

**The Black-White Achievement Gap in the First College Year:  
Evidence from a New Longitudinal Case Study**

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## ABSTRACT

In the United States, an achievement gap between whites and blacks persists at all levels of schooling from elementary school to higher education. Definitive reasons and remedies for minority underperformance remain unclear. This study examines how students acquire and utilize “collegiate capital” which, in turn, relates to their academic achievement in the first year of college. Results indicate that significant black-white differences in academic achievement emerge as early as the first semester of students’ first year in college. Controls for family background, parental involvement, prior ability, cultural capital acquired during the middle- and high-school years, and other factors produce a moderate reduction in the achievement gap, but over half of the gap remains unexplained. The study is part of a larger research project that involves a longitudinal study of two cohorts -- the graduating classes of 2005 and 2006 -- at a major private university. Through the assessment of pre-college differences and extensive data collected via student surveys and academic records during the college years, the goal of the larger project is to illuminate the factors underlying raced-based variations on a range of academic outcomes such as educational performance and attainment, but also several new measures of collegiate intellectual development such as students’ ecological integration, perceptions of other groups, and satisfaction with college.

## **The Black-White Achievement Gap in the First College Year: Evidence from a New Longitudinal Case Study**

Conventional scholarly wisdom on stratification patterns for blacks and whites in the United States suggests a pattern of gradual convergence in the post-World War II years (Featherman and Hauser 1978; Hout 1988; Hirschman and Snipp 1999). Further, educational achievement has been one of the key factors in the convergence (Kuo and Hauser 1995). However, a growing literature in the U.S. finds a persistent gap in academic performance between whites and blacks at all levels of schooling from elementary school to higher education (Jencks and Phillips 1998). African Americans also continue to have higher rates of drop out and lower educational attainment than whites. In one of the more comprehensive studies to date, Bowen and Bok (1998) postulate several reasons for the minority achievement gap, including poorer academic preparation, dis-identification with achievement in response to academic hardships, and racial distrust. Status attainment and human capital perspectives maintain that students' educational outcomes are a function of their family background, cognitive abilities, and achievement orientations. Yet prior research that accounts for these factors provides only modest reductions in the black-white performance gap. Thus, the precise reasons and remedies for minority underperformance remain unclear. This paper and larger research project of which it is part apply this question to the arena of higher education: What are the causes of the black-white achievement gap and what might reasonably be done to ameliorate it?

In the sections that follow, we review the evidence and explanations that have been offered for the achievement gap. Then we discuss the *Campus Life and Learning*

*Project*, a new longitudinal study of racio-ethnic differentials in educational performance in higher education. The research project features a prospective panel study of two cohorts, the graduating classes of 2005 and 2006, at Duke University, a major private university in the southeastern United States. We will survey about 1,500 students annually through college exit or graduation and at least two years thereafter. A number of recent or ongoing studies use samples of multiple institutions or large heterogeneous samples of individuals in order to investigate racial differences in educational outcomes. These include general surveys of children and youth, such as the National Educational Longitudinal Surveys, Children of the National Longitudinal Survey, and High School and Beyond. Other studies by Bowen and Bok (1998) and Massey et al. (2003) are also designed to investigate racial achievement gaps in higher education. The *Campus Life and Learning Project* is distinctive in that it entails a panel study of a single institution with the goal of providing a more detailed, in-depth assessment of the wide range of explanations for race-based performance differences than can be achieved with larger, multiple institution studies.

After discussing the design of the larger research project and situating Duke University within the population of four-year colleges and universities in the United States, we utilize data from two survey waves for the first cohort in the study to examine the determinants of academic performance, measured by grade point average (GPA), at the end of the first semester of the first college year. One goal of this analysis is to establish whether an achievement gap between minority students and whites in our sample emerges as early as the end of the first semester of college and to compare the size of this gap, if found, to achievement gaps found in other studies. A second goal is to

estimate a “net” achievement gap, controlling for a wider range of status attainment, human capital and cultural capital factors than in prior studies of the achievement gap. Results indicate that an achievement gap emerges early in the college career. A range of pre-college factors is responsible for ameliorating or exacerbating the achievement gap in first semester grades. We conclude the paper with a discussion of the main implications of the findings and our plans for future research.

### THE MINORITY ACHIEVEMENT GAP: EVIDENCE AND EXPLANATIONS

A long tradition of research has found substantial differences in college grades, persistence in college, and graduation rates between African-Americans and whites in the United States (Cleary 1968; Crouse and Tusheim 1988; Nettles, Theony, and Grosman 1986; Nettles 1988; Ramist, Lewis and McCamley-Jenkins 1994). Kane (1998) used data from the High School and Beyond (HSB) study to investigate differences in the educational performance of minority and white students. The HSB data refer to a sample of students in the graduating class of 1982 from over 1,000 public and private high schools in the United States, who were periodically resurveyed over the next 10 years. Using a sub-sample of 2,912 students, Kane reports that black and Hispanic students scored from .3 to .4 of a letter grade lower in college GPA (on a four-point scale), compared with white students. Generally, the size of the achievement gap between Hispanic students and whites was about half of the gap for blacks. Adjustments for family background (parental education and income), and other controls (gender, SAT score, and high school GPA) reduced the gap by about half for both groups.

Vars and Bowen (1998) provide a similar estimate of the gap. They used the College and Beyond dataset, which contains a sample that is more selective than HSB, as the data refer to more than 10,500 students entering six private universities and five selective liberal arts colleges in 1989. Vars and Bowen report a black-white gap in college GPA of .5 of one letter grade. Controls for family socioeconomic background, attendance at private versus public high school, and prior achievement reduced the gap by about half. More generally, using data for two cohorts from the College and Beyond data, Bowen and Bok (1998) show that while the black-white gap in SAT test scores has narrowed, the gap in college performance is nearly as large for the college cohort entering in 1989 as it was for the 1976 cohort. Moreover, the gap may be largest among students in the highest echelons of the SAT distribution and at more selective institutions.

What factors can explain these persistent differences in academic performance?

A variety of explanations have been offered to account for the minority achievement gap. Most arguments focus on differences in various forms of capital for students of different racio-ethnic groups. Other arguments maintain that a combination of institutional factors are to blame for these achievement differences. Below we summarize the main factors emphasized by prior research attempting to explain minority achievement gaps. They include status attainment variations, social and cultural capital differentials, negative stereotype threat, and the racial climate of college classrooms and campuses.

**Status Attainment and Human Capital.** Scholars of education have long recognized that an individual's experiences during childhood, and the financial resources and socioeconomic standing of one's family are very important for later educational attainment and achievement. At the same time, it is important to note that prior research

suggests that status attainment and human capital variables *do not* fully explain the gap; at most, they account for one-half of the gross differential in grades and test scores (for summary, see Bowen and Bok 1998: 53-90; Jencks and Phillips 1998: 1-51). The most frequently studied measures include family socioeconomic background (family income, parents' occupation and education levels), family size and structure, rural background, cognitive ability measured by prior test scores, and the quality of prior schooling (including class size, teacher characteristics, school type, etc.).

