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Black students' graduation from elite colleges: Institutional characteristics and between-institution differences

Mario L. Small [a,*], Christopher Winship [b]

[a] Department of Sociology, University of Chicago, IL 60637, Chicago
[b] Department of Sociology, Harvard University, MA 02138, Cambridge

Abstract

Among the nation's elite colleges and universities, black graduation rates vary dramatically from institution to institution. Many sociologists have suggested that this is due not to differences in the student bodies but to institutional factors; however, this "institutional hypothesis" has not been recently examined empirically. We test the institutional hypothesis for a set of elite institutions using College and Beyond, a restricted dataset containing data for the entire 1989 cohort of 27 elite institutions, matched to institution-level data, employing HLM techniques. We ask three questions: Do institutional factors affect black students' probability of graduation? Do they account for between-institution differences in black graduation? And are institutions where blacks have a high probability of graduation the same as or different from those where whites do? Testing for the effect of eight major institutional factors, we find, surprisingly, that only selectivity has a statistically significant effect. Contrary to common belief, selectivity improves black probabilities of graduation, and helps blacks more than it helps whites. It also accounts for roughly 38% of the between-institution variance in black graduation. Finally, we find that after controls, black and white probabilities of graduation across institutions are highly correlated (.909), such that institutions in which blacks are likely to graduate are those in which whites are likely to graduate, too. Findings suggest that researchers should examine other institutional factors in greater depth, as well as the role of pre-college preparation more seriously.
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* Corresponding author.
E-mail address: mariosmall@uchicago.edu (M.L. Small).

1. Introduction

The politics of Affirmative Action have made the performance of black students in elite colleges and universities an issue of social and political concern. Indeed, the (2003) Supreme Court case involving the University of Michigan prompted the Bush administration to file a brief with the Court opposing the use of race in admissions at both the undergraduate and graduate levels (Nagourney, 2003). That an Affirmative Action case involving a top university attracted controversy is no accident: the presence of blacks in these gatekeeper institutions is much more contentious than their presence in the typical college. Indeed, as Kane (Dickens and Kane, 1999; Kane, 1998) has shown, it is only in the nation's elite colleges that Affirmative Action increases black students' chance of admission. At the vast majority of colleges, blacks would be admitted at the current rates even under completely race-blind policies. Since black students in these institutions have lower graduation rates than whites (Bowen and Bok, 1998), it is of pressing social interest to conduct rigorous research on which factors affect their performance and which do not.

One fact rarely appreciated about elite colleges is the high variance in their black students' graduation rates. According to the 1997 Journal of Blacks in Higher Education, the 1996 black graduation rate was only 66% at the University of Michigan but 95% at Harvard University. Some of the variance is due to the characteristics of the students who apply, are accepted, and choose to attend different elite institutions. However, sociologists have also suggested that much of it is due to institutional factors. Previous tests of this ''institutional hypothesis,'' however, have been inadequate because of inappropriate data or modeling techniques.

In what follows we present more rigorous tests of this hypothesis for a set of elite institutions using College and Beyond (C&B). The dataset was the source of Bowen and Bok's (1998) influential book, *The Shape of the River*, which covered a wide breath of material but did not examine the institutional hypothesis in depth. Our analysis focuses on why black graduation rates vary across an elite set of institutions. We seek to answer three questions: Do institutional factors affect black students' probability of graduation? Do they account for between-institution differences in black graduation? And are institutions where blacks have a high probability of graduation the same as those where whites do? We begin by reviewing previous research.

2. Previous research

A vast, but contradictory literature, stimulated by the Coleman Report (Coleman et al., 1966), has examined the importance of institutional factors for explaining academic success at the primary and secondary schooling levels. Card and Krueger (1996) provide new evidence and review the existing literature, arguing that institutional factors are important. But Hanushek (1996) also reviews the literature and reaches the opposite conclusion.

The literature specifically on higher-education institutions is small and underdeveloped. Part of the issue appears to be a decline in research during the 1990s due to a lack of adequate data, as few datasets were available containing both adequate samples of institutions and large samples of black students within the same institutions.

Generally, the institutional perspective states that specific characteristics of a college or university present constraints or opportunities affecting students' chances of graduating, independent of the students' other traits. We identify the four models that have received the greatest attention: (a) the academic difficulty model; (b) the institutional resource model; (c) the social mismatch model; (d) and the group conflict model. We then use these models to inform our tests of eight institutional variables.

2.1. Academic difficulty

The most common assumption is that black students have lower graduation rates because of the elite institutions' academic difficulty. A standard criticism by opponents of Affirmative Action is that academically unprepared black students receive preferential treatment, only to buckle under the institutions' academic demands and then fail to graduate. This is one element of the academic "fit" hypothesis, by which black students are expected to have low chances of graduation because their academic preparation is a poor fit with the expectations and requirements of these top colleges (see Bowen and Bok, 1998, 59ff).

Most empirical tests of this hypothesis use a school's selectivity as a proxy for its academic rigor. The standard measure of selectivity is an institutions' mean SAT score. The results have been mixed. Thomas (1981b), using NLS-72, and Dale and Krueger (1999), using C&B, find no effect. However, several studies have found positive, rather than negative effects. Bowen and Bok (1998, 337), using C&B data, find that when an institution goes from a medium selectivity category (mean SAT, 1150–1300) to a top one (mean SAT > 1300) a student's probability of graduating increases by 8% points. Gosman et al. (1983) find, after institution-level controls (but no student-level controls), that a 100-point increase in a school's mean SAT increases a cohort's graduation rate by about 10% points. Kane (1998), using the High School & Beyond, finds a positive effect for black students specifically.

