Determinants of Grades, Persistence and Major Choice for Low-Income and Minority Students

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Abstract:

Currently, students from low-income backgrounds are underrepresented at selective colleges and universities in the U.S. With the introduction of many programs aimed at increasing the numbers of these students at selective institutions, it is important to understand how the characteristics of an institution can affect educational outcomes. Using restricted data from the *National Education Longitudinal Study of 1988* and the *National Longitudinal Survey of Freshmen*, this paper finds that students from low-income families at more selective institutions achieve lower grade point averages than other students and are less likely to graduate within 6 years from their original institution. This effect seems to be mainly due to the gap between SAT scores of these students and the median SAT scores at the institution they attend. This paper also explores how these effects differ by race. Peer group size, as defined by income or race status seems not to affect grades or persistence, but does play a role in college major choice. These results can help educators and administrators to better understand the post-secondary experience of low-income and minority students, specifically at the more selective colleges and universities.

I. Introduction

There has been a recent push by post-secondary institutions, policy-makers, and educational researchers, to address the issue of under-representation of high-ability low-income students at our nation's colleges and universities. This under-representation occurs most dramatically at the most elite of the four-year institutions. Many individual post-secondary institutions have announced programs in the past few years, mostly financial aid based, aimed at attracting and enrolling more students from low-income backgrounds. Research has shown that low-income students that graduate from a selective college or university enjoy a wage premium (Behrman, et al., 1996; Dale and Krueger, 2002). Increasing the number of these students that receive degrees from elite colleges and universities therefore will increase their own lifetime earnings, as well as possibly have benefits in terms of intergenerational income mobility.

Currently, the majority of these institutional programs are focused on increasing matriculation of low-income students to their institutions. Some preliminary research from Harvard suggests that the program there has been somewhat successful in its goals. (Avery et al., 2006) However, there has been less of a focus on how students from low-income backgrounds fare once they are at these colleges and universities. Once they have matriculated, do these students do equally well in terms of their educational outcomes, such as grade point average (GPA), or persistence? How do their own characteristics and those of the institution they attend affect their choices of college major?

Although there is a body of research examining measures of college success such as GPA and persistence, very little of this work has focused on how the importance of the

determinants of these outcomes may differ for students from low-income backgrounds. Similarly, little research has focused on what factors may differentially impact students from underrepresented minority groups.

Low-income and minority students face a number of hurdles at selective four-year institutions. Both income and race have been found to be correlated with test scores - minority and low-income students on average tend to have lower test scores and be less well-prepared educationally when they enter college. This may affect their success at elite colleges and universities, where median test scores are very high and the average student has been very well prepared for this level of study. In particular, students from these specific groups may be impacted more or less strongly than the average student by having test scores below the median at the college or university that they attend. Additionally, the environment at these institutions may be very unfamiliar for students from these groups. The student bodies at these colleges and universities have very low percentages of low-income and minority students. This may have social consequences for students from these groups that may have educational spillovers. If students feel out of place because there are not many other students from similar backgrounds with which to form friendships and study-groups, their coursework and other outcomes may suffer. It is also possible that these students may in fact do better in an unfamiliar environment as this may cause them to reach outside of their comfort zone and form bonds with students of different backgrounds, which may enhance their learning and educational outcomes.

Therefore, it is important to understand how characteristics of the institution students attend can affect their outcomes. This paper will attempt to shed light on the

post-secondary educational experiences of low-income and minority students, focusing on elite colleges and universities. To do this I use two datasets, the *National Longitudinal Survey of Freshmen (NLSF)* and the *National Education Longitudinal Study of 1988 (NELS:88)* to examine the determinants of college GPA, persistence and college major choice. Low-income students at more selective institutions have lower GPAs in their first year, and this seems to be mostly due to having SAT scores below the median scores at the institution they attend. Unfortunately, this effect does not seem to go away by senior year. Students that enter a college or university in the bottom half of the test score distribution suffer in terms of GPA in both their first year and through to their senior year. This finding seems to be particularly true for Black and Asian students. GPA does not appear to be affected by the percent of the student body that comes from one's own racial group or income group. However, the size of these peer groups can impact college major choice, but in different ways for students of different racial backgrounds.

This paper proceeds as follows. Section II discusses the literature in this area and discusses in more details the hypotheses this paper tests. Descriptive statistics are found in Section III, followed by Results in Section IV and then concluding remarks.

II. Background and Empirical Approach

College GPA is an important predictor of future success after graduation from a four-year institution. All else equal, students with higher GPAs upon graduation have been found to have higher incomes. Results of other studies suggest that a full one point increase in college GPA is associated with roughly an 8.9% increase in earnings (Jones &

Jackson, 1990). Although Wise, in a 1975 paper, finds a much smaller average effect of GPA on earnings, his results suggest that the effect is almost twice as large for students graduating from more selective institutions. Graduate and professional programs also take college GPA into account when admitting students, and therefore GPA can have important consequences for further education. It is important to understand what student and institutional characteristics and interactions between these two groups of characteristics can impact GPA.

Both test scores and high school GPA are significant predictors of college GPA. Students with higher test scores and grades have demonstrated higher ability prior to entering college, and therefore tend to perform better in college as well (Cohn et al., 2004). In addition to showing scholastic ability, these measures also indicate that students that are better prepared during their time in high school to do college level work earn higher grades in their college courses.

Characteristics of the institution a student attends can also have an impact on their future earnings. In particular, many studies have found that the selectivity of an institution, as measured by median SAT scores, is positively correlated with future earnings (see for example Brewer, Eide and Ehrenberg, 1999). A typical finding is that a one hundred point increase in median SAT scores of an institution is associated with a 3-7% increase in future earnings (Kane, 1998). Although Dale and Krueger (2002) don't find this connection for the average student, their results suggest that students from low-income families enjoy an 8% earnings increase for a 200 point increase in the median SAT scores of the institution they attend.

