	77219	77218	77130	61546	61542	61542	24936	24936	24300	18771	18771	18771
R-squared	0.06	0.27	0.29	0.04	0.22	0.24	0.03	0.21	0.24	0.03	0.19	0.23
Number of High Schools			2117			1864			1154			1049

Note: All Models include year fixed effects ***1%, **5%, *10%

a. Extended and fixed effects models included mother's education, which is unavailable for other institutions

Table 3

Determinants of 6th Semester Cumulative GPA: Four Texas Public Universities

Institution	UT-Austin [a]			TAMU			Texas Tech			UTSA		
Years	1992-2001			1992-2002			1996-2001			1995-2001		
Specification	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects
Male	-0.151***	-0.179***	-0.144***	-0.147***	-0.150***	-0.114***	-0.227***	-0.187***	-0.158***	-0.172***	-0.160***	-0.108***
	(0.005)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.010)	(0.009)	(0.009)	(0.018)	(0.016)	(0.018)
Black	-0.386***	-0.192***	-0.125***	-0.352***	-0.160***	-0.067***	-0.362***	-0.183***	-0.103***	-0.213***	-0.110***	-0.066*
	(0.013)	(0.012)	(0.012)	(0.014)	(0.012)	(0.013)	(0.029)	(0.025)	(0.029)	(0.039)	(0.036)	(0.040)
Hispanic	-0.214***	-0.101***	-0.044***	-0.236***	-0.141***	-0.085***	-0.159***	-0.087***	-0.065***	-0.145***	-0.097***	-0.020
	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)	(0.018)	(0.016)	(0.017)	(0.019)	(0.018)	(0.021)
Asian	0.024***	-0.011*	-0.048***	0.017	-0.023**	-0.030***	-0.083**	-0.072**	-0.058*	-0.046	-0.033	-0.048
	(0.007)	(0.006)	(0.006)	(0.013)	(0.011)	(0.011)	(0.037)	(0.032)	(0.033)	(0.042)	(0.038)	(0.040)
Other	-0.065	-0.022	-0.004	-0.082***	-0.070***	-0.051***	0.051	0.096	0.109	-0.095	-0.116	0.007
	(0.041)	(0.036)	(0.035)	(0.022)	(0.019)	(0.019)	(0.077)	(0.067)	(0.070)	(0.161)	(0.146)	(0.147)
Class Rank		0.012***	0.019***		0.013***	0.019***		0.010***	0.014***		0.009***	0.014***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.001)
Test Score (SAT/ACT)		0.123***	0.080***		0.121***	0.085***		0.099***	0.067***		0.112***	0.068***
		(0.002)	(0.002)		(0.002)	(0.002)		(0.003)	(0.004)		(0.006)	(0.007)
Constant	3.004***	0.408***	0.397***	2.996***	0.474***	0.333***	3.079***	1.255***	1.259***	2.678***	0.934***	0.963***
	(0.006)	(0.024)	(0.025)	(0.009)	(0.022)	(0.022)	(0.014)	(0.036)	(0.037)	(0.034)	(0.068)	(0.071)
Observations	52025	52025	51976	50260	50259	50259	11573	11573	11334	5419	5419	5419
R-squared	0.07	0.28	0.31	0.06	0.27	0.29	0.07	0.31	0.33	0.03	0.20	0.22
Number of high schools			1728			1713			925			590

Note: ***1%, **5%, *10%, All Models include year fixed effects.

a. Extended and fixed effects models included mother's education, which is unavailable for other institutions

Table 4
Determinants of 6th Semester Cumulative GPA with High School Fixed Effects and Choice of Major: Four Texas Public Universities