The positive effect of selectivity is consistent with an important thesis proposed by Steele (1992) and others. Steele argues that racial differences in educational performance are a product of the anxiety black students have in regards to the stereotype that they do not have the needed ability to perform adequately. He argues that the solution is not to treat black students as needing remedial help (which only reinforces the stereotype) but to place them in high-achievement environments with the expectation that they do well (which counters it). An implication of Steele's argument is that more selective schools may actually promote higher levels of academic performance by black students because of the higher expectations these schools have of all students.[1]

A different hypothesis based on this model focuses on grading. Some conservative commentators have suggested that after the 1960s, when the number of black students at top colleges rose sharply, liberal professors faced with under-prepared black students responded by grading more easily, resulting in sharp grade inflation (Mansfield, 2001) and effectively rendering the schools academically less difficult. By this logic, institutions with tougher grading standards would have lower black graduation rates. Empirical tests of the effects on graduation among black students have been scarce.

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[1] We are grateful to an anonymous reviewer for pointing out this argument to us.

2.2. Institutional resources

A different literature has focused on resources such as services. Greater service-provision helps students cope with the academic and social burdens of college and university life, thus increasing the chances they graduate. In a survey of black students at 7 predominantly white universities, Smith (1980, 14) asked respondents what remedies they believed would improve black student retention: 81% cited improved counseling facilities; 80%, improved remedial and tutorial programs; and 75%, pre-college programs. However, the study does not demonstrate that schools with more of these services have higher graduation rates. Although it is a common expectation among college administrators, empirical data demonstrating that these services do, in fact, improve chances of graduation (as opposed to improving well-being or mental health) has been indirect, meager, and mixed. Jackson and Swan (1991) do find that "respondent satisfaction with the tutorial service" (1991:130) has mixed effects on black students' GPAs.

Similarly, the institution's wealth has been thought to improve chances of graduation. Wealthier schools can provide more and better services and better financial packages. Being in a school with a weak endowment might produce financial anxiety about the coming and subsequent years, thus increasing stress level and reducing chances of graduating. There are few studies. Thomas (1981a) finds that the amount institutions make available in grants and loans increases black students' probability of graduation. Gosman et al. (1983) find that a 1% point increase in the number of students in a college cohort receiving aid increases its graduation rate by 0.14% points.

2.3. Social mismatch

A third literature has focused on the social environment black students face in elite colleges. With roots in diverse works such as Bourdieu's (1984; Bourdieu and Passeron 1979; see also Granfield 1991), what might be termed a "social mismatch" model posits that elite colleges present socio-cultural environments alien to and insufficiently supportive of black students, since the latter are more likely than whites to have come from non-elite and non-white environments (Massey et al., 2003). This may be thought of as the question of the *social* (or cultural), rather than academic "fit" between black students and elite colleges. The range of manifestations of social mismatch is potentially quite large; we focus on two that have received attention.

Some researchers have focused on the social life of blacks in predominantly white schools (Allen, 1988; Epps, 1972; Hemmons, 1982; Nettles, 1988a,b; Smith, 1981; Smith and Allen, 1984; Smith and Moore, 2000; Thomas, 1981c; Willie and McCord, 1972; Willie and Cunnigen, 1981). After interviewing black students at predominantly white colleges, Willie and McCord (1972) report that "dating is a serious problem... [because the] chance of a black person finding another black person with whom he is compatible is more limited" (1972:16); they also report "feelings of disgruntlement due to an insufficient range of personalities with whom to interact" (1972:19; see also Berry, 1983). In a recent study based on survey data and in-depth interviews of black students in a predominantly white institution, Smith and Moore (2000) report high tensions among black students, particularly around issues such as dating, though the authors also report heterogeneity in how black students respond to their environment. The social duress students experience is hypothesized to reduce chances of graduation. There seems to be little disagreement about

the duress experienced by black students, but few empirical tests on whether this stress lowers the chances of graduation.

A different consideration of the social environment has been the location of the institution's campus. Researchers have suggested that because many elite colleges are located in rural parts of the country, black students lack outlets when they need to escape from what are often socially and culturally alienating environments (but see Alexander-Snow, 2000; Smith and Moore, 2000). Based on interview data, Willie and McCord (1972, 93) report that the "absence of blacks in the surrounding areas is one of the major complaints of black students attending these colleges." They find that "[b]lack students at white colleges in small towns who do not have access to transportation for weekend trips away from the campus feel as if they were trapped, imprisoned, and isolated" (1972:94). In contrast, "[a]t colleges located in areas with a local black community, the black students tend to feel more comfortable patronizing the community facilities that have been established to service the personal, recreational, and other leisure time needs of the local blacks" (1972:100). This lack of outlets is said to increase their stress level and decrease their chances of graduating.

2.4. Group conflict

A final set of variables can be derived from the group conflict perspective, which would perceive graduation rates as outcomes ensuing from the conflicts between blacks and whites in elite colleges. From this perspective, with origins in such works as Willis (1977), factors such as group position and relative group strength are important. The perspective suggests since blacks perceive themselves in competition with whites, the larger the comparative disadvantage black students face, the lower their chances of graduation. The available information to measure group conflict is unfortunately quite limited. We focus on two possibilities.