There has been relatively little work looking at how characteristics of the institution a student attends and how interactions between school characteristics and personal characteristics can impact the grades they receive. It is possible to measure how good of a fit a student has with their chosen institution along two main dimensions, academic and social. The research in this area has mostly focused on the first measure, with most studies examining how affirmative action affects the outcomes of students in minority groups. This body of research generally finds that minority students on average have test scores below that of the average at the institution they attend, but that this does not impact their probability of graduating. Minorities attending selective colleges and universities in fact seem to be more likely to graduate, suggesting that the hurdles they may face at these elite institutions do not ultimately affect persistence (Alon & Tienda, 2005). Fischer and Massey show that for Black and Hispanic students, having an SAT score below the institutional average actually leads to a slight increase in first-year GPA (2007). These studies provide evidence that academic institutional fit can play a role in determining educational outcomes, but it is still unclear how important this measure of fit is and how its effect may differ for students from different racial and income groups.

The evidence on the importance of social integration is less developed. One can imagine that students that feel more comfortable in their college surroundings may perform better academically as a result. This may be because the effort they put into their work is more productive if they are socially comfortable. Another possibility is that students that are better able to form social networks are then better able to form study-groups and gain knowledge through their peers, therefore increasing their educational output. A body of research focusing on the formation of social networks by

undergraduate students has found that both race and income can play an important role. Mayer and Puller (2008) use friendship formation on the website Facebook.com for students at ten Texas Universities to examine the importance of race in social interactions. They find that race is a significant determinant of a friendship formation, particularly for non-white students. Similarly, using the volume of emails between Dartmouth students as a measure of social interaction, Marmaros and Sacerdote (2006) find that within-race interactions are more likely to occur. Additionally, the authors find that aided students are more likely to interact with other aided students than with a non-aided student. This suggests that family income, in addition to race, can also play an important role in social group formation in college.

There is also evidence that the formation of peer and social groups can impact educational outcomes. Studies examining peer effects using the ability of randomly assigned roommates in college have found evidence that students have higher educational outcomes if they associate with higher ability students (Sacerdote, 2001; Zimmerman, 2003). Fletcher and Tienda (2008), with a sample of students at one large University in Texas, show that students with more peers at college that attended the same high school do slightly better in their first-year GPA and are slightly more likely to persist past the first two years. They also find evidence that for minority and disadvantaged students, increasing the number of students at the university from their high school and from their own peer group (either defined by race or income) has a positive impact on both grades and persistence. Additionally, the results of a study examining grades and satisfaction with college for students at a liberal arts college found that students felt a stronger sense of belonging and performed better academically if a larger percentage of the student body

came from their own social class (Ostrove and Long, 2007). The results of these studies provide suggestive evidence that it may be the case that minority students or those from low-income backgrounds may feel more comfortable and therefore have a better match with the institution they attend, if there are more students from their own group, as defined by income or race. This in turn may translate into higher grades and increased persistence.

In this paper I examine how measures of institutional fit, both academic and social, can affect educational outcomes of low-income and minority students. To do this, I estimate college GPA in the first year, cumulative GPA in the fourth year, and persistence to the degree, as functions of a set of measures of institutional fit. Academic fit is measured here by the difference between a student's own SAT score and the median SAT score of the four-year college or university that he or she attends. This measure is interacted with an indicator for low-income status, in order to test whether students from this group are more or less sensitive to an increase in the gap between their personal SAT scores and the median SAT scores of the institution they attend.

Size of peer group, with peers defined by race or income status, is used to measure one element of social institutional fit. These measures are used to test whether students' academic outcomes are impacted on by the percentage of the student body at their institution that comes from their own peer group. Students may adjust more easily to an atmosphere that feels less foreign to them, and then be able to perform better academically and be more likely to remain at their original institution. Of course, it may also be true that placing a student in a relatively unfamiliar environment where their peer group makes up a small percentage of the student body may cause students to form bonds

with other students they may not have otherwise, which may have a positive impact on grades and persistence. All models are also estimated separately by racial group to examine how the effects of institutional fit may differ for students of different races.

In addition to understanding how these measures of fit affect grades and persistence, I examine their impact on student's choice of major. Earnings and occupational choice are linked to a student's choice of major during college. There is a wide body of research examining college major choice. Studies have found that socioeconomic status can affect choice of major, and that this effect can differ by gender (Leppel, Williams and Waldauer, 2001). In particular, low-income students tend to be less likely to major in fields associated with risky income returns, such as Business (Saks and Shore, 2005). Other studies have also found that major choice can differ by race. Black students seem less likely to choose majors in Business or STEM fields like engineering and the physical sciences (Loury and Garman, 1995). Here, I examine how the measures of institutional fit described above can impact on major choice, with a focus on the measures of social fit. The socioeconomic and racial composition of the institution a student attends may influence the make-up of the social networks formed during college. This may in turn affect course-taking behavior, and ultimately choice of college major.

III. Data and Descriptive Statistics

In order to investigate these questions, I use two restricted-access longitudinal datasets, the *National Education Longitudinal Study of 1988* (NELS:88) and the *National Longitudinal Survey of Freshman* (NLSF). The first is a nationally representative dataset that surveyed approximately 24,000 students in eighth grade in 1988. These students

were administered follow-up surveys in the tenth and twelfth grade, as well as during their post-secondary experiences. Roughly 4,500 students in this sample ultimately attended a four-year college or university, and the study includes full college transcripts for these students. This paper uses data on high school characteristics, test scores and family background information from the second follow-up, administered while the students were in their senior year of high school. These background characteristics are linked to college GPA and persistence to a four-year degree, both of which are reported in the transcript studies.

The NLSF consists of a sample of about 4000 students that first enrolled at 28 selective colleges and universities in the fall of 1999. The sample and survey were modeled after the Andrew W. Mellon Foundation *College and Beyond* survey, with a few differences in the sample of institutions included. Minority students are over-sampled in this dataset, resulting in relatively equal numbers of students from each of four racial groups: White, Black, Hispanic and Asian. This allows for an in-depth analysis of how the effects of the explanatory variables differ between racial groups. Follow-up surveys were administered in the spring of each year for the first four years after matriculation. In each wave, students are asked to report what college courses they took in each semester of that year, and what grades they received in each class. This can then be used to calculate their GPAs for each semester, as well as their cumulative GPAs for all four years. The data also includes an indicator for whether students receive a degree within four or six years, and if this degree was earned at the original institution.