Institution	UT-Austin [a]		TAMU		Texas Tech		UTSA	
Years	1992-2001		1992-2002		1996-2001		1996-2001	
Fixed Effects	HS	Major/HS	HS	Major/HS	HS	Major/HS	HS	Major/HS
Male	-0.144***	-0.110***	-0.114***	-0.073***	-0.160***	-0.087***	-0.119***	-0.052**
	(0.004)	(0.005)	(0.004)	(0.004)	(0.010)	(0.011)	(0.021)	(0.021)
Black	-0.124***	-0.118***	-0.067***	-0.058***	-0.118***	-0.090***	-0.075	-0.043
	(0.012)	(0.012)	(0.013)	(0.013)	(0.033)	(0.032)	(0.049)	(0.046)
Hispanic	-0.044***	-0.047***	-0.085***	-0.086***	-0.060***	-0.039**	-0.048**	-0.031
	(0.007)	(0.007)	(0.008)	(0.008)	(0.020)	(0.019)	(0.025)	(0.023)
Asian	-0.048***	-0.025***	-0.030***	-0.034***	-0.082**	-0.071*	-0.136***	-0.127***
	(0.006)	(0.006)	(0.011)	(0.011)	(0.038)	(0.037)	(0.051)	(0.048)
Other	-0.004	-0.004	-0.051***	-0.048***	0.118	0.085	0.011	-0.032
	(0.035)	(0.034)	(0.019)	(0.018)	(0.077)	(0.074)	(0.161)	(0.147)
Class Rank	0.019***	0.017***	0.019***	0.017***	0.014***	0.014***	0.013***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Test Score (SAT/ACT)	0.080***	0.074***	0.085***	0.084***	0.071***	0.074***	0.066***	0.064***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.008)	(0.008)
Constant	0.412***	0.506***	0.333***	0.354*	1.199***	1.394***	1.118***	1.013***
	(0.024)	(0.152)	(0.022)	(0.192)	(0.041)	(0.202)	(0.082)	(0.384)
Observations	51968	51968	50259	50259	9161	9161	4027	3747
R-squared	0.31	0.37	0.29	0.35	0.34	0.39	0.21	0.3
Number of high schools	1725	1725	1713	1713	864	864	500	490

Note: ***1%, **5%, *10%, All Models include year fixed effects.
a. Extended and fixed effects models included mother's education, which is unavailable for other institutions

Table 5
Determinants of Four Year Graduation with High School Fixed Effects:
Four Texas Public Universities

Institution	UT-Austin [a]			TAMU			Texas Tech			UTSA		
Years	1990-2000			1992-2000			1996-2000			1996-2000		
Specification	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects	Basic	Extended	Fixed Effects
Male	-0.140***	-0.143***	-0.124***	-0.223***	-0.220***	-0.205***	-0.144***	-0.124***	-0.111***	-0.029***	-0.026***	-0.022***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.008)	(0.004)	(0.004)	(0.005)
Black	-0.177***	-0.107***	-0.066***	-0.134***	-0.075***	-0.030**	-0.148***	-0.117***	-0.078***	-0.012	0.001	0.003
	(0.009)	(0.009)	(0.010)	(0.011)	(0.011)	(0.013)	(0.020)	(0.020)	(0.024)	(0.009)	(0.009)	(0.010)
Hispanic	-0.115***	-0.068***	-0.030***	-0.106***	-0.077***	-0.041***	-0.114***	-0.100***	-0.057***	-0.012***	-0.007	-0.004
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.008)	(0.013)	(0.013)	(0.014)	(0.004)	(0.005)	(0.005)
Asian	-0.003	-0.009*	-0.036***	0.015	0.004	-0.001	-0.099***	-0.107***	-0.107***	0.010	0.010	0.009
	(0.005)	(0.005)	(0.006)	(0.011)	(0.011)	(0.011)	(0.028)	(0.028)	(0.029)	(0.012)	(0.011)	(0.012)
Other	-0.080***	-0.060**	-0.044	-0.052***	-0.043**	-0.026	0.092	0.097	0.103	0.010	0.014	0.025
	(0.029)	(0.029)	(0.029)	(0.018)	(0.017)	(0.018)	(0.061)	(0.060)	(0.063)	(0.033)	(0.033)	(0.035)
Class Rank		0.004***	0.007***		0.004***	0.006***		0.003***	0.005***		0.001***	0.001***
		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)
Test Score (SAT/ACT)		0.038***	0.014***		0.031***	0.017***		0.013***	-0.001		0.011***	0.006***
		(0.001)	(0.002)		(0.002)	(0.002)		(0.003)	(0.003)		(0.002)	(0.002)
Constant	0.361***	-0.507***	-0.447***	0.388***	-0.331***	-0.372***	0.307***	-0.072**	-0.048	0.059***	-0.107***	-0.088***
	(0.007)	(0.020)	(0.020)	(0.007)	(0.021)	(0.021)	(0.009)	(0.029)	(0.031)	(0.005)	(0.016)	(0.017)
Observations	62062	62061	61997	49690	49686	49686	13793	13793	13499	10900	10900	10900
R-squared	0.05	0.09	0.09	0.07	0.10	0.10	0.04	0.07	0.07	0.01	0.03	0.03
Number of high schools			1969			1754			986			839

Note: ***1%, **5%, *10%, All Models include year fixed effects.

a. Extended and fixed effects models included mother's education, which is unavailable for other institutions

Appendix Table 1A
Comparison of Full Sample vs. Heterogeneous School Sample:
Results for First Semester GPA