One approach has been to measure the percentage of black students in the institution. While the social mismatch model posited that fewer black students result in fewer opportunities for socialization, the group conflict posits that a smaller *proportion* of black students results in a comparatively weaker black student body, a greater sense of alienation from the overall student body. According to this approach, having 100 black students in a campus of 1000 is better than having 100 in a campus of 1500. In general support of this idea, Nettles et al. (1986), based on data on students in 30 institutions, find that being a member of the racial minority on campus decreases GPA (1986:298). Gosman et al. (1983) find that cohorts in majority-black institutions have graduation rates 0.38 of a percentage point higher. Thomas (1981a), however, finds no effect of having a majority black student body. Nevertheless, most of these studies do not focus on elite colleges, which, having lower proportions of black students, might show starker effects.

Another possibility is to focus not on the proportions but on *differences*. The group conflict model would predict lower chances of graduation when black students, as a whole, are academically quite different from white students in a given institutional setting. A high disparity may trigger, for example, what Steele (Steele and Aronson, 1998) has called the "stereotype threat," negatively affecting performance and probability of graduation. Steele and his colleagues have found that highly capable black students, when faced with tests that push their limits on an issue about which there is a black stereotype, will trigger the stereotype in their minds, which, in turn, will decrease their performance (Steele and

Aronson, 1998). Massey et al. (2003) provide one of the few direct tests of Steele's hypothesis for actual academic performance. They show that blacks and Latinos who they identified as being particularly susceptible to stereotype threat had significantly worse academic records in their first year of college.

In sum, tests of these four models in the institutional perspective have been inconclusive. For some of the hypotheses, there have been few or no tests; for others, tests have shown mixed results. In addition, many of the tests themselves are either missing appropriate modelling techniques to account for multi-level processes or not focused on elite institutions. Few studies have employed a hierarchical dataset with numerous students located in numerous schools; almost none have tested the institutional hypotheses with recent and more appropriate hierarchical modelling techniques (Raudenbush and Bryk, 2002), which properly account for variation at the individual and institutional levels. In what follows, we employ hierarchical modeling techniques to examine this question.

3. Data and methods

3.1. Data

We use C&B and supplementary datasets. Our sub-sample of C&B is a restricted dataset, collected by the Mellon Foundation, which contains transcript data on most or all students of the 1989 first-year cohort in 27 elite colleges and universities.[2] There are 17 universities and 10 colleges, including four all-women colleges, but no historically black colleges or universities. The dataset includes four large, highly selective public universities. In these four universities, all of the black students and all of the athletes were selected, along with a random sample of 500 of the remaining white students; in all other institutions, all students were selected. Our sample is limited to blacks ($n = 2294$) and whites ($n = 23,903$). The dataset contains complete transcript data for all students in the sample. For a full description of the dataset, see Appendix A in Bowen and Bok (1998). The institutional data were supplemented with data from *America's Best Colleges* for 1990 (compiled by *US News and World Report*) and the Integrated Postsecondary Educational Data System (IPEDS) dataset for 1991, compiled by the National Center for Education Statistics.

The variables and their sources are listed in Table 1. Our dependent variable is whether students graduated within 6 years from the college they entered in 1989.[3] Since it is difficult to know how to compare grades across institutions, we do not analyze the determinants of student GPA. This has the benefit of focusing on a comparable outcome across institutions, an outcome that, in addition, is critical to mobility and job attainment. However,

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[2] The institutions in the College & Beyond sample are the following: Miami University (Ohio), University of Michigan (Ann Arbor), University of North Carolina (Chapel Hill), Pennsylvania State University, Columbia University, Duke University, Emory University, Northwestern University, University of Pennsylvania, Princeton University, Rice University, Stanford University, Tufts University, Tulane University, Vanderbilt University, Washington University, Yale University, Denison University, Hamilton College, Kenyon College, Oberlin College, Swarthmore College, Wesleyan University, Williams College, Barnard College, Bryn Mawr College, Smith College, Wellesley College (Bowen and Bok, 1998, 292).

[3] We do not have data to indicate which students transferred to and graduated from another institution. Bowen and Bok, using restricted elements of C&B, found that roughly 4% of all students fit this category. Though minimal, this figure should be kept in mind throughout the discussion and analysis.

Table 1
Variables and sources

	Description	Source
Institution-level variables		
Selectivity	Mean SAT for cohort enrolled in 1989	US News 10/15/90
Grading leniency	Average cumulative GPA	C&B transcript
Wealth	Dollar amount of institution's total expenditures divided over enrollment for 1989	US News 10/15/90
Service expenditures	Dollar amount of expenditures on student resources divided over total enrollment for 1991	IPEDS (1995)
Number of black students	Number of black students in 1989 cohort	C&B transcript
Geographic isolation	Dichotomous variable for whether institution's campus is in a rural location	www.usnews.com
Black–white SAT gap	Difference between average black SAT score and average white SAT score	C&B transcript
Percent of students black	Percent of students black in 1989 cohort	C&B transcript
Student-level variables		
Graduation	Dichotomous variable for whether student graduated within 6 years of enrollment from the first school attended	C&B transcript
SAT score	Combined math and verbal SAT score	C&B transcript
Income	Fourteen-point scale of student's family income	C&B transcript and survey, HERI
Father's education	Dichotomous variable for whether father graduated from college	C&B transcript and survey, HERI
Mother's education	Dichotomous variable for whether mother graduated from college	C&B transcript and survey, HERI