For both samples, data on institutional characteristics were compiled from three main sources. Information on expenditures per student, control of the institution (Public

or Private), and percentage of the student body from each racial group was obtained from the IPEDS database. Median SAT scores for each institution in the samples were obtained from the College Board's *Annual Survey of Colleges* data[1]. The percentage of students at each institution from low-income families is proxied by the percentage of the student body that receives Pell Grants. All institutional characteristics were collected for the year in which students started their post-secondary study (for NELS:88 this is the 1992-1993 academic year, for the NLSF, this is the 1999-2000 academic year).

Descriptive statistics for the student level variables from the NLSF and NELS:88 can be found in Tables 1 and 2 respectively, for the whole sample and broken down by income group. Here low-income is defined as all students reporting family incomes of less than \$35,000 in their senior year of high school[2]. It is immediately noticeable that the NLSF did sample all four main racial groups fairly equally. This is helpful in this study, allowing larger sample sizes for minority groups, as well as a larger sample of low-income students. Although average high school GPA is similar across the two income groups in both samples, SAT scores are markedly different. Students from low-income backgrounds on average have SAT scores about 90 points lower than their higher income counterparts. As a result, 70% of low-income students in the NLSF sample attend an institution at which their personal SAT score is below the median SAT score of the school, while only 50% of higher income students did so. In addition, of the students that have SAT scores below the median of their institution, low-income students have

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[1] What is referred to as a median SAT score in this paper is actually the midpoint of the 25th to 75th percentile range. Assuming SAT scores within this range at an institution are not clumped at one end or another, this measure is a good approximation of the median.
[2] In both datasets family income is only reported in ranges and although \$35,000 is a fairly low family income, it was picked as the cut-off for low-income status as the next higher family income category may include students not traditionally considered to be low-income.

average scores that are much lower than the median, on average about 50 points lower than higher income students. This is not surprising, given that income and SAT scores are highly correlated. These numbers suggest that if entering college with SAT scores well below the median at an institution leads to difficulty in learning and therefore lower educational outcomes, then low-income students are likely to be impacted more than other students.

Tables 1 and 2 also suggest that low-income students may be at a disadvantage in terms of outcomes during college. Low-income students have first year GPAs that are 0.2 points lower on average than higher income students. This gap narrows slightly by senior year in the NLSF sample, but remains positive, and does not narrow at all for the NELS:88 sample. We see a similar pattern with persistence as measured by the percentage of students graduating from their original college or university within 6 years of matriculation. In both samples, low-income students are less likely to have graduated within 6 years from their original institution. However, these gaps may be due to differences in other observables, such as test scores, that are correlated with income.

Descriptive statistics for choice of college major by senior year for the students in the NLSF sample are also shown in Table 1. Students are about twice as likely to major in a STEM field or a Social Science, than Humanities or Economics/Business. However, some of these differences in means may be due to the programs available to major in at each of the institutions included in this sample. There are not any immediately obvious differences in major choice for the two income groups, although low-income students seem slightly less likely to have majors in the Humanities or Business/Economics. This may be due to the typically low returns to Humanities majors, and high variability in

returns to Business/Economics majors, a behavior that has been documented in the literature.

Table 3 contains descriptive statistics for the samples of four year institutions corresponding to the two student samples. Panel A shows the sample of 28 four year schools in the NLSF, 82% of which are private. This sample of institutions is fairly selective. Average total expenditures per student are $98,000 on average, and the average median SAT score for the sample is 1326. As discussed earlier, the percentage of the student body from low-income families, proxied here by percent receiving Pell Grants, is fairly low at 15%. However, there is a fair amount of variation between institutions in the NLSF sample as this percentage ranges from 8% to 44%. These colleges and universities also have fairly low percentages of students from minority groups with these percentages ranging from less than 1% to over 87%.

Similar statistics for the sample of schools attended by students in the NELS:88 data are displayed in Panel B. These institutions are far less selective, and less likely to be private. The average total expenditures per students is only $18,000[3] and the average re-centered median SAT score is 1098, about 200 points lower than for the institutions in the NLSF sample. These institutions also have a much larger average percentage of Pell Grant recipients, 29%. Due to these differences between samples, results of estimations using this sample of schools may be very different, but perhaps more representative of four-year colleges and universities in general than those resulting from the NLSF estimations.

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[3] Dollar amounts were not adjusted for inflation so the difference in expenditures per student is not quite as dramatic as it appears here.

IV. Results

A. Determinants of GPA

Results for Tobit estimations of college GPA in the first year and cumulative for the first four years, using the NLSF dataset are shown in Table 4. Tobit equations were estimated in order to take into account a small amount of clustering (roughly 10% of the sample) at a GPA of 4.0. Results are quantitatively very similar to those using OLS, but there is a slight gain in efficiency. All four columns include controls for personal characteristics, such as gender, race, parent's education level, high school GPA and whether they attended a Public or Private high school, and main course of study in college, as well as institution characteristics, such as expenditure per student, control (Public or Private) and average GPA[4].

Column (1) shows the results for the estimation of GPA in the first year. After controlling for many background characteristics, low-income students do not seem to do poorer GPA wise in their first year. Students with reported family incomes of $75,000 or higher do slightly better in their first year. However, this effect does not seem to last through senior year, as it is no longer significant in Column (3). Students attending colleges or universities in the sample with Median SATs greater than 1350 (approximately 40% of the sample) have slightly lower GPAs, in both the first year and after four years. These institutions are some of the most selective in the U.S. and this probably reflects either the increased difficulty of classes at these schools or harder grading standards vis-à-vis the other schools in the sample. Notably, in column (1) the coefficient on the interaction term of low-income and the measure of institutional

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[4] Average institutional GPA was calculated using students in the NLSF sample. Assuming this was a relatively random sample, this measure should capture the institutional averages fairly well.

selectivity shows that students from low-income backgrounds have lower GPAs on average at the more selective institutions in the sample. This effect shrinks to half the size and is no longer significant for cumulative GPA, but retains the same sign. This result suggests that although low-income status does not have a direct effect on GPA, these students have slightly lower GPAs at more selective institutions.