**Cultural Capital.** A growing literature finds that cultural capital, conceptualized as high status cultural knowledge (Bourdieu 1977; Dimaggio 1982) or cognitive and linguistics skills (DeGraaf, DeGraaf and Kraaykamp 2000), shapes students' educational outcomes in primary and secondary school. Using two cohorts of data from the National Educational Longitudinal Survey, Roscigno and Ainsworth-Darnell (1999) find that cultural capital ("high brow" cultural trips and classes) and household educational resources explain a modest portion of the racial gap in high school grades and mediate some of the effects of family background. Notably, little research has applied these ideas to the study of higher education. Cultural capital factors may have modest independent and mediating effects on initial college grades, and may explain a small part of the race-ethnic achievement gap. It is also possible that cultural capital matters more for college enrollment than for academic performance in college. Moreover, once students are enrolled in college, their cultural capital may require rebuilding or redirection in order for it to exert effects on educational achievement or other college-level outcomes. This latter issue raises questions about the amount of "carry-over" of cultural capital acquired by

students prior to college to their experiences once in college. Thus far research has not examined such questions.

**Social Capital.** Primary proponents of the concept of social capital, Bourdieu (1977) and Coleman (1988), see social capital as inherent in the character of social relations among people (versus human capital such as skills that reside within individuals). Accordingly, relationships have varying levels of trust, obligations and normative expectations (Coleman 1988). Some initial research shows promise for the idea that high-school students with well-developed social capital have higher educational outcomes (e.g., Stanton-Salazar and Dornbusch 1995), but, as in the case of cultural capital, the role of social capital in the realm of higher education represents largely uncharted waters. Several aspects of social capital may be related to students' college outcomes. For example, how do students use social networks (family, peer, professional and academic ties) as sources of support and information? How do these networks change in terms of their diversity and frequency over the college years?

Homophily is a well-established tendency in human association and networks (McPherson, Smith-Lovin and Cook 2001). Some studies have found considerable diversity in the degree of racial homophily in the social networks of college students (Smith and Moore 2000), which may also have implications for academic performance. For example, Bowen and Bok (1998) speculate that black students are disadvantaged by racially-homophilous peer networks, because the black distribution of ability, as measured by test scores, is lower on average than the white distribution. Finally, resource provision, information and social support in associational ties are not only a matter of personal networks and individual action, but also of structured opportunities

provided by institutional life. Students at many colleges and universities live in dormitories with randomly-assigned roommates in their first year. Differences in the composition of students' social networks, which are partly determined by such institutional regulations, may be related to student perceptions, aspirations, and performance differentials.

**Negative Stereotype Threat.** Psychologists Claude Steele, Joshua Aronson and colleagues (Steele 1997, 1999; Steele and Aronson 1995, 1998; Aronson et al. 1999, Aronson, Fried, and Good 2002) have advanced a novel explanation for the achievement gap. Negative stereotype threat begins with cultural beliefs about how members of different social groups perform in different situations, but especially those involving competitive performance. Negative stereotype threat is activated (i.e., perceived by ego) when such beliefs are made salient and referenced in a situation and, in turn, have affective and motivational consequences, such as fear and anxiety. These responses interfere with the efficiency of information processing and eventually reduce performance on evaluated tasks such as exams. Over the longer term these experiences may lead to dis-identification with being a "good" student and devaluing of academic performance.

Empirical evidence supporting the negative stereotype threat hypothesis has been reported for African American students relative to their white counterparts in standardized test performance (Aronson, Fried and Good 2002; Steele and Aronson 1995), for women's performance at mathematics relative to males (Croizet et al. 2001), white men's performance at mathematics relative to their Asian counterparts (Aronson et al. 1999), and students of different socioeconomic status/social class levels and their

performance on intellectual tasks (Croizet and Claire 1998). Nearly all of the empirical support for the theory has been based on experimental or quasi-experimental designs, or on elementary or secondary school populations (Voelkl 1997). In the typical experimental or quasi-experimental design, the salience of the stereotype is manipulated and subsequent test performance is the measured dependent variable.

**Micro- and Institutional Climates.** Perspectives emphasizing the importance of institutional climate for minority underperformance involve several classes of explanations. “Climate” refers to the extent to which prospective interactional ties of a focal environment (i.e., classroom, dormitory, social or institutional group) are perceived as welcoming and integrative, on the one hand, or hostile and exclusive, on the other (Astin 1993; Hurtado 1992; Hurtado et al. 1998; Pascarella et al. 1986; Pfeifer 1976). These researchers maintain that some minority students perceive various environments as hostile for their ascriptive social group which, in turn, leads to: (a) reduced levels of ecological integration or a sense of belonging; (b) increased stress that can impede academic performance; (c) different patterns of social and human capital acquisition and help-seeking behavior in academic settings.

Other research in this genre focuses on the “micro-politics” of classrooms such as differential treatment by teachers, school personnel and peers (Roscigno and Ainsworth-Darnell 1999), black students’ fears of acting white (Cook and Ludwig 1998), and oppositional cultures of minority groups (Ogbu 1974, 1986; Ainsworth-Darnell and Downey 1998; Farkas et al. 2002).

## RESEARCH DESIGN AND ANALYSIS

**The Larger Project.** In order to investigate the salience of these various perspectives in determining racial differences in academic achievement, we have designed a major research effort that improves upon prior studies in several important ways. The *Campus Life and Learning Project* entails a multi-year, prospective panel study of two consecutive cohorts of students admitted to Duke University, the incoming classes of 2001 and 2002 (graduating classes of 2005 and 2006). Duke is a private research university located in Durham, North Carolina with an undergraduate enrollment of about 6,000 students from the United States and several foreign countries. In contrast to other studies that investigate multiple institutions, the study is designed to capture the rich details of students' experiences and the structure of a single institution of higher education. It includes several key types of data and audit points that permit comparison to other institutions of higher education, particularly private elite colleges and universities.<sup>1</sup>

First, each cohort is surveyed via mail in the summer preceding their enrollment.<sup>2</sup> This survey gathers data on factors predicted by status attainment and human capital arguments to be important for academic achievement: measures of the quality of prior schooling and pre-college achievement orientations, (including self-esteem, self-perceptions of ability in different domains, and expectations for future performance). It provides a more detailed assessment of family socioeconomic background than prior research because we have access to data on students' financial aid and other aspects of family wealth.

The pre-college survey also allows a detailed assessment of students' cultural capital during their middle- and high-school years. Questions regarding students' exposure to high culture, interaction with parents over curricular and non-curricular matters, parental participation in school activities, and household educational resources will provide valuable data to address questions regarding the role of prior cultural capital in academic achievement in college.