In universities, the service expenditures are divided over total student body, including graduate students. The income categories are as follows: 1, less than $6,000; 2, $6,000-$9,999; 3, $10,000-$14,999; 4, $15,000-$19,999; 5, $20,000-$24,999; 6, $25,000-$29,999; 7, $30,000-$34,999; 8, $35,000-$39,999; 9, $40,000-$49,999; 10, $50,000-$59,999; 11, $60,000-$74,999; 12, $75,000-$99,999; 13, $100,000-$149,999; 14, $150,000 or more. The graduation variable excludes students who graduated from another school. Bowen and Bok (1998, 55–56), using survey data, estimate that 4% of the students in the C&B sample left the first school and graduated from another.

we emphasize that findings related to graduation cannot be assumed to reflect relationships regarding GPA or other educational outcomes. Future research using this or other datasets should examine racial differences in GPA in institutions of higher education, their impact on graduation, and later social and economic success.

Informed by the four models, we examine a total of eight institutional factors, focusing on those for which there is strongest substantive interest. We include two indicators of academic difficulty, selectivity, operationalized as an institution's mean SAT score,[4] and grading leniency, operationalized as an institution's mean GPA. We include two indicators of institutional resources. We could not locate reliable information on either the number or the quality of student services in 1989, which would be the best measures. IPEDS, however, provides data on each institution's total expenditure on services contributing to

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[4] A different measure of selectivity, the institution's acceptance rate, was highly correlated with mean SAT, suggesting they measured similar constructs. However, it induced multi-collinearity when combined with other factors. Thus, mean SAT was used.

''students' emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal education program.'' Thus, that variable, scaled for the size of the student body, is used instead;[5] we also include wealth, operationalized as total expenditures per student. We include two measures informed by the social mismatch model, the number of black students on campus and the school's geographic location (operationalized as rural or not); and we include two indicators informed by the group conflict model, the proportion of the student body that is black and the difference between an institution's average black and average white SAT scores. Naturally, these indicators do not exhaust the possible measures of these models. Yet they represent the best data available, and a marked improvement on prior tests.

The student-level controls are the most commonly employed in the literature—combined SAT score, family income, and each parent's education. The parental education variable, with values of 0, 1, and 2, adds father's and mother's dichotomous variables for whether they graduated from college; the resulting variable indicates how many of a student's parents graduated from college. Our choice of controls was constrained by two factors, data availability and institutional degrees of freedom. Additional background controls were either unavailable or missing for significant portions of the sample. Nevertheless, as we show, the presence of additional controls at the individual level would likely strengthen, rather than undermine, our findings.[6]

Table 2 shows descriptive statistics for the institution- and student-level variables used. The first row in the top panel shows that the average graduation rate for blacks across the 27 institutions is 78%, with a standard deviation of 10 percentage points. For comparison purposes, it also exhibits the white rate, which is 12 percentage points higher and has a lower standard deviation. The correlation between both rates is high, at 0.729 (not shown). As expected, the institutions are highly selective, with a mean SAT score of 1241 (SD, 78). The mean GPA is quite high at 3.17, with a small standard deviation of 0.15, on a 4-point scale. The institutional resource measures vary dramatically across institutions: average wealth per student is over $27 thousand, with a standard deviation of close to half that amount; average expenditures per student is over $1600, with a standard deviation of over $900. The social mismatch variables also show considerable variance: the average number of black students is somewhat low, at 87, with a standard deviation of 80, and 5 institutions were geographically isolated. The group conflict measures show the potential for both small and large effects. The average proportion of black students is very low, at

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[5] Service expenditures include the following: ''Funds expended for admissions, regular activities, and activities whose primary purpose is to contribute to students' emotional and physical well-being and to their intellectual, cultural, and social development outside the context of the formal education program. Examples are career guidance, counseling, financial aid administration, and student health services (except when operated as a self-supporting auxiliary enterprise)'' (IPEDS, 1991).

[6] C&B is a restricted dataset held by the Mellon Foundation, and only portions of the complete dataset are made available to researchers. Our data contained several additional variables that we might have included: type of high school attended, high school class rank, and gender. The first variable was missing for all students in four institutions; the second was missing for all the students in about one half of the schools. Given the importance of institutional context, imputation was not a viable option; listwise deletion would have reduced sample sizes to very low levels. The last variable, gender, was available for all students. However, the sample contained 4 women's colleges (Bowen and Bok, 1998: Appendix A), all of which would be dropped in random effects models. We did run the models with gender controls and our estimates were not appreciably affected, except for some lost efficiency.

Table 2
Descriptive statistics

	Mean/N	SD
Institution-level variables (n = 27)		
Institutional graduation rates (group mean)		
Black rate	78%	10%
White rate	90%	6%
Academic difficulty		
Selectivity (mean SAT)	1241	78
Grading leniency (mean GPA)	3.17	0.15
Institutional resources		
Student services (expenditures per student)	$1,614.01	$937.78
Wealth (per student)	$27,583.74	$12,704.62
Social mismatch		
Number of black students	87	80
Geographically isolated (rural campus)	5	
Group conflict		
Percent of students black	7%	3%
Black–white SAT gap	182	53
	Blacks (*n* = 2294) Mean (SD)	Whites (*n* = 23,903) Mean (SD)
Student-level variables		
Graduated	77%	90%
Combined SAT	1052 (168)	1233 (145)
Family income score	8.14 (3.05)	10.19 (2.68)
Parental education	1.02 (0.81)	1.48 (0.66)

	Characteristics of graduates and non-graduates			
	Blacks		Whites	
	Graduates	Non-graduates	Graduates	Non-graduates
Combined SAT	1066	1006	1237	1195
Family income score	8.22	7.89	10.22	9.90
Parental education	1.06	0.90	1.50	1.33

Student-level figures are un-weighted. Weighted figures are similar or identical. Available upon request.