Having found that low-income students have lower GPAs at the more selective institutions in the sample, it is possible to examine whether either or both of the two measures of institutional fit discussed earlier can explain some or all of this effect. Columns (2) and (4) include these measures and the results suggest that it is the measure of academic institutional fit that is able to explain the original finding. The effect of a gap between personal SAT scores and institution median SAT scores is allowed to differ for students with scores below (score gap below) and above (score gap above) the median. For students with SAT scores below the institutional median, the larger the gap in the scores, the lower the average GPA, both in the first year, and overall. A student with a personal SAT score 100 points below the institutional median would on average have a GPA that was 0.05 points lower. This effect is stronger for low-income students, by about 0.03 GPA points, although the coefficient is not significant for first-year GPA. As a result, low-income students that enter college with SAT scores 100 points below the institutional average will on average have GPAs that are lower by 0.08 points. Remember, 70% of all low-income students do have SAT scores below the median, and the average gap is well over 100 points. Therefore, this is a significant group of students that is affected. However, given results of past studies relating changes in GPA to earnings, this effect is fairly small in terms of future earnings. A 0.08 point decrease in

GPA would be associated with less than a 1% decrease in earnings, a small effect in terms of policy considerations.

Once controlling for these measures of academic fit, low-income students no longer have lower GPAs at selective institutions[5]. In addition, the percentage of low-income students in the student body does not have an impact on the GPAs of low-income students. The grades of low-income students do not seem to be impacted by the size of their peer group as defined by income. It may be that this measure of peer group size is not precise enough, in that it doesn't directly measure the size of the peer group an incoming student may come in contact with most often, the number of low-income students in their own class. In particular, in some of the larger universities, students may only come in contact with peers within their own school or field, and the peer group size there may not be proportionate to that in the entire student body. Therefore, although there is not a significant result here, it is possible that the available measure is just not fine enough to capture it.

Results of similar estimations for the NELS:88 data are reported in Table 5. Tobit models of first-year and cumulative GPA were estimated for three samples of institutions. The first is the entire sample of four-year colleges or universities attended by students in the NELS:88 data. This sample is then split into a more selective group of institutions with median SATs of 1100 or greater, intended to mimic the NLSF sample of institutions as much as is possible with this data. The second sample looks at the students attending the less selective institutions in the sample, with median SATs less than 1100. As seen with the NLSF data, there is no direct effect of income on college GPA. The farther

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[5] In columns (1) and (3) of Table 4, institutional selectivity is measured by a dichotomous variable indicating whether the median SAT scores at an institution are equal to or exceed 1350. In columns (2) and (4) selectivity is instead measured by the continuous variable of institutional median SAT scores.

below the median of the institution a student's personal SAT score falls, the lower their GPA in both their first year and cumulatively. On average, a student with a SAT score below of 100 points below the median has a first year GPA that is 0.15 points lower. This gap shrinks slightly to 0.1 GPA points by their final year, but remains significant. Students in the less selective sample with SAT scores below the median also earn lower GPAs on average, but the effect is slightly less than in the sample of students attending selective schools. However, opposite to what was found with the NLSF data, for low-income students with below score gaps, as this gap increases they actually have *higher* GPAs in both their first and final years. On average, in the selective sample, low-income students with SAT scores 100 points below the median will have first-year GPAs that are only 0.05 points lower, and cumulative GPAs that are 0.04 points lower on average. The complete effect for low-income students in the selective NELS:88 sample is then similar to that found in the NLSF sample. Although not at the same level of significant, there is the same pattern of results in the less-selective NELS:88 sample as in the more selective samples. This suggests that effects found here may be heightened at more selective schools, but these results may also have some implications for students at four-year institutions in general. Again, although the effect on GPA is significant, in terms of policy significance, the effects are very small. Similar to the findings with the NLSF sample, the percentage of students at an institution with Pell Grants has no impact on GPAs.

In order to examine how some of these findings may differ by race, Table 6 shows Tobit estimates of GPA in the first year and fourth year for each of the four main racial groups for the NLSF sample. There are some differences between the races that are

immediately apparent. Although students from all four racial groups have lower GPAs the farther their SAT score is below the institutional median, the coefficients are only significant for Hispanic and White students, and they are much larger for these two groups. For Hispanic students, a 100 point gap between their score and the median of their institution is associated with a 0.08 points lower GPA (0.07 for cumulative GPA). The results are similar for White students, but slightly smaller. For Black and Asian students the effects are very small (less than 0.03 GPA points), and not significant. However, for White and Hispanic students, although slightly lower, the effect does seem to persist and impact cumulative GPA. Interestingly, it is the Black and Asian low-income students that are affected by having SATs below the institutional median. For Black students this effect is roughly the same size as we found for the sample as a whole. For Asian students, the effect is twice as large; a low-income student with a SAT score 100 points below the institutional median would have a GPA 0.1 points lower on average in both the first year and through to the fourth year. For Black and Asian low-income students, there is also a negative effect for having SAT scores above the institutional median. It is unclear why this might be. It is a fairly small and select group of students which may be generating this result.

In addition to including the percentage of low-income students in the student body, these estimations include the percent own race in the student body, to examine how the size of peer groups as defined along racial lines can affect these educational outcomes. Percent own race is only significant for Asian students, and the effect is negative. If the percent of the student body that is Asian increases by 10%, Asian students would have on average 0.03 point lower first-year and cumulative GPAs, a fairly

small effect. For the other three racial groups, there is no effect of changing percent own race. As we saw in the whole sample, there is also no effect for low-income students of any race of the size of the low-income peer group at their institution.