Second, surveys administered during the college years contain a core set of questions, supplemented with questions regarding students' social networks, social and cultural capital, performance attributions patterns, and the like. Additional modules will include questions on time-use, choice of major, residential life, campus climate, advising, support networks, finances, and faculty-student interaction. In order to examine the role of social capital, the in-college surveys will obtain replicate panels of assessments of students' strong-tie and weak-tie networks over time, along with selected characteristics (race, gender and location) of these ties. We will examine how peer networks of black and white students vary and how these variations relate to a range of college experiences and outcomes. Moreover, we can investigate how various aspects of institutional support for specific student populations, such as scholarship athletes or students participating in highly-integrated, small-group curriculum programs, are related to differential academic outcomes and satisfaction with the college experience, net of individual factors. Additionally, as a first step toward testing negative stereotype threat arguments in a survey design framework with college students, we will measure the affective, motivational and behavioral components of this sequence for the most challenging class a student takes each semester and track students' academic performance and several

identity components in each survey wave. One challenge for the negative stereotype threat explanation is to move beyond the laboratory and to demonstrate external validity in broader real world contexts of actual classrooms and students' academic careers. The study will measure students' perceptions of climate in academic (i.e, classroom), residential, social, and extracurricular arenas at multiple time points during the college years in order to investigate the salience of these perspectives for explaining the relationship between campus and classroom climate and students' college performance and experiences.

The study also features several assessments of climate at local (living group, social group), university, and community levels. Archival methods will capture salient issues and events in the local media and student culture, while focus groups interviews will capture elements of the racial climate that are not easily measured in surveys. Also, for each respondent, we anticipate building a full temporal, spatial segregation profile that maps the racio-ethnic composition of his or her classes, living groups, and social networks. This type of information should illuminate the developmental patterns of integration and segregation as they evolve over the undergraduate career.

Finally, students will be surveyed after they leave Duke University, whether by graduation or early exit. Figure 1 summarizes the design and data collection points, and illustrative information that we expect to gather each year.<sup>3</sup> The sampling design randomly selects about 350 whites in each cohort and all black and Hispanic students, and about two-thirds of the Asian students in each cohort. Thus, the full design across both cohorts will have about 700 whites and 800 non-whites.<sup>4</sup>

**The Current Study.** While the larger Campus Life and Learning project is in still in progress, the current paper utilizes the pre-college and first year surveys for the incoming class of 2001 with two immediate goals. First, we seek to establish the size of the achievement gap between minority students and whites in our sample and compare it to other studies. The dependent variable for these analyses is first semester GPA. Second, we estimate a “net” achievement gap, controlling for status attainment and human capital factors and an extensive set of cultural capital measures taken prior to students’ arrival at college. Prior research finds an achievement gap in the range of one-half of one letter grade between black and white students, and about half of this amount between Hispanic and white students. In both cases, roughly half of the gap is explained by pre-college differentials in family background, prior schooling, test scores, and cultural capital.

Note that the sample for this study was not designed to be representative of the U.S. population of college and university students. Rather, it is more representative of highly selective institutions of higher education in the United States. In their sample of the cohort entering college in 1989, Bowen and Bok (1998: 337) define their top tier of selective institutions as those with combined average SAT scores (verbal and mathematics) of 1300 or higher. Their sample included institutions like Bryn Mawr, Swarthmore, and Williams colleges, and Princeton, Duke, Rice, Stanford and Yale universities. The average SAT score of Duke’s 2001 entering cohort was 1385. SAT scores have been rising over time so some upward shift since 1989 is to be expected. Further, Bowen and Bok (1998) reported a performance gap of .5 letter grade in overall college GPA between white and black sample members for the class of 1989 from 28

sampled selective institutions. Their broader sample includes the likes of Columbia University, Northwestern University, Wellesley College, the University of Michigan, and the University of North Carolina at Chapel Hill.

Table 1 provides a further comparison of the racio-ethnic composition of the Duke student body compared with all U.S. public and private higher education institutions in 1999 (the last year for which the latter data are available). Duke is fairly comparable to other universities with the exception that Duke University has about twice the percentage of Asian students (similar to other private elite institutions) and somewhat more students in the “Other” category. The latter difference is likely because the Duke admissions form includes a category in which students can describe themselves as “Bi- or Multi-racial.”<sup>5</sup>

#### TABLE 1 ABOUT HERE

As noted above, the pre-college survey contains questions on a wide range of issues including students’ social and economic background, past schooling experiences, social and cultural capital, social psychological characteristics, and expectations for college life. Procedures for all surveys follow Dillman’s (1978) Total Design Method. Table 2 provides the response rates by racio-ethnic group for the pre-college survey of the incoming Class of 2001. Response rates varied by racio-ethnic groups, ranging from 75 to 86 percent, and only about 2.5 percent of the sample refused to participate. The overall response rate was high; 80 percent of the sample completed the pre-college survey.

#### TABLE 2 ABOUT HERE

The analysis refers to members of the 2001 entering cohort who had relatively complete data (N = 673, 80% of total sample) and who authorized release of their Duke student records (91% of the above respondents). This sub-sample is comprised of 610 respondents (73% of original sample members).<sup>6</sup>

The dependent variable in all analyses is GPA (on a 4 point scale) at the end of the first semester of the first college year. Independent variables include a range of individual, family background, and other factors. Students' race is gathered from multiple U.S. Census type questions, that separately measure whether the respondent is Hispanic, and then asks for racial identification (White, Black, American Indian or Pacific Islander, Asian, Biracial or Multi-racial, or Some Other Race). The respective categories include both foreign and native born (i.e., Asian includes both foreign born and Americans of Asian descent). We combined Bi-/Multi-racial with the Other category. Virtually all of respondents who self-identified as Hispanic listed racial categories other than Black; accordingly, we assigned these cases to the Hispanic group. Following prior studies (Bowen and Bok 1998; Roscigno and Ainsworth-Darnell 1999) we include controls for sex, citizenship, parental education, occupation, income, labor force status, family structure, number of siblings, and the type of high school (private or public) attended. In most cases, students are asked to provide information on background measures for the time period of their senior year in high school; in other cases the more general period of high school years was used. The student's score on the verbal and math areas of the Scholastic Aptitude Test, typically taken in the fall of the senior year of high school was also included as an independent variable. These controls are more comprehensive than those of prior studies, since most datasets do not include all of the

above measures. For example, the only other published study to examine minority achievement gaps in the first semester of college (Massey et al. 2003), does not control for SAT scores or most of the family background measures used here.

Other independent variables capture pre-college levels of human, cultural and social capital. While there is debate about the exact boundaries of human, social and cultural capital (Farkas 1996), here we try to specify pre-college capital as completely as possible, regardless of whether the exact components fall in one domain or another.

Measures of pre-college human capital include: whether the student applied for financial aid during the first year of college; whether the student was enrolled in the engineering college during the first year (usually indicating more rigorous preparation in natural science and mathematics fields in high school); average hours studied per week in high school (Rau and Durand 2000); a measure of the importance of being a good student for one's self identity; and self-ratings of ability in challenging math/science and literature courses (Spenner and Featherman 1978).