7%, with a standard deviation of 3% points; yet the average black–white SAT gap is quite large, at 182, with a standard deviation of 53.

The bottom panel shows the unweighted student-level variables for blacks, and for comparison whites. The first row shows the outcome variable; 77% of blacks and 90% of whites in the sample graduated. The black SAT score is roughly 180 points lower than whites', though the standard deviation is higher. Because schools reported income differently, we used a scale to create comparability. The footnote to Table 1 describes how incomes were categorized. The family income score for blacks is 8.14, which corresponds to a little over $35 thousand a year (in 1989 dollars) with a standard deviation of about $10 thousand; for whites, it is over $50 thousand, with a standard deviation of about $8 thousand. The parental education score for blacks is about 1, suggesting that black students had on average one parent who was a college graduate; stated differently, each of their

parents had a 50% chance of being a college graduate. For whites, it is roughly 1.5, suggesting whites came from families in which each parent had a 75% chance of being a college graduate. Both groups, therefore, stem from highly educated families. In all figures, whites score higher and have lower variances than do blacks.

Table 2 also exhibits the characteristics of graduates and non-graduates in each racial group. For both blacks and whites, graduates have higher SAT scores and family incomes and more educated parents than non-graduates. Interestingly, the graduate–non-graduate SAT gap is larger for blacks (60 points) than for whites (42 points). The gaps in family income and family education are virtually identical in both races.

3.2. Methods

We employ hierarchical logit models (Bryk and Raudenbush, 1992; Raudenbush and Bryk, 2002) in which the key items of interest are the effects of academic difficulty, institutional resources, social mismatch, and group conflict on black students' probability of graduation. As a yardstick, we also compare blacks with whites at strategic junctures in the analysis. Appendix A presents our formal model, which was run on HLM 5.0. We estimate random effects models with the individual-level variables centered on the black mean. Institution-level variables are centered on the grand mean. The model suppresses the intercept and estimates the effects of level-2 variables on the coefficients for black and white, thus allowing for racial comparison of level-2 effects. In addition, since the intercept is suppressed and all student controls centered on the black mean, the coefficients for black and white will represent the conditional log odds of graduating for the average black student and for a white student with identical characteristics. HLM 5.0 allows us to estimate the covariance (or correlation) between those log odds across institutions.

4. Analysis

We examine which institutional factors predict black probability of graduation, how much of the variance across institutions they account for, and whether institutions where blacks have a high probability of graduation are the same as or different from those where whites do.

Which factors matter? Models I to VIII in Table 3 test for the effect of our eight measures. The findings are unexpected. Neither the difference between the average black and average white SAT scores nor the percentage of black students on campus have a statistically significant effect on black students' chances of graduation. The remaining variables do have significant effects. However, when we control for all characteristics simultaneously (model IX), only selectivity has a significant effect. The effects of other variables are not only insignificant, but close to zero.[7] In the discussion section below, we suggest why most of these factors failed to register a statistically significant influence after a careful modeling strategy, even with only a small number of student background controls. Here, we address the more immediate analytical question of how the single robust effect, selectivity, operates.

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[7] Extensive analyses suggest the slight increase in the SAT measure is due to some collinearity with the mean GPA variable. None of the other estimates seemed affected by collinearity, and the collinearity with mean GPA does not affect our substantive findings.

Table 3
Effects of institutional factors on black students' log odds of graduation, after controlling for background traits

	I	II	III	IV	V	VI	VII	VIII	IX
Academic difficulty									
Selectivity	0.416[**]								0.645[**]
(SAT × 100 pts)	(0.076)								(0.167)
Grading leniency		1.410[**]							−1.644
(mean GPA)		(0.531)							(1.134)
Institutional resources									
Wealth (×$1000)			0.018[**]						−0.002
			(0.07)						(0.008)
Expenditure on				0.018[*]					0.004
services (×$100)				(0.010)					(0.008)
Social mismatch									
Number of black					−0.154[**]				−0.023
students					(0.042)				(0.081)
Geographic						−0.240			
isolation (rural campus)						(0.223)			
Group conflict									
Percent of							−1.686		
students black							(1.582)		
Difference between								−0.248	
black and white SAT								(0.159)	

All models control for SAT score, parental education, and family income, centered on the black mean. The intercept is suppressed, and all variables are also modeled to affect white log odds of graduation (not shown). All level-1 effects are random. All institutional variables are centered on the institution-level mean. All standard errors are robust.

  [*] $p < 0.10$.
  [**] $p < 0.05$.