B. Persistence

Results of logit estimations for the probability of graduating within six years from the original institution attended in freshman year are reported in Tables 7 and 8 for the NLSF and NELS:88 samples respectively. For the NLSF, estimates are provided for the whole sample, as well as for each of the main racial groups. As was seen with GPA, there is no direct effect of income on persistence. As the selectivity of an institution increases, students are more likely to graduate within six years. An increase in the median SAT score of the institutions by 100 points leads to about a 1.7 percentage point increase in the probability of graduating within 6 years[6]. However, this effect is not significant for the Black and Hispanic sub-samples. As the gap between a student's SAT score and that of the median score of the institution they attend widens, students are not any less likely to graduate within six years. Black students in this position are in fact more likely to graduate within six years by about 0.2 percentage points for a 100 point SAT score gap, a finding that is consistent with the literature looking at the effects of affirmative action on persistence. As with the GPA models, percent own race in the student body has no effect on persistence for all but the White sub-sample. As the percentage of White students increases, White students are more likely to complete their degree within 6 years. It may be that this measure, rather than focusing on diversity and own race effects, is picking up an institutional effect. Most selective institutions have

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[6] Average marginal effects for the persistence logit estimations can be found in Tables A1 and A2 in the Appendix.

very low percentages of minority students, and therefore very high percentages of White students. Therefore, this effect may be due to a correlation with a measure of institutional quality or type. The results for the NELS:88 sample are fairly similar. As with GPA, estimations were performed on the entire sample as well as on both selective and non-selective sub-samples. In the selective sub-sample, students that have personal SAT scores 100 points below the median of the institution they attend are less likely to graduate within 6 years from that institution by about 3 percentage points. Another notable difference is that for the selective sample of institutions in the NELS:88, the interaction term between low-income status and percent Pell Grant in the student body is now significant. If the percentage of Pell Grant students at an institution increased by 10%, entering low-income students would be less likely to graduate from that original institution within 6 years by 0.2 percentage points. It may be that these students are transferring, or are unable to afford to complete their degree. In both samples, as with GPA, it seems that academic institutional fit plays a significant role in affecting persistence.

C. College Major Choice

Results of multinomial logit estimations of the probability of majoring in one of four fields - STEM, Humanities, Social Sciences or Economics/Business – broken down by race are displayed in Table 9 and average marginal effects can be found in Appendix Table A3. All coefficients are in comparison to choosing a major in any field not included in the four main fields, henceforth the residual major category. Coming from a low-income background can affect a student's choice of major, but this effect is only significant for Black and Hispanic students. Low-income Black students are significantly

more likely to major in a STEM field, and low-income Hispanic students are much less likely to choose Economics/Business as a major, in comparison to choosing a major that is not Econ/Business, STEM, Humanities or Social Science based. This result for income is similar to that found in the literature, that low-income students are more likely to choose lucrative careers like Engineering, and less likely to choose risky careers, such as Business. Entering college with a SAT score below that of the median affects major choice for all racial groups except Asian, but in different ways. Black students with scores below the median are less likely to choose a STEM major by about 1.7 percentage points for a 100 point gap in scores below the median, and Hispanics are less likely to choose either a STEM or Humanities major by about 3.5 percentage points for a 100 point gap in scores. However, for low-income Hispanic students with SAT scores 100 points below the Median, the total effect is actually positive, with these students roughly 2.5 percentage points *more* likely to choose a Humanities major. White students with SAT scores below the median are less likely to major in Business/Economics versus the residual category of majors as the gap in scores below increases.

Although this paper did not find that peer group size, defined by income or race, affects grades or persistence, it does seem to have an impact on college major choice. For White and Asian students from low-income backgrounds, an increase in the percentage of students with Pell Grants is associated with an increase in the probability of majoring in a Social Science over a residual major field. An increase in percent Pell Grant by 10 percent is associated with a 10 percentage point increase in the probability of choosing a Social Science major for White students, and a 5.6 percentage point increase for Hispanic students. For low-income Hispanic students, an increase in the size of this

peer group increases the probability of majoring in Economics/Business versus a residual major. Although low-income Hispanic students are less likely to pick Economics/Business as a major overall, this effect is lessened at colleges and universities where there are more low-income students, but not by very much. It may be that at institutions of this type, these low-income students are able to form larger social networks and feel more comfortable, leading some to branch out in course taking behavior and take more chances with major choice.

Major choice is also affected by the size of the racial peer group at an institution, but again, this measure affects each racial group slightly differently. Black students are less likely to choose a STEM, or Social Science major over a residual major field as the percentage of Black students increases. For Asian students, an increase in the percentage of Asian students at an institution leads to a decrease in the probability of majoring in a STEM field or the Humanities versus choosing a residual major field, but an increase in the probability of majoring in a Social Science. Similarly, Hispanic students are more likely to major in the Humanities or Social Sciences rather than a residual major field as percent Hispanic increases, but less likely to choose a STEM major. Therefore, it seems clear that the percentage of the student body that comes from one's own racial group has an important impact on course-taking behavior and college major choice, but that this effect differs between the main racial groups.

V. Conclusion

There has been a recent push to increase access for low-income students to the more selective colleges and universities in the U.S. However, very little is actually

known about the factors which affect the educational outcomes of these students while in college. A large fraction of low-income students begin their post-secondary experience at institutions with median SAT scores well above their own personal scores. In addition, the socioeconomic composition of most selective institutions is such that low-income students are faced with very small peer groups as defined by income at their college of choice. These two factors could potentially have significant impacts on educational outcomes such as GPA and persistence, as well as course-taking behavior and major choice.

This paper uses restricted-access data from both the NELS:88 and NLSF to examine how educational outcomes of low-income and minority students are impacted by institutional and personal characteristics, and interactions between the two. In particular, it examines how grades and persistence are affected by two different measures of institutional fit, academic and social. Models of first-year and cumulative GPA, and persistence are estimated to test how students with gaps between their own SAT scores the median scores of the institution they attend are affected, and if low-income or minority students are affected any more or less strongly by a gap in scores. Social fit is measured by peer group size, either the percentage of Pell Grant students at an institution for low-income students, or the percentage of students from your own racial group for minority students. Finally, I estimate a multinomial logit model of the probability of majoring in a STEM, Humanities, Social Science, or Economics/Business field in one's senior year of college, using the NLSF sample.

Results suggest that a large gap between a student's personal SAT score and the median of the institution they attend can have a significant negative impact on their first-

year and cumulative GPA. Black students in this position are more likely to graduate from their original institution within six years, a finding that supports results from the literature on affirmative action that persistence of Black students is not hurt by a large gap in SAT scores. The impact on GPA of having a gap in SAT scores below the median is greater for low-income students, a significant finding given that low-income students are much more likely to be in this position, and have much larger gaps between their own scores and the institutional median. However, although statistically significant, the effects found here are very small and not significant in a policy sense. Citing results of other studies, low-income students attending a selective institution with median SAT scores 100 points higher will on average have earnings that are 4% higher. This increase in median SAT scores, relative to their own personal scores is associated with a decrease in college GPA, leading to earnings that are less than 1% lower. Therefore, the direct positive effect on earnings of attending a selective institution outweighs the indirect negative effect operating through lower college GPAs for these students. However, the magnitude of the effects found here are very similar to those found in the peer effects literature suggesting that these results are worth noting.