For measures of cultural and social capital, we drew heavily on prior research (DeGraaf, DeGraaf and Kraaykamp 2000; Dimaggio 1982; Roscigno and Ainsworth-Darnell 1999; Stanton-Salazar and Dornbusch 1995). Based on these studies, the instrumentation included a pool of approximately 40 items that captured various aspects of high culture activities, popular culture activities, types of interactions with parents, parent's involvement in school and other domains of the respondent's life, and educational resources available to the respondent in the home and elsewhere. These were measured for the high school years and, for 15 of the items, the middle school years. We factor analyzed these items, for middle and high school separately, under a variety of

model conditions.<sup>7</sup> Four factors emerged that were fairly comparable across the middle and high school years, although there were some small variations in variables that loaded high. The high-culture factor is defined by the respondent visiting a museum, art gallery, zoo, or science center, or attending opera, ballet and the theater, either alone or with parents. The popular culture factor involves going to popular musical concerts, sporting events (high school), or parents talking with friends (middle school). A “parents-school-activity” factor is defined by parental participation in school-based Parent Teacher Association activities or other types of school activities. Finally, a parent homework factor involves parents regularly checking to see if homework is completed or assisting with homework.

**Results.** Table 3 provides descriptions, means, and standard deviations for all variables for each racio-ethnic group. Data for the entering cohort of 2001 shows a black-white performance gap in first semester grades of .39, slightly smaller than that found by Bowen and Bok (1998), but slightly larger than that reported by Massey et al. (2003). Recall, this is but one semester of grades and the gap typically grows some over the undergraduate years. In general, whites are advantaged on most socioeconomic measures compared with black and Hispanic students. For example, average family income for white students ranges from \$100,000 to 150,000 (USD) per year, for Hispanic and Asian students from \$75,000 to 100,000, and for black students from \$50,000 to 75,000 per year. A few other racio-ethnic differences are noteworthy: three out of four black students are female<sup>8</sup>; Asian students are less likely to be U.S. citizens; only four out of ten white students had mothers who worked full time in the labor force while they were in high school, compared with more than seven out of ten black students. Finally,

black students and, to a lesser extent, Hispanic and Other students are less likely to have lived in an intact family and more likely to have experienced the divorce of their parents during their high school years (see Massey et al. [2003] for similar findings).

#### TABLE 3 ABOUT HERE

There are few racio-ethnic differences in the measures of cultural capital and school involvement. Black students report lower levels of participation in high culture and popular culture activities (along with Asian students) in middle and high school. Also of note, Asian students have the lowest levels of parental participation in homework activities compared with any racio-ethnic group, yet have the highest first semester GPA's of any group. Massey et al. (2003) reported a similar finding for Asian students, wherein Asian parents were less involved in monitoring and assisting in homework.

For SAT scores measured during the senior year of high school, Asians score the highest, followed by white students, students of bi- or multi-racial identification, Hispanics and blacks. The black-white difference is a sizeable 52 points on the verbal score (over one standard deviation in the black distribution, and two-thirds of a standard deviation in the white distribution). The mathematics test score difference is even larger at 87 points (more than two standard deviations in the black distribution and 1.4 standard deviations in the white distribution). These sizable differences are in line with those found in several of other studies. Also, note that no black student respondents are in the School of Engineering, compared with 22 percent of whites and 30 percent of Asian students. This finding, too, reflects differences found at the national level. Finally, one out of four white students had a relative or family member who attended Duke; in contrast, only about ten percent of members of other racio-ethnic groups reported having

a family member or relative who had attended Duke. This distinction is potentially important because some portion of these respondents could be categorized as “legacy” cases. Legacy cases are of several types. One group involves student applicants who may be given some special consideration in the admissions process because their parents or relatives attended the same institution. Another group involves applicants from wealthy families who receive special consideration in the admission process because their family makes or promises to make a sizeable donation to the college or university. Legacy cases have been discussed in the literature (for example, Bowen and Bok [1998]) and have been a contentious issue in the media recently, but to the best of our knowledge there is no empirical research based on systematic data on this issue.

Table 4 reports parameter estimates for nested regression models of racio-ethnic group and several sets of control variables on first semester GPA.<sup>9</sup> These are unstandardized coefficients with standard errors in parentheses. Whites comprise the excluded category relative to dummy variables for other racio-ethnic groups.

#### TABLE 4 ABOUT HERE

It is striking that already in this first semester of college, for students at a highly selective university who have taken only four college courses, a sizable gap emerges. Blacks score .39 of one letter grade lower than whites in the first semester. The academic performance of other racio-ethnic groups is not significantly different from that of whites, although the Hispanic-white gap is one-third of the black-white gap, and the difference between Hispanics and whites may become significant with added data from a second cohort or with passing semesters and accumulation of grades.

Notably, model 6, which includes all pre-college control variables, reduces the black-white achievement gap by 41 percent, leaving 59 percent of the gap unexplained by measured pre-college differentials. Most other studies report reductions in the neighborhood of 40 percent of the gross gap, once pre-college factors are controlled (Bowen and Bok 1998; Jencks and Phillips 1998; Massey et al. 2003). Hence, this key finding for the Campus Life and Learning population is similar to that found in other studies, even though our models include more extensive control variables than prior research. These results strongly indicate that there are important within-college processes that differentiate students by racio-ethnic group, even very early in their collegiate careers.

In estimating the nested models, we tested all of the independent variables listed in the left-hand column of Table 4. The final model reported in each column reflects a trimmed equation that includes predictors that maintain their significance through to the full model (model 6), and predictors found to be important in other research. Predictors designated as “trimmed” were tested both individually and as a group for each model. Gender and parent’s education, found to be important in some other studies, are not significant predictors of first semester grades at conventional levels of probability. Students from families with larger sib-ships bear a small but statistically insignificant disadvantage in grades. This coefficient approaches significance in some equations. In contrast to the findings of some prior studies, neither intact family nor parental divorce has a significant net effect on first semester grades for this group of students. The means in Table 3 demonstrate that black and, to some extent, Hispanic students were more likely

to come from non-intact families. In our results, it appears the control for racio-ethnic status removes any disadvantage for students from nonintact families.

The middle and high school capital variables do not make much difference in first semester grades, once racio-ethnic group and demographic factors have been controlled. During the middle school years, parental involvement in homework signals a small disadvantage in college grades; we suspect this reflects a process whereby parents respond to their child's lack of self-direction or underachievement, relative to the larger group of students with credentials to secure admission to an elite institution. Also, active participation in sporting events and popular music concerts in high school has a significant negative effect on first semester grades, net of other factors. Overall, the pre-college level of cultural capital makes little difference, at least at this early point in the college career. As noted above, it is possible that cultural capital is expended in the college admissions process or needs readjustment and re-accumulation in the college environment. We will explore these possibilities with additional waves of data in the future.

Test scores are strong predictors of first semester grades. Alone, they explain seven percent of the total variance and about one third of the explained variance (relative to model 6) in first semester grades. With combined SAT verbal and mathematics scores controlled, the achievement gap is reduced from .39 to .19 of a letter grade of GPA. A one-hundred point increment in verbal test scores, with other factors statistically controlled, translates into one-tenth of letter grade of GPA; a one-hundred point increment in mathematics scores translates into a one-fifth of a letter grade of GPA.