How does selectivity operate? And how much of the variance across institutions does selectivity account for? In the main literature review, we discussed two general perspectives on how selectivity might work. The first and most common perspective is that greater selectivity implies greater difficulty, leading to lower probabilities of graduation. The opposite perspective, supported in this and other empirical studies, is that selectivity increases the probability of graduation. A positive effect of selectivity could signal one of three types of effects: an individual effect, an institutional effect, and a group effect. The first suggests that a school's mean SAT score is nothing more than the sum of its individual students' SAT scores—that is, there is no collective process at play. This is not supported by the findings above, where the institutional SAT score affects students' chances of graduation independent of their own SAT score. In terms of an institutional effect, mean SAT score signals a host of possible factors (Bowen and Bok, 1998): an institution's wealth, as higher scores can selectively attract the best students; its provision of services to help students graduate; or the economic value of a degree, as some economists have suggested (Loury and Garman, 1995). The first two of these have been obviated by our controls for other institutional traits in our analysis (Model IX in Table 3). Testing whether the economic value of the degree motivates students to graduate is beyond the scope of our data, as we have no measures of future labor market outcomes for students in different institutions. The selectivity effect, finally, could refer to group processes taking place in highly selective institutions. By this account, being surrounded by highly competitive peers motivates

students to push themselves to the limits of their abilities. This process could be related to Steele's (1992) argument that very high standards, coupled with the expectation that blacks must do well, contributes to high performance. In an environment with high-performing peers, the natural expectation of high achievement for all students becomes a motivating factor.

The findings below on how selectivity operates are consistent with the notion of group processes and the motivating impact being surrounded by high performance. We examine three interrelated ways selectivity operates: how it affects an average black student's probability of graduation; how it affects the *gap* between black and white students' probability of graduation; and how it affects the *variance* across institutions in black students' probability of graduation.

First is the magnitude of its effect on black students' probability of graduation. Table 4 shows the full set of estimates of the effect of selectivity on log odds of graduation. Consider the top row of the bottom panel. The coefficient for black is 1.333, which represents the average black student's log odds of graduating, after controls. This represents a probability of graduating of 0.79 ($p = 1/(e^{-(1.333)} + 1)$). The top panel shows that the effect of selectivity for blacks is .416. A 100 point increase in an institution's selectivity will increase a black student's predicted log odds of graduating $1.333 + 0.416 = 1.749$. Thus, the predicted probability of graduation increases from 0.79 to 0.85, or about 6% points.

The second issue is whether selectivity widens or narrows the gap between black and white students' probability of graduation. One possibility is that it helps whites more than blacks. Since blacks in these institutions are on average less academically prepared, one might expect they would have to work harder to attain what would come more easily to whites. An analogy is a game of basketball in which one team is on average taller than the other. Raising the hoop a few inches increases the comparative advantage of the average member of the taller team. In this sense, increased selectivity would *widen* the gap between black and white probabilities of graduation.

Table 4
Effect of selectivity and student characteristics on log odds of graduation

Institutional factor	Coefficient showing effect on	
	Black slope	White slope
Selectivity (SAT × 100 pts)	0.416[**]	0.328[**]
SE	(0.076)	(0.068)
Student factors	Coefficient	
Black	1.333[**]	
SE	(0.077)	
White	1.866[**]	
SE	(0.328)	
SAT score, per 100 pts	0.019	
SE	(0.020)	
Income (14 point scale)	0.046[**]	
SE	(0.008)	
Parental education	0.167[**]	
SE	(0.029)	

Selectivity is centered on the institution-level mean. Controls for students background are centered on the black mean. All standard errors are robust.
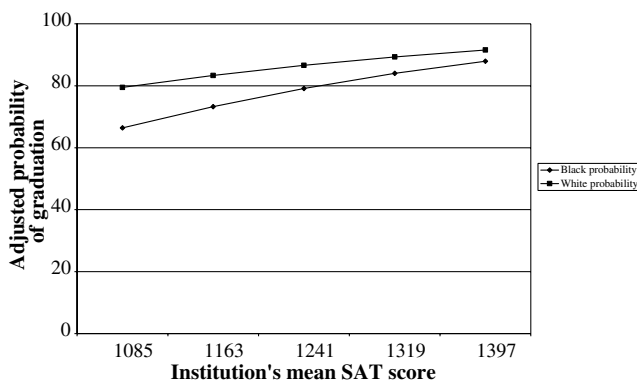
[**] $p < 0.05$.

Fig. 1. Average black student's and identical white student's probabilities of graduation, by selectivity of institution, after controlling for student background.

The other possibility is that selectivity helps blacks more than whites either through competition or encouragement. The perceived comparative disadvantage would serve as an incentive, as blacks would simply work harder than whites because they have more to gain. Similarly, the process Steele (1992) has theorized could be in place. Blacks in American society experience a stigma around educational achievement that whites do not. As discussed above, being in an institution with very high expectations for all students might reduce the impact of this stigma, as black students, now forced to perform at very high standards, accelerate their progress. Thus, selectivity would *reduce* the gap, as blacks saw either the competitiveness of their classmates as an incentive to "catch up" or the accelerated pace of high-standards setting as a motivation to fulfill their potential.[8]

Fig. 1 shows the probability of graduating for an average black student and a comparable white student at schools with different levels of selectivity. Five different selectivity levels are presented: the mean across institutions, 2 SD's below, 1 SD below, 1 SD above, and 2 SD's above.

The mean selectivity is 1241; the standard deviation is 78. The difference in the predicted probabilities of graduation between blacks and whites is reduced significantly as the institution becomes more selective. In institutions of very low selectivity (2 SD's below the mean), a black student with average characteristics has a probability of graduating about 13% points lower than a white student with those same characteristics. In a highly selective school (2 SD's above the mean), the difference narrows dramatically to 3.6% points. (Both of these differences are statistically significant at the .05 level.) Thus, the evidence is consistent with the notion of group-level processes by which black students "catch up" to the selectivity of their peers.