Peer group size, either for income or racial group, does not seem to have an impact on GPA or persistence. However, it should be noted that these measures are very broad, and only measure percentages in the entire student body. At large schools, this may not very accurately measure the percentage within the student population that these students come into contact with on a daily basis. Therefore, it is possible that although no effects were found here, there are actually significant affects of peer group size on grades and persistence. There is a significant impact of peer group size on choice of

college major. Results from the NLSF show that as the percentage of Pell Grant recipients increases, Hispanic students are more likely to major in Business/Economics, mitigating the negative direct effect of coming from a low-income background on the choice of this major field. Percentage of the student body that comes from one's own racial group can also affect major choice for all three non-white racial groups, although the distributional effects across major fields are different across racial groups. As peer group size changes, students may form social networks with very different compositions, and therefore be influenced to take different types of courses, leading to different major choices.

Educators and college administrators interested in increasing the representation of low-income students at selective colleges and universities can gain a better understanding of the determinants of educational outcomes of these students from this paper. Although there is a wage premium for low-income students associated with graduating from a selective institution, a large percentage of these students may suffer in terms of GPA during their post-secondary experience due to low test scores upon matriculation. These low test scores likely represent less preparation for the level of study required at more selective institutions. As GPA is linked with future wages, this is an important result to consider, and perhaps additional educational programs are needed to help compensate for the lower average level of preparation of low-income students. Finally, as the socioeconomic and racial composition of colleges and universities change, it is important to consider how this will impact major choice, as this helps determine the supply of new workers in the major fields. Results from this paper suggest that these changes in

composition can have important implications for major choice, and that these effects can

differ for students of different races.

VI. References

Alon, Sigal and Marta Tienda. (2005). "Assessing the Mismatch Hypothesis: Differentials in College Graduation Rates by Institutional Selectivity." *Sociology of Education*, 78(4), 294-315.

Avery, Christopher, Caroline Hoxby, Clement Jackson, Kaitlin Burek, Glenn Poppe, and Mridula Raman. 2006. "Cost Should Be No Barrier: An Evaluation of the First Year of Harvard's Financial Aid Initiative." *N.B.E.R. Working Paper No. 12029*.

Behrman, Jere, Jill Constantine, Lori Kletzer, Michael McPherson, and Morton Schapiro (1996). "The Impact of College Quality on Wages: Are There Differences Among Demographic Groups?" Williams Project on the Economics of Higher Education, Discussion Paper No. 38.

Brewer, Dominic, Eric Eide, and Ronald Ehrenberg. (1996). "Does it Pay to Attend an Elite College? Cross Cohort Evidence on the Effects of College Type on Earnings," *Journal of Human Resources*, 34, 104-123.

Cohn, Elchanan, Sharon Cohn, Donald C. Balch, and James Bradley Jr. (2004). "Determinants of undergraduate GPAs: SAT scores, high-school GPA and high-school rank." *Economics of Education Review*, 23, 577-586.

College Board (various years). *Annual Survey of the Colleges of the College Board* and *Data Base,* 1990-1991 and 1999-2000.

Dale, Stacey Berg, and Alan B. Krueger (2002). "Estimating the Payoff to Attending a More Selective College: An Application of Selection on Observables and Unobservables." *The Quarterly Journal of Economics*, 117(4), 1491-1527.

Fischer, Mary J. and Douglas S. Massey. (2007). "The effects of Affirmative Action in Higher Education." *Social Science Research*, 36, 531-549.

Fletcher, Jason M. and Marta Tienda. (2008) "High School Peer Networks and College Success: Lessons from Texas." Unpublished working paper.

Jones, Ethel B., and John D. Jackson (1990). "College Grades and Labor Market Rewards." *Journal of Human Resources*, 25(2), 253-266.

Kane, Thomas. (1998). "Racial and Ethnic Preferences in College Admission," in C. Jencks and M. Phillips, eds., *The Black-White Test Score Gap*. (Washington, DC: The Brookings Institution).

Leppel, Karen, Mary L. Williams, and Charles Waldauer. (2001). "The Impact of Parental Occupation and Socioeconomic Status on Choice of College Major." *Journal of Family and Economic Issues*, 22(4), 373-94.

Loury, Linda Datcher, and David Garman (1995). "College Selectivity and Earnings," *Journal of Labor Economics,* 13(2), 289-308.

Marmaros, David, and Bruce Sacerdote. (2006). "How do Friendships Form?" *Quarterly Journal of Economics*, 121, 79-119.

Mayer, Adalbert, and Steven L. Puller. (2008). "The Old Boy (and Girl) Network: Social Network Formation on University Campuses." *Journal of Public Economics*, 92, 329-347.

Ostrove, Joan M., and Susan M. Long. (2007). "Social Class and Belonging: Implications for College Adjustment." *The Review of Higher Education*, 30(4), 363-389.

Sacerdote, Bruce. (2001). "Peer Effects with Random Assignment: Results for Dartmouth roommates." *Quarterly Journal of Economics*, 116, 681-704.

Saks, Raven E., and Stephen H. Shore. (2005). "Risk and Career Choice." *The B.E. Journal of Economic Analysis & Policy*, 5(1), Article 7.

Wise, David A. (1975). "Academic Achievement and Job Performance." *American Economic Review*, 65 350-66.

Zimmerman, David J. (2003). "Peer Effects in Academic Outcomes: Evidence from a Natural Experiment." *Review of Economics & Statistics*, 85, 9-23.