However, a key portion of the achievement gap remains unexplained even after adjusting for test scores. Controls for other pre-college factors increase the net unexplained gap.

Among other capital measures, enrollment in the school of engineering, hours studied in high school, and self-rated ability at challenging high school classes do not significantly affect first semester college grades. Unfortunately, there are not enough intercollegiate athletes in this first cohort to be able to assess the effect of athlete status. A student's academic identity, measured as the extent to which a student views "being a good student" as an important part of his or her overall identity prior to college, significantly affects first semester grades. This finding is important for several reasons. First, there is precedent for this finding of identity effects on behavior in the literature (Gecas and Burke 1995) and we plan to explore it further with future waves of data. Second, this finding is consistent with evidence that domain identification (i.e., valuing the self highly in particular performance arenas) mediates the relationship between negative stereotype threat and performance (Aronson et al. 1999). Those who identify closely with a particular arena, in this case academic achievement, may be more subject to the effects of negative stereotype threat on academic performance. Finally, such an identity configuration might predict persistence in courses and areas of study in the face of academic difficulty or failure.

A final interesting finding relates to the fact that students whose relative or family member previously attended Duke scored significantly lower in first semester grades (by about one-seventh of a letter grade,  $b = -.14$ ) than other students. It is likely that not all of these students constitute true legacy cases, for example some students responding yes to this question may have had a sibling attend Duke; nonetheless legacy

cases are subsumed within this category of students. This gap of one-seventh of a letter grade is about one-third of the gross black-white gap, and about two-thirds the size of the net black-white gap (model 6). At first glance the negative effect may seem like an anomaly; one might expect relatives and family members with experience at the student's education institution to provide a *positive* form of social capital for the student. On further consideration of legacy cases in U.S. higher education, and elite institutions in particular, there are several plausible explanations for the significant achievement gap between this group of students and others. If higher education institutions bend their admission standards to accommodate the children and relatives of alumni and alumnae (particularly potential donors), these students may be less prepared and have lower ability to endure the demands of college than their counterparts who have no familial ties to the university. Alternatively, legacy cases on balance, once admitted, may "coast" or pursue their studies less vigorously compared with non-legacy cases. They may believe that their legacy status buffers them from the negative outcomes of poor academic performance in college. We will explore these possibilities in greater detail with future waves of data.

## CONCLUSION

The black-white achievement gap has drawn significant attention of both the scholarly and policy communities in the United States in recent years. This is the case at all levels of education, but particularly in higher education, and perhaps even more so at elite institutions. The achievement gap is sizable and virtually all efforts to explain it with traditional background and capital factors leave a substantial portion of the gap

unexplained. Why is this the case? This paper begins to address this question by examining racio-ethnic differentials in GPA at the end of the first semester of the first college year at one highly-selective U.S. university. In an attempt to examine some of the major explanations for the minority achievement gap, including those of status attainment and cultural and social capital differences, the analyses control for a wider range of factors than prior studies. The empirical analyses establish the emergence of a substantial and significant black-white achievement gap after as little as four months into the college career. This gap is nearly as large as that reported in other national studies for the entire college career. Other minority groups demonstrate no significant differences at this early stage of college, though it is possible that significant achievement gaps for other minority groups emerge over the college career.

Controlling for a range of pre-college factors – in terms of family background, middle- and high-school cultural capital, parental involvement, test scores and other capital measures – indicates that about forty percent of gap in first-semester GPA can be explained by differences in the socioeconomic background and academic preparation between black and white students. These findings accord well with theoretical perspectives that emphasize capital deficits as a central explanation for the lagging educational achievement of minority groups. When students arrive at college, they bring with them widely-varying amounts of pre-college human, social, and cultural capital that predict a portion of the variation in academic achievement in the first college semester. The importance of a student's pre-college academic identity for first-semester achievement is also interesting, as it suggests a form of psychic capital that might serve to buffer students as they make the transition from high school to college. Students who

report a strong identification with “being a good student” may respond differently to educational challenges and successes than other students. As we follow these students through college we can examine whether those who identify strongly with the academic domain benefit from this identity or, alternatively, as the work of Steele and Aronson (Steele 1997; Steele and Aronson 1995; Aronson et al. 1999) suggests, whether they are more susceptible to the detrimental effects of negative stereotype threat. At the same time it is striking that such a large portion, about sixty percent, of the gap remains unexplained.

Overall, our results raise several implications for future research as well as for policymakers hoping to find ways to increase the achievement of all students. First, scholars seeking to understand achievement gaps in college performance would do well to examine students’ academic experiences at even earlier stages in the life course, from early childhood to young adulthood, as some of the sources of achievement differences in college are likely to be found in the educational experiences and family backgrounds of children well before they reach college. For example, some research indicates that minority achievement differences emerge as early as preschool and kindergarten (Barbarin et al. forthcoming). A greater dialogue between researchers focused on college students and scholars examining similar issues at earlier stages of childhood and youth could yield very fruitful results.

In light of the above comments, it may be tempting to conclude that college administrators and policy makers can do little to enhance the achievement of minority students or that elementary and secondary school practitioners are best suited to address the problems of the minority achievement gap. While early interventions are certainly

important, institutions of higher education should not relinquish their critical role in addressing the minority achievement gap. The knowledge that achievement gaps emerge so early in the college career is powerful in that it can be utilized by college faculty and administrators to craft effective programs to identify high-risk students early and to find effective ways to help these students acclimate to college and strengthen their academic skills. Such efforts might entail better support services and counseling as well as tutoring and academic skills training. By no means is this an easy task since universities, especially elite universities, and students, especially minorities students, may be resistant to programs that emphasize academic-skills training and tutoring and are seen as remedial. But absent such interventions, students who are struggling academically are more likely to drop out or experience other academic episodes detrimental to their college performance and completion. As we follow two cohorts of Duke Students over their college careers we will assess how students utilize a range of university academic and counseling services and the efficacy of such programs for improving their academic achievement. These investigations should yield more detailed knowledge for those interested in implementing successful programs to address achievement gaps in college.

Finally, this study is the first to document an achievement gap between students with familial ties to their university (of whom whites comprise the largest category) and students with no such familial ties. This finding is especially interesting in light of the current heated debates regarding affirmative action in U.S. higher education. It underscores the point that universities consider a wide range of factors beyond academic achievement in their admission processes. While the national conversation has disproportionately focused on issues of race, it should be broadened to include legacy

students as well. As we continue with this research, we hope to illuminate the mechanisms behind the achievement gaps of both minority and legacy students and to see how such differences in academic performance change over the college years.

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## NOTES

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<sup>1</sup> The stream of measurements, assessments, and data merges proceeds over the college years of each cohort. The design provides full access to Duke University's Student Information Support System (SISS) database for those students who give signed release. Information from admissions files, registrar files (including grades, courses taken, honors, special programs, and study-abroad activities each semester), financial aid files, and residential housing files will be merged and analyzed.