The third issue deals with the effect of selectivity on the variance across institutions in black students' probability of graduation. Based on the moderate effects of selectivity on probability of graduation (6% and 3% points for blacks and whites, respectively, per 100 point increase in selectivity), one might expect the variable to account for little of the

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[8] In some ways, these two models are analogous to DiMaggio's (1982) "cultural reproduction" model, where having cultural capital helps wealthier children more than it does poorer children, and "cultural mobility" model, where having cultural capital helps poor children more than wealthier ones.

Table 5
Between-institution variances in average black student's log odds of graduation

	No controls	Standard controls[a]	SEL (Preferred model)[a]
Variance in black log odds	0.303	0.226	0.109
SE	(0.109)	(0.088)	(0.051)
Remaining percentage of initial variance	100.0%	74.6%	36.0%
Variance in white log odds[a]	*0.641*	0.698	0.577
SE	*(0.182)*	(0.211)	(0.178)
Black–white coefficient correlation	0.849[**]	0.874[**]	0.909[**]
SE	(0.281)	(0.300)	(0.332)

All variances evaluated at the black mean.
[a] Please note that the variance for whites in the first column (identified by italics) cannot strictly be compared with the others, since it is based on the traits of the average white student.
[**] $p < 0.05$.

variation. By contrast, one might expect the variable to tap into fundamental group processes that vary dramatically from institution to institution, processes operating independently from their effects on individuals. That is, one might expect selectivity to matter more *across* institutions than *within* them.

The results are on the top panel of Table 5. The panel shows the variance across institutions in the average black student's log odds of graduation with no controls, after adding controls for student background, and after adding controls for selectivity. The remaining percentage of the initial variance is also shown. The initial variance is 0.303. Controlling for student background characteristics cuts the variance 25.4% to 0.226. Controlling for selectivity cuts the initial variance another 38.6%, bringing it down to 0.109, or 36% of the original variance. Thus, selectivity accounts for a great deal of the between institution-variance, even though its effect on a given black student's likelihood of graduation is moderate.

Are institutions where blacks have a high probability of graduation the same as or different from those where whites do? The bottom panel of Table 5 addresses our final question. The panel shows the correlation across institutions between the black log odds of graduation and the white log odds. If the correlation is low, this suggests blacks do well in institutions different from those in which whites do, which would support the idea that unobserved factors affect blacks and whites differently. After controlling for individual differences and selectivity, the correlation between the black and white graduation rates is extraordinarily high, 0.909, though this correlation is estimated with considerable impression (SE = 0.332). To the degree that institutions vary in the probabilities of graduation of their students, this difference does not vary by race.[9]

5. Discussion and conclusion

We have three sets of findings. Our first findings were perhaps the most surprising—as almost none of the most common institutional factors expected to affect probabilities of graduation had a statistically significant effect. This occurred for three reasons.

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[9] For this analysis, we allowed a latent variable to simultaneously affect the log odds of graduation of blacks and whites. Under this model, variance in the black graduation rates remaining after controlling for all variables in the table as well as the latent variable, was not significantly different from zero.

First, we should be clear we did not test for all potentially relevant factors. Future tests and additional data collection are needed to determine whether other factors matter; we consider our study only a first step. For example, one factor that we could not test for (for lack of available data) was the number of black faculty on campus, which would be expected to have an impact on the type of environments that black students experience and their ability to find mentors. However, any research on additional factors among the universe of elite colleges should note that there are at most 40, perhaps 50, such colleges. In theory, therefore, there are more imaginable conditions than top colleges, a degree-of-freedom consideration that should guide any such studies, as it has ours. Our strategy, to focus on those factors of greatest substantive and theoretical interest (and those for which reliable data are available) seems an appropriate balance. A second reason for the lack of an effect is that *pre*-college factors may be more important than the institutional hypothesis suggests (see Massey et al., 2003). Indeed, our findings suggest that high school preparation may be more important than several college conditions for graduation from college. If so, college preparatory programs sponsored by elite universities among high school students may be more important to ensure high performance in college than college-level programs instituted after black students have already entered these elite institutions. In a sense, easier, post-facto solutions such as support services in college, though important, may be less effective than providing the educational equipment by establishing, sponsoring, funding, or otherwise supporting high school preparation.

An additional consideration is that our focus has been on graduation. Graduation is arguably the most important educational attainment outcome with respect to these issues. Nonetheless, we believe it would be premature to conclude that, since most of the institutional characteristics we studied did not impact graduation, they do not impact anything. Indeed, we would expect several of these factors to have an effect on issues such as the stress level of black students, mental health, choice of major, or even the expectation to pursue a post-graduate degree. What our findings suggest is that students with the adequate pre-college preparation are likely to persevere and graduate, even if they do so while experiencing greater duress, or with lower GPAs, or choosing different career paths than comparable white students. Thus, inequality may manifest itself again in the stage after graduation, and high graduation rates in a given institution must be interpreted in light other outcomes. These include, grade point averages, which affect admission to the best graduate schools and some forms of highly sought employment (such as banking and management consulting); choice of major, which significantly affects post-educational outcomes in major fields such as medicine and engineering; mental health and identification with education (Steele, 1999), which affects the probability of pursuing a post-graduate education. These issues deserve examination in future work.