Table 1: Descriptive Statistics for Student Variables (NLSF)

Variable	Whole Sample	Income≥35K	Income <35K
Female	0.581	0.574	0.617
Black	0.268	0.240	0.403
Asian	0.244	0.255	0.190
Hispanic	0.233	0.217	0.314
HS GPA	3.701	3.714	3.639
	(0.331)	(0.322)	(0.368)
HS private	0.289	0.301	0.229
SAT	1303.879	1318.353	1228.326
	(161.190)	(155.944)	(167.084)
SAT<MedianSAT	0.532	0.498	0.708
Difference in SATs	127	117	164
if below Median	(110)	(107)	(113)
Parent: BA	0.240	0.235	0.264
Parent: Grad degree	0.537	0.607	0.193
Income < $35,000	0.176		
Income < $50,000	0.297		
GPA First-Year	3.177	3.208	3.025
	(0.509)	(0.490)	(0.567)
Cumulative GPA	3.248	3.276	3.113
	(0.438)	(0.422)	(0.485)
Grad Orig. Inst. 6 yrs	0.831	0.843	0.771
Major Humanities	0.067	0.069	0.059
	(0.250)	(0.253)	(0.235)
Major Soc. Sci.	0.145	0.140	0.166
	(0.352)	(0.347)	(0.372)
Major Bus./Econ.	0.091	0.094	0.080
	(0.288)	(0.291)	(0.271)
Major STEM	0.180	0.181	0.176
	(0.385)	(0.385)	(0.382
N	3924	3261	663

Table 2 : Descriptive Statistics for NELS:88

Variable	Whole Sample	Income≥35K	Income<35K
Female	0.553	0.525	0.606
Black	0.079	0.056	0.146
Asian	0.103	0.101	0.108
Hispanic	0.077	0.061	0.127
HS GPA	3.155	3.172	3.109
	(0.565)	(0.562)	(0.571)
HS Private	0.229	0.265	0.125
Pct. Free Lunch G12	15.535	13.128	22.556
	(18.785)	(16.983)	(21.796)
SAT	1078	1100	1013
	(179)	(175)	(174)
SAT < Median	0.49	0.40	0.41
Difference in SATs			
if below Median	(89)	(86)	(94)
Par: Some College	0.338	0.287	0.476
Par: BA	0.237	0.264	0.162
Par: MA	0.170	0.212	0.056
Par: PhD/Prof. Deg.	0.114	0.150	0.016
Income < $35,000	0.262		
GPA First-Year	2.693	2.734	2.574
	(0.744)	(0.720)	(0.799)
Cumulative GPA	2.822	2.871	2.679
	(0.683)	(0.647)	(0.760)
Grad. Orig. Inst. 6 yrs	0.572	0.596	0.502
N	4140	3090	1060

Table 3: Descriptive Statistics for Institutions attended by students in the NLSF & NELS:88 Samples

Panel A: NLSF Institutions

	Mean	Std. Dev.
Private	0.82	0.39
Exp/student	9.81	7.57
Median SAT	1326	92
Inst.GPA1	3.19	0.13
Inst. GPA	3.27	0.12
Pct. Pell	15.20	8.26
Pct. Black	9.23	15.36
Pct. Hispanic	4.84	2.60
Pct. Asian	11.55	8.01
N	28	

Panel B: NELS:88 Institutions

	Mean	Std. Dev.
Private	0.54	0.50
Exp/Student	18.43	23.64
Median SAT	1098	110
Pct. Pell	28.81	14.70
Pct. Black	10.12	19.32
Pct. Hispanic	3.98	8.07
Pct. Asian	3.52	5.76
N	1040	

Table 4:Determinants of First-year and Cumulative GPA (NLSF)

	(1) GPA1	(2) GPA1	(3) GPA	(4) GPA
Income< $35,000	0.039	0.516	0.016	0.164
	(0.03)	(0.435)	(0.026)	(0.321)
Income ≥ $75,000	0.066	0.142	0.04	0.09
	(0.029)**	(0.333)	(0.024)	(0.174)
Selectivity	-0.077	-0.051	-0.068	-0.02
	(0.036)**	(0.027)*	(0.029)**	(0.013)
Low Inc. X Selectivity	-0.086	-0.035	-0.043	-0.011
	(0.041)**	(0.03)	(0.033)	(0.022)
High Inc. X Selectivity	-0.045	-0.008	-0.022	-0.005
	(0.035)	(0.024)	(0.028)	(0.013)
Dist. Sat Below Median		-0.046		-0.044
		(0.016)***		(0.012)***
Low Inc. x Dist. Below Median		-0.029		-0.027
		(0.021)		(0.013)**
Dist. SAT above Median		0.121		0.09
		(0.015)***		(0.013)***
Low Inc. X Dist. Above Median		-0.103		-0.025
		(0.065)		(0.029)
Pct Pell Grant		0.002		0.002
		(0.001)		(0.001)***
Low Inc. x PctPell		0		0
		(0.002)		(0.002)
Observations	3745	3745	3813	3810

Notes: Robust standard errors in parentheses. * significant at 10%;
 significant at 5%; * significant at 1%. Includes controls for gender, race,
  high school GPA and type, parent's education, exp/student average institutional GPA,
  institution type and student's major course of study. Columns (1) and (3) also control
  for student's own SAT score. In columns (1) and (3) selectivity refers to MedianSATs >
   1350, in columns (2) and (4) selectivity is a continuous measure of MedianSATs.

Table 5: Determinants of first-year and cumulative GPA (NELS:88)

	All		SAT>1100		SAT<1100	
	GPA1	**GPA**	**GPA1**	**GPA**	**GPA1**	**GPA**
Income<$35,000	-0.104	0.013	-0.305	0.751	-0.169	-0.025
	(0.101)	(0.077)	(0.648)	(0.476)	(0.11)	(0.083)
Median SAT	0.003	-0.003	0.078	0.045	-0.005	-0.006
	(0.004)	(0.003)	(0.029)***	(0.021)**	(0.005)	(0.004)
Low Inc. X Median SAT	0.002	0.001	0.025	-0.058	0.01	0.007
	(0.007)	(0.0050	(0.052)	(0.037)	(0.009)	(0.006)
Dist. Sat Below Median	-0.128	-0.104	-0.145	-0.104	-0.073	-0.088
	(0.018)***	(0.014)***	(0.022)***	(0.017)***	(0.029)**	(0.024)***
Low Inc. x Dist. Below Median	0.043	0.063	0.098	0.061	-0.04	0.069
	(0.029)	(0.023)***	(0.035)***	(0.028)**	(0.051)	(0.041)*
Dist. SAT above Median	0.134	0.111	0.133	0.116	0.163	0.113
	(0.022)***	(0.014)***	(0.032)***	(0.021)***	(0.032)***	(0.020)***
Low Inc. X Dist. Above Median	0.044	-0.014	0.109	0.008	-0.009	-0.04
	(0.045)	(0.035)	(0.059)*	(0.048)	(0.064)	(0.0520
Pct. Pell Grant	0	0.001	0.003	0.001	0	0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Low Inc. X Pct. Pell	0.002	0	-0.003	-0.002	0.003	0
	(0.0020	(0.002)	(0.004)	(0.003)	(0.002)	(0.002)
Constant	0.749	1.796	-0.174	1.217	0.79	1.847
	(0.141)***	(0.094)***	(0.353)	(0.256)***	(0.181)***	(0.121)***
Observations	3970	2410	2020	1460	1950	960