<sup>2</sup> The pre-college survey is administered and coded by an external data collection subcontractor, Research Triangle Institute. RTI is well-established national survey research organization. We will employ two strategies to deal with potential sample selection bias resulting from the possibility that those who matriculate at Duke are not representative of those admitted. As an alternative to conventional selection modeling techniques, which can provide misleading results (Stolzenberg and Relles 1990), Land and McCall (1993) present a Bayesian 'mixture-modeling' technique for estimating the sensitivity of sample parameter estimates to various assumptions about sample selection bias. Given an observed response and covariate data, this technique provides a subjective probability interval within which a sample statistic would lie if non-respondents had been included. Necessary covariate information (demographic, pre-college grades, test scores, etc.) will be available for both matriculates and non-matriculates. In the fourth year of the project we plan to obtain academic performance data from a sub-sample of those who were admitted to Duke but matriculated elsewhere. While attempting to track and survey a parallel sample of non-matriculates over four years would be prohibitively costly and time-consuming, obtaining minimal performance data at year four (via postcard and/or 5-

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minute telephone interview) is feasible. It will allow us to compare matriculates and non-matriculates on key variables, and empirically examine the assumptions used in the (Land-McCall) sensitivity analysis.

<sup>3</sup> Wave 1 (pre-college) and wave 2 (first year) instrumentation can be viewed at:  
<http://www.soc.duke.edu/dept/faculty/kspen.html>.

<sup>4</sup> We have conducted extended analyses of the power in our sampling design under a variety of assumptions, including different analysis models and with tabular data. The key results lead us to be confident that we have sufficient statistical power in the research design (i.e., given the sample of approximately 1500 students over two cohorts). The statistical power for analyses of a single cohort is marginal but still acceptable, including with the response rates reported here.

<sup>5</sup> We also made comparisons of Duke to other so-called “Elite” (Harvard, Princeton, Yale, Dartmouth, the University of Pennsylvania, Brown, Stanford and Columbia) and “Top 50” (based on SAT scores) universities. In general Duke is identical to or slightly below the elite institutions and clearly above the Top 50 institutions. For example, Duke’s first year retention rate is 97 percent compared with 97 percent for the elite and 90 percent for the Top 50. The 2000 graduation rate is 93 percent of those matriculating, compared with 93 percent for the elite, and 80 percent for the Top 50 institutions. The student-faculty ratio is 9.0:1, versus 8.22:1 for the elite and 10.69:1 for the Top 50 institutions. Finally, the 25<sup>th</sup> and 75<sup>th</sup> percentile of SAT scores for Duke are 1300 and 1500; for elite institutions, 1334 and 1522; for Top 50 institutions, 1234 and 1424. These comparisons help to situate Duke in the national distribution.

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<sup>6</sup> We compared those in the analysis sub-sample to non-respondents in the sample using pre-college admissions data (test scores and demographics). The only significant difference ( $p < .05$ ) involved SAT mathematics scores, with respondents scoring about 15 points higher than non-respondents. All other differences were not significant (SAT verbal, high school rank, overall admissions rating, mother's and father's college graduation, financial aid applicant, and public-private high school).

<sup>7</sup> This included input correlation and covariance matrices, varimax and promax rotations, and 3, 4, 5, and 6 factor solutions.

<sup>8</sup> This is the case in the population of Duke students and not a non-response differential.

<sup>9</sup> We handled missing data as follows. For continuous independent variables with fewer than 5 percent missing, we used mean imputation as described in Cohen and Cohen (1975). For dichotomous variables with fewer than 5 percent missing we used stochastic imputation for binary outcomes (Little and Rubin 1987) with cut points set to the mean of a dummy variable. Variables with more than 5 percent missing included verbal SAT (15.6%), mathematics SAT (18.4%), and family income (7.7%). For these variables, we imputed a regression-predicted score using other variables in the design (ACT scores plus high school record for SAT; demographic variables plus financial aid information for family income). Prediction equations explained more than 60% of the variance in each regression imputed outcome, an indication that minimal bias will be present in substantive models using these imputed variables (Landerman, Land and Pieper 1997).

**Pre-Collegiate Variables**

Pre-College Survey  
 Demographic
 

- Racio-Ethnic Identity
- Parental Racio-Ethnic Identity
- Citizenship
- Religious Affiliation

 Family Structure  
 Family Capital  
 Cultural Capital  
 Schooling Experiences  
 Diversity Exposure  
 Performance Expectations  
 Performance Attributions  
 Non-Cognitive Resources  
 Identity Encapsulation  
 Social Support Network  
 Gender Roles  
 College Expectations  
 Admissions Resources  
 SES Constellation  
 Occupational Aspirations  
 Psychological Stressors

SISS  
 High School Curriculum  
 Test Scores (SAT, ACT, etc.)  
 GPA  
 Reader Rating Scores  
 High School Extracurricular  
 Financial Aid and Support

**Collegiate Wave 1 Variables**

Survey conducted during the sample's first year

Academic
 

- Record
- Course difficulty
- University academic climate general and diversity\*
- Classroom climate general and diversity
- Integration\*\*
- Proposed major

 Social/interpersonal networks and support  
 Residential Life
 

- Climate general and diversity
- Integration

 Extracurricular  
 Durham community  
 College development
 

- Stressful events and coping flexibility
- Stereotype threat

**First Year Specialized Modules-Survey and qualitative research**

- Transitions to college
- Pre-major advising/academic risk assessment
- Scholarship recipients
- Student athletes
- FOCUS Program

\* Diversity includes breadth of network and experiences of discrimination

\*\* Integration is the degree to which a student is strongly affiliated with a given domain, resources and opportunities available in that domain.

**Post-College Variables**

Graduation  
 Educational Attainment  
 Occupational Attainment  
 Income Attainment  
 Life and Job Satisfaction  
 Satisfaction with Duke

**=> Time Line of Measures of Institutional Structure and Climate**

Application to Duke	2001	'02	'03	'04	'05	'06	'07	'08
<b>Design Timeline →</b>								
<b>Data Collection</b>								
<b>Class of 2005 (Cohort 1)</b>	Wave - 1	W2	W3	W4	W5		W6	
<b>Class of 2006 (Cohort 2)</b>		W1	W2	W3	W4	W5		W6

Figure 1 – Summary of Major Design Components

Table 1: Percentage Enrollment by Racio-Ethnic Category for U.S. Four-Year Public and Private Higher Education Institutions and Duke University (1999 data).

Racio-Ethnic Category	Public Four-Year	Private Four-Year	Duke University
White, non-Hispanic	74.9	75.8	69.7
Black, non-Hispanic	10.7	11.4	8.0
Hispanic	6.9	6.2	4.2
Asian	6.5	6.0	14.2
Other	1.0	.6	3.9

NOTES: “Other” for public and private four-year institutions includes those for whom racio-ethnic category is unknown. For Duke this category includes racio-ethnic category unknown and a category for “Bi- or Multi-racial.” Data sources: For public and private four-year institutions: U. S. Department of Education, National Center for Education Statistics. 2002. *Digest of Education Statistics, 2001*. NCES 2000-130, by Thomas D. Snyder. Washington, D.C. For Duke University, Office of the Registrar (unpublished data).