Institution	UT-Austin [a]		TAMU		Texas Tech		UTSA	
Years	1992-2003		1992-2002		1996-2003		1996-2004	
Sample	Extended	Mixed Schools	Extended	Mixed Schools	Extended	Mixed Schools	Extended	Mixed Schools
Male	-0.179***	-0.171***	-0.110***	-0.104***	-0.156***	-0.133***	-0.165***	-0.190***
	(0.006)	(0.007)	(0.006)	(0.009)	(0.010)	(0.017)	(0.015)	(0.021)
Black	-0.090***	-0.079***	-0.098***	-0.077***	-0.133***	-0.120***	0.007	-0.032
	(0.014)	(0.016)	(0.016)	(0.020)	(0.028)	(0.042)	(0.034)	(0.041)
Hispanic	-0.039***	-0.034***	-0.182***	-0.183***	-0.132***	-0.155***	-0.107***	-0.099***
	(0.008)	(0.011)	(0.009)	(0.015)	(0.017)	(0.029)	(0.017)	(0.023)
Asian	0.096***	0.063***	0.017	0.020	0.024	0.037	0.197***	0.165***
	(0.008)	(0.008)	(0.015)	(0.019)	(0.034)	(0.053)	(0.035)	(0.043)
Other	-0.149***	-0.180***	-0.078***	-0.096**	-0.065	-0.008	-0.198*	-0.244
	(0.043)	(0.051)	(0.026)	(0.039)	(0.068)	(0.110)	(0.115)	(0.176)
Class Rank	0.020***	0.020***	0.017***	0.019***	0.014***	0.014***	0.014***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Test Score (SAT/ACT)	0.184***	0.174***	0.170***	0.155***	0.113***	0.114***	0.211***	0.201***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.004)	(0.006)	(0.006)	(0.008)
Constant	-1.004***	-0.903***	-0.733***	-0.618***	0.654***	0.717***	-0.838***	-0.726***
	(0.031)	(0.036)	(0.030)	(0.045)	(0.041)	(0.069)	(0.067)	(0.091)
Observations	77218	53529	61542	26085	24936	8882	16916	8936
R-squared	0.27	0.28	0.22	0.24	0.21	0.21	0.18	0.19
Number of high schools								

Note: ***1%, **5%, *10%, All Models include year fixed effects.
"Mixed Schools" refer to schools that send at least one black and Hispanic student to the university.
a. Extended and fixed effects models included mother's education, which is unavailable for other institutions

Appendix Table 2A
Predictors of 6th Semester Attrition: Extended and Fixed Effects Models

Institution	UT-Austin [a]		TAMU		Texas Tech		UTSA	
Years	1990-2001		1992-2001		1996-2001		1993-2001	
Specification	Extended	Fixed Effects	Extended	Fixed Effects	Extended	Fixed Effects	Extended	Fixed Effects
First semester GPA	-0.193***	-0.181***	-0.195***	-0.185***	-0.197***	-0.190***	-0.193***	-0.193***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.004)	(0.004)
Male	0.013***	0.008**	0.007**	-0.002	-0.023***	-0.030***	-0.018**	-0.016*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.007)	(0.007)	(0.008)	(0.009)
Black	-0.009	-0.034***	0.027***	-0.003	-0.000	-0.034	-0.045**	-0.046**
	(0.008)	(0.008)	(0.009)	(0.010)	(0.020)	(0.023)	(0.018)	(0.020)
Hispanic	0.030***	0.006	0.045***	0.028***	0.050***	0.037***	-0.049***	-0.043***
	(0.004)	(0.005)	(0.005)	(0.006)	(0.012)	(0.013)	(0.009)	(0.011)
Asian	-0.032***	-0.022***	0.044***	0.048***	0.001	0.002	-0.070***	-0.084***
	(0.004)	(0.004)	(0.008)	(0.009)	(0.025)	(0.026)	(0.021)	(0.022)
Other Race	0.039*	0.027	0.044***	0.031**	-0.039	-0.053	0.003	-0.044
	(0.023)	(0.024)	(0.014)	(0.014)	(0.055)	(0.058)	(0.064)	(0.067)
HS Rank	0.001***	-0.001***	-0.000***	-0.002***	-0.001***	-0.002***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SAT/ACT	0.013***	0.021***	0.018***	0.026***	0.023***	0.029***	0.009***	0.014***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.004)
Constant	0.556***	0.560***	0.538***	0.553***	0.702***	0.697***	1.021***	0.994***
	(0.015)	(0.015)	(0.016)	(0.017)	(0.028)	(0.030)	(0.032)	(0.034)
Observations	64916	64854	55397	55397	16869	16494	12271	12271
R-squared	0.17	0.16	0.15	0.15	0.12	0.12	0.19	0.20
Number of high schools		2008		1809		1036		884

Note: ***1%, **5%, *10%, All Models include year fixed effects.

a. Extended and fixed effects models included mother's education, which is unavailable for other institutions