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. All columns include controls
  for gender, race, high school type and GPA, SAT, % free lunch, parent's education, institution type
  exp/student and Pct. residential. Robust standard errors in parentheses

Table 6: Determinants of First-Year and Cumulative GPA by race (NLSF)

	Black (1)	Black (4)	Hisp. (1)	Hisp. (4)	Asian (1)	Asian (4)	White (1)	White (4)
Median Sat	-0.036	0.006	-0.107	-0.024	-0.015	0.028	-0.045	-0.041
	(0.047)	(0.02)	(0.054)**	(0.034)	(0.036)	(0.04)	(0.055)	(0.035)
Low Inc. X MedianSAT	-0.036	-0.001	-0.001	-0.064	-0.083	-0.062	-0.032	-0.019
	(0.055)	(0.033)	(0.06)	(0.055)	(0.064)	(0.052)	(0.088)	(0.069)
High Inc. X MedianSAT	-0.035	-0.012	0.008	-0.023	0.001	-0.025	0.02	0.034
	(0.03)	(0.021)	(0.033)	-(0.024)	(0.029)	(0.033)	(0.045)	(0.033)
Dist. Sat Below Median	-0.026	-0.026	-0.083	-0.073	-0.017	-0.031	-0.076	-0.055
	(0.021)	(0.017)	(0.022)***	(0.022)***	(0.031)	(0.023)	(0.026)***	(0.023)**
Low Inc. x Dist. Below Median	-0.047	-0.041	0.033	0.048	-0.109	-0.114	0.081	-0.013
	(0.028)*	(0.019)**	(0.027)	(0.027)*	(0.056)*	(0.044)***	(0.037)**	(0.056)
Dist. SAT above Median	0.166	0.176	0.153	0.11	0.107	0.078	0.111	0.064
	(0.049)***	(0.048)***	(0.028)***	(0.023)***	(0.019)***	(0.011)***	(0.026)***	(0.022)***
Low Inc. X Dist. Above Median	-0.108	-0.129	0.078	0.092	-0.27	-0.114	0.05	-0.048
	(0.060)*	(0.076)*	(0.079)	(0.072)	(0.107)**	(0.048)**	(0.101)	(0.098)
Pct Pell Grant	0.005	0.007	-0.001	0	0.002	0.002	0	-0.002
	(0.002)**	(0.001)***	(0.002)	(0.001)	(0.001)**	(0.001)**	(0.002)	(0.001)**
Low Inc. X Pct. Pell	0.001	0	0	-0.004	-0.005	-0.002	0.004	0
	(0.004)	(0.002)	(0.004)	(0.004)	(0.004)	(0.003)	(0.01)	(0.009)
Pct. Own Race	0	0.001	0.012	0.006	-0.003	-0.003	-0.001	0
	(0.001)	(0)	(0.009)	(0.007)	(0.001)***	(0.001)***	(0.001)	(0.001)
Observations	1007	1025	875	891	915	934	948	963

Notes: Robust standard errors in parentheses. * significant at 10%;
 significant at 5%; * significant at 1%. Includes controls for gender, race,
   high school GPA and type, parent's education, exp/student, institution type and student's major course of study.

Table 7: Logit Estimates of Probability of Graduating from Original Institution Within 6 Years (NLSF)

	Whole Sample	Black	Hispanic	Asian	White
Income < $35,000	1.122	-3.56	-0.699	4.288	8.776
	(2.392)	(2.877)	(2.856)	(5.299)	(7.739)
Median SAT	0.311	0.207	0.265	0.65	0.786 (0.187)**
	(0.098)***	(0.213)	(0.281)	(0.261)**	*
Low Inc. X Med. SAT	-0.07	0.288	0.008	-0.243	-0.656
	(0.169)	(0.198)	(0.199)	(0.361)	(0.565)
Dist. Sat Below Median	0.037	0.206 (0.102)*	-0.03	-0.019	0.071
	(0.058)	*	(0.099)	(0.215)	(0.211)
Low Inc. x Dist. Below Median	-0.116	-0.261	0.073	-0.263	
	(0.102)	(0.135)*	(0.203)	(0.299)	
Dist. SAT above Median	0.01	0.598 (0.275)*	0.501	-0.207	-0.281
	(0.071)	*	(0.292)*	(0.177)	(0.117)**
Low Inc. X Dist. Above Median	-0.188	1.068	0.073	-0.341	-0.33
	(0.2)	(0.638)*	(0.66)	(0.298)	(0.65)
Pct. Pell Grant	0.003	-0.008	0.002	0.016	0.007
	(0.01)	(0.015)	(0.012)	(0.010)*	(0.009)
Low Inc. X Pct. Pell	-0.014	0.008	0.008	-0.055	-0.042
	(0.021)	(0.026)	(0.026)	(0.022)**	(0.042)
Pct. Own Race		0.002	-0.067	0	0.016
		(0.004)	(0.046)	(0.008)	(0.006)**
Constant	-5.148	-5.281 (2.531)*	-3.612	-8.328 (2.754)**	-13.466 (2.833)**
	(1.224)***	*	(3.105)	*	*
Observations	3910	1051	914	950	984

Notes: Robust standard errors in parentheses. * significant at 10%;
 significant at 5%; * significant at 1%. Includes controls for gender, race,
  high school GPA and type, parent's education, exp/student, and institution type.

Table 8: Logit Estimates of Probability of Graduating from Original Institution Within 6 Years (NELS:88)