Table 2: Population, Sample, and Response Rates: Pre-college Survey, Incoming Class of 2001.

	Total	Asian	African-American	Hispanic	Other <sup>a</sup>	White
POPULATION	1631	238	182	123	114	974
SAMPLED (sampling fraction)	837 (.51)	147 (.62)	178 (.98) <sup>b</sup>	120 (.98) <sup>b</sup>	36 (.32)	356 (.37)
COMPLETED (response rate)	673 (.80)	114 (.78)	137 (.77)	103 (.86)	27 (.75)	292 (.82)
REFUSALS (n)	21	2	1	3	3	12
OTHER NONRESPONSE	143	31	40	14	6	52

Notes:

a. "Other" includes Native American, multiracial ethnic identification, no ethnic identification.

b. Sampling fractions for African-Americans and Hispanics are not 100% because of late changes in intention to matriculate.

**Table 3: Measures and Descriptive Statistics by Racio-Ethnic Status, Pre-College Survey, Class of 2005**

Variable	Metric/Notes	Mean (Standard Deviation) by Racio-Ethnic Group									
		White		Black		Hispanic		Asian		Other	
<b>Race</b>	Dummy variable for groups; left out category = white; U.S. Census questions	285		104		93		97		31	
<b>Sex</b>	0 = Male 1 = Female	0.49	(.59)	0.74	(0.33)	0.46	(0.36)	0.48	(0.47)	0.61	(0.47)
<b>Citizenship</b>	0 = Other 1 = U.S. Citizen	0.98	(.17)	0.93	(0.19)	0.91	(0.21)	0.70	(0.43)	0.89	(0.30)
<b>Father's Education<sup>1</sup></b>	1 = Less than high school graduate 2 = High school graduate 3 = Some college/vocational school 4 = College graduate 5 = Some graduate school or Master's Degree 6 = Higher professional degree (Ph.D., J.D., M.D.)	4.97	(1.28)	3.95	(1.13)	4.43	(1.05)	5.04	(1.13)	4.98	(0.97)
<b>Mother's Education<sup>1</sup></b>	1 = Less than high school graduate 2 = High school graduate 3 = Some college/vocational school 4 = College graduate 5 = Some graduate school or Master's Degree 6 = Higher professional degree (Ph.D., J.D., M.D.)	4.41	(1.16)	3.77	(1.02)	4.09	(0.89)	4.11	(1.02)	4.29	(0.85)
<b>Father's Occupation</b>	Duncan Socioeconomic Status Score assigned to 1990 census 3-digit occupation	57.72	(19.92)	49.13	(13.35)	53.76	(13.51)	58.77	(15.50)	58.32	(14.54)
<b>Mother's Occupation</b>	Duncan Socioeconomic Status Score assigned to 1990 census 3-digit occupation	52.41	(16.23)	50.41	(11.11)	50.91	(11.71)	50.94	(16.59)	54.67	(11.57)
<b>Mother Working</b>	0 = No 1 = Yes, mother employed full-time in labor force during respondent's senior year of high school	0.39	(0.57)	0.72	(0.34)	0.51	(0.36)	0.43	(0.46)	0.44	(0.48)

**Table 3: Measures and Descriptive Statistics by Racio-Ethnic Status, Pre-College Survey, Class of 2005**

Variable	Metric/Notes	Mean (Standard Deviation) by Racio-Ethnic Group									
		White		Black		Hispanic		Asian		Other	
<b>Parent's Income</b>	1 = less than \$1,000 2 = \$1,000 to \$9,999 3 = \$10,000 to \$19,999 4 = \$20,000 to \$29,999 5 = \$30,000 to \$49,999 6 = \$50,000 to \$74,999 7 = \$75,000 to \$99,999 8 = \$100,000 to \$149,999 9 = \$150,000 to \$199,999 10 = \$200,000 to \$499,999 11 = \$500,000 or more	8.33	(2.42)	6.44	(1.64)	7.25	(1.71)	7.48	(2.07)	8.32	(1.79)
<b>Intact Family (Senior Year)</b>	0 = Not Intact 1 = Intact	0.88	(0.38)	0.53	(0.38)	0.79	(0.29)	0.88	(0.30)	0.79	(0.39)
<b>Experienced Parent's Divorce During High School</b>	0 = No 1 = Yes	0.06	(0.28)	0.12	(0.24)	0.10	(0.22)	0.02	(0.13)	0.10	(0.29)
<b>Number of Siblings</b>	Number (including step and half siblings)	1.72	(1.30)	2.17	(1.28)	1.87	(1.31)	1.42	(0.97)	1.69	(1.31)
<b>Financial Aid- Applicant</b>	0 = No 1 = Yes (applied for aid packages from univ.)	0.53	(0.59)	0.63	(0.36)	0.54	(0.36)	0.56	(0.46)	0.58	(0.48)
<b>Public High School</b>	0 = No 1 = Yes (major school attended)	0.66	(0.56)	0.70	(0.35)	0.52	(0.36)	0.79	(0.38)	0.62	(0.47)
<b>Middle School Cultural Capital<sup>2</sup></b>	Sum of variables that load high on factor Scales range from 1 = Never to 5 = Very Often										
<b>Factor 1 - High Culture</b>	Respondent visits museum, art gallery Respondent attends opera, ballet, etc. Respondent visits zoo, science center, etc Respondents visit museum/art gallery w/ parents Respondent attends opera/ballet/etc. w/ parents	12.15	(3.86)	9.68	(2.38)	11.20	(2.43)	10.75	(2.88)	12.78	(3.13)
<b>Factor 2 - Pop Culture</b>	Parents talk with friends Respondent goes to movies Respondent attends pop. music concerts Respondent attends sporting event	11.84	(2.30)	9.76	(1.93)	11.29	(1.46)	9.36	(2.35)	11.61	(2.23)