Finally, the finding that most institutional factors did not affect graduation should be interpreted in light of our sample of elite institutions. As we mentioned earlier, Kane (1998) has shown that it is only in these institutions that Affirmative Action increases black students' chance of admission, since at other institutions the black admission rate would be the same even under race-blind policies. Elite institutions are also gatekeepers for many high-status and highly influential positions in academia, the professions, and government, so they demand attention by students of education and inequality. Nevertheless, the majority of college students do not attend these schools, and conditions in elite schools may be markedly different from those in non-elite colleges. The variance in factors such

as student services may be much higher, and these factors may have an impact on graduation in these colleges, even if they do not do so in elite institutions.

Our second major finding is the importance of selectivity. Selectivity, it seems, captures several of the effects often attributed to other institutional conditions. The emerging picture with respect to selectivity is complex. First, consistent with a few other studies (Bowen and Bok, 1998; Kane, 1998) but contrary to much public opinion, selectivity increases the probability of graduation. A 100 point increase in selectivity increases a black student's probability by about 6 percentage points. Second, it is noteworthy that it helps blacks more than it does whites, suggesting that selectivity is a proxy for group-level dynamics that should be studied further. We have suggested two closely related ways of looking at this issue. One is that selective institutions provide black students, who on average had lower levels of predictors of achievement, strong incentives to "catch up" to their classmates, such that higher selectivity results in a narrower black–white gap. Another is that the high standards of selective institutions may help reduce the stigma among blacks that Steele (1992) has argued is prevalent in American education. Being treated as a student with high potential, rather than as a student requiring remedial help, appears to strongly improve the chances of graduation among blacks. For this interpretation to hold, it would have to be the case that as institutions become more selective, black students in them are more likely to be treated under the high expectations of all students than as students requiring remediation. Still, by either interpretation, the strong effects of selectivity demonstrate a clear benefit of Affirmative Action in elite institutions. Future ethnographic work on this issue is needed to identify how these mechanisms manifest themselves in practice. Indeed, the fact that selectivity accounted for a major portion of the variance across institutions suggests that researchers should pay greater attention to the environments in which highly competitive students of different racial backgrounds are operating.

Our third finding also speaks to policy concerns. Our analysis of the effects of individual characteristics and selectivity showed that both sets of factors affect black and white graduation rates. Further, the residual correlation in the unexplained portion of their graduation rates was found to be extraordinarily high (.909). These results suggest that institutions do not specifically differ in their ability to graduate black students. Rather they have different black graduation rates because they differ in their ability to graduate students more generally. This suggests programs aimed at increasing black graduation should focus on the concerns black students share with all students.

Appendix A. Formal Model

In its simplest form, our basic model allows for both institution-level and student-level effects:

Student-level

$$\ln(\phi_{ij}/1 - \phi_{ij}) = \beta_0 + \beta_1 X_{ij}$$

Institution-level

$$\beta_0 = \gamma_{00} + \gamma_{01} W_{0j} + \mu_{0j}$$

Combined model

$$\ln(\phi_{ij}/1 - \phi_{ij}) = \gamma_{00} + \beta_1 X_{ij} + \gamma_{01} W_{0j} + \mu_{0j}$$

where $\phi_{ij}/1-\phi_{ij}$ is the odds ratio, the probability that student i in institution j will graduate over the probability that he or she will not; X_{ij} is a vector of student-level predictors or controls; W_{0j} is a vector of institution-level predictors; μ_{0j} is the institution-level random effect, whereby institutions are allowed to have independent mean graduation rates.

In order to assess the graduation process for blacks vis-a-vis that of whites, we modify this basic model. We allow the institutional factors to separately affect blacks and whites. Since the sample is limited to blacks and whites, we suppress the intercept to avoid linear dependence. The resulting estimates for the variables BLACK and WHITE will be the log odds of graduation for, respectively, a black or a white student with a value of zero on all other student- and institution-level factors. The modified basic model follows:

Student-level

$$\ln(\phi_{ij}/1 - \phi_{ij}) = \beta_0(\text{BLACK}) + \beta_1(\text{WHITE}) + \beta_2 X_{ij}$$

Institution-level

$$\beta_0 = \gamma_{00} + \gamma_{01}W_{0j} + \mu_{0j}$$
$$\beta_1 = \gamma_{10} + \gamma_{11}W_{1j} + \mu_{1j}$$
$$\beta_2 = \gamma_{20} + \mu_{2j}$$

Combined model

$$\ln(\phi_{ij}/1 - \phi_{ij}) = \gamma_{00}(\text{BLACK}) + \gamma_{01}W_{0j}(\text{BLACK}) + \mu_{0j}(\text{BLACK}) + \gamma_{10}(\text{WHITE})$$
$$+ \gamma_{11}W_{1j}(\text{WHITE}) + \mu_{1j}(\text{WHITE}) + \gamma_{20}(X_{ij}) + \mu_{2j}(X_{ij})$$

Where μ_{0j} and μ_{1j} are institution-level random effects associated with the black and white slopes, respectively, and are assumed to be correlated; and μ_{2j} is a vector of random effects associated with the vector of student-level controls, X_{ij}. All X's are centered on the black grand mean; all W's, on the between-institution mean (the variable RURAL, which is dichotomous, is uncentered). As a result, throughout the discussion, the coefficient for BLACK will be equal to the log odds of graduation for the average black student in an institution with average characteristics that is also non-rural; the coefficient for WHITE, to the log odds for a white student with the characteristics of the average black student. In the modified model, all institutional factors operate either through BLACK or WHITE, which allows for a clear, parsimonious comparison of the effects of institutional variables on each of the racial groups.

Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ssresearch.2006.06.006.

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