**Table 3: Measures and Descriptive Statistics by Racio-Ethnic Status, Pre-College Survey, Class of 2005**

Variable	Metric/Notes	Mean (Standard Deviation) by Racio-Ethnic Group									
		White		Black		Hispanic		Asian		Other	
<b>Factor 3 - Parent-School</b>	Parents participate in parent-school organization (e.g., PTA) Parents participate in other school activities	6.23	(2.13)	4.86	(1.57)	5.57	(1.55)	4.78	(1.88)	5.72	(1.79)
<b>Factor 4 - Parent-Homewk</b>	Parents check homework completion Parents help with homework	5.99	(1.81)	5.86	(1.30)	5.73	(1.32)	5.35	(1.61)	5.48	(1.93)
<b>High School Cultural Capital</b>	Sum of variables that load high on factor Scales range from 1 = Never to 5 = Very Often										
<b>Factor 1 - Parent School</b>	Parents participate in PTA Parents participate in other school activities	5.75	(2.28)	4.57	(1.46)	5.03	(1.55)	4.65	(1.92)	5.11	(1.81)
<b>Factor 2 - High Culture</b>	Respondent visits museum, art gallery Respondent attends operal, ballet, etc. Respondent visits zoo, science center, etc.	6.97	(2.54)	6.15	(1.53)	6.84	(1.40)	7.06	(1.96)	7.35	(2.16)
<b>Factor 3 - Pop Culture</b>	Respondent attends pop music concerts Respondent attends sporting events	5.93	(1.64)	4.98	(1.03)	5.62	(0.96)	4.76	(1.57)	5.93	(1.24)
<b>Factor 4 - Parent-Homewk</b>	Parents check if homework is done Parents help with homework	4.46	(1.96)	4.34	(1.25)	4.07	(1.24)	3.85	(1.57)	4.26	(1.56)
<b>Test Score - Verbal</b>	Scholastic Aptitude Test <sup>3</sup> (max - 800)	696.5	(79.43)	644.61	(44.25)	661.8	(42.79)	701.4	(68.25)	695.9	(60.06)
<b>Test Score - Mathematics</b>	Scholastic Aptitude Test <sup>3</sup> (max - 800)	720.5	(61.38)	633.3	(40.19)	677.2	(36.27)	750.4	(44.99)	711.9	(65.28)
<b>Scholarship Athlete</b>	0 = No 1 = Yes	0.03	(0.21)	0.01	(0.07)	0.02	(0.10)	0	(0)	0.03	(0.16)
<b>Engineering</b>	0 = Arts & Sciences College 1 - Engineering College	0.22	(0.48)	0	(0)	0.08	(0.19)	0.30	(0.43)	0.15	(0.34)
<b>Hours Studied - High School</b>	Average number of hours spent studying or doing homework per week in high school	13.22	(9.83)	14.99	(6.68)	13.78	(6.09)	15.86	(8.06)	15.90	(8.84)

**Table 3: Measures and Descriptive Statistics by Racio-Ethnic Status, Pre-College Survey, Class of 2005**

Variable	Metric/Notes	Mean (Standard Deviation) by Racio-Ethnic Group									
		White		Black		Hispanic		Asian		Other	
<b>Student Identity</b>	Importance of "being a good student" to overall identity (from 5 = Extremely Important to 1 = Not at all Important)	4.31	(0.93)	4.74	(0.40)	4.58	(0.56)	4.34	(0.82)	4.30	(0.84)
<b>Self- Rated Ability</b>	Sum of two questions: For (a) most recent challenging math/natural science class and (b) challenging literature class (from 5 = Very Much Above Average to 1 = Very Much Below Average)	8.25	(1.38)	7.93	(0.87)	8.27	(0.82)	8.29	(1.11)	8.09	(1.06)
<b>Relative at Duke</b>	Family member or relative attended Duke University 0 = No 1 = Yes	0.26	(0.51)	0.10	(0.23)	0.09	(0.20)	0.10	(0.28)	0.11	(0.30)
<b>Grade Point Average</b>	0.0 = F, 1.0 = D, 2.0 = C, 3.0 = B, 4.0 = A	3.27	(0.64)	2.8	(0.36)	3.12	(0.34)	3.32	(0.47)	3.24	(0.44)

Notes:

<sup>1</sup> The temporal referent for family background measures was senior year in high school unless noted otherwise.

<sup>2</sup> Factors were identified through analysis of covariance matrices under a promax solution. The mean loading was 0.73; the minimum loading was 0.43. The solution chosen was one that provided a clearly interpretable pattern separation with items loading on one and only one factor.

<sup>3</sup> Most students had SAT scores in their records. A small number of students had ACT scores, which we transformed to an SAT analog score by regression imputation.

**Table 4: Nested Regression Models of Racio-Ethnic Group and Sets of Control Variables on First-Semester Grade Point Average  
(Ordinary Least Squares)**

Independent Variable	Model											
	1		2		3		4		5		6	
	b	(s.e.)	b	(s.e.)	b	(s.e.)	b	(s.e.)	b	(s.e.)	b	(s.e.)
<b><u>RACIO-ETHNIC GROUP<sup>1</sup></u></b>												
Black	-.39**	(.07)	-.36**	(.08)	-.35**	(.08)	-.39**	(.08)	-.19*	(.08)	-.23**	(.08)
Hispanic	-.14	(.08)	-.12	(.08)	-.13	(.08)	-.15	(.08)	-.03	(.08)	-.07	(.08)
Asian	.04	(.06)	.04	(.06)	.01	(.06)	-.04	(.07)	-.09	(.06)	-.11	(.06)
Other	-.03	(.10)	-.04	(.10)	-.06	(.10)	-.06	(.10)	-.05	(.10)	-.06	(.10)
<b><u>DEMOGRAPHICS</u></b>												
Female			-.00	(.04)	-.01	(.04)	-.01	(.04)	.05	(.04)	.04	(.04)
Citizenship			a		a		a		a		a	
Father's Education			.02	(.02)	.03	(.02)	.03	(.02)	.01	(.02)	.02	(.02)
Mother's Education			.03	(.02)	.03	(.02)	.04	(.02)	.03	(.02)	.03	(.02)
Father's SEI			a		a		a		a		a	
Mother's SEI			a		a		a		a		a	
Mother Working			a		a		a		a		a	
Parents' Income			a		a		a		a		a	
Intact Family			-.05	(.06)	-.02	(.06)	-.05	(.06)	-.06	(.06)	-.04	(-.06)
Parent Divorce			a		a		a		a		a	
Number of Siblings			-.03	(.02)	-.03	(.02)	-.03	(.02)	-.03	(.02)	-.03	(.02)
Financial Aid Applicant			a		a		a		a		a	
Public High School			a		a		a		a		a	
<b><u>MIDDLE SCHOOL CAPITAL</u></b>												
High Culture					a		a		a		a	
Pop Culture					a		a		a		a	
Parent-School					a		a		a		a	
Parent-Homework					-.05**	(.01)	-.05**	(.01)	-.04**	(.01)	-.04**	(.01)
<b><u>HIGH SCHOOL CAPITAL</u></b>												
Parent-School							a		a		a	
High Culture							a		a		a	
Pop Culture							-.05**	(.02)	-.04*	(.02)	-.03*	(.01)
Parent-Homework							a		a		a	

**Table 4: Nested Regression Models of Racio-Ethnic Group and Sets of Control Variables on First-Semester Grade Point Average  
(Ordinary Least Squares)**

Independent Variable	Model					
	1	2	3	4	5	6
	b (s.e.)	b (s.e.)	b (s.e.)	b (s.e.)	b (s.e.)	b (s.e.)
<b>TEST SCORES</b>						
SAT-Verbal					.001** (.0003)	.001** (.0003)
SAT-Math					.002** (.0004)	.002** (.0004)
<b>OTHER CAPITAL MEASURES</b>						
Scholarship Athlete						a
Engineering						a
Hours Studied						a
Student Identity						.08* (.03)
Self-Rated Ability						a
Relative at Duke						-.14* (.05)
<b>REGRESSION SUMMARY</b>						
R-squared	.051	.063	.088	.102	.172	.197

Notes:

<sup>1</sup> Excluded category: white

\*\* indicates  $p \leq .01$ ; \* indicates  $p \leq .05$ .

<sup>a</sup> variable trimmed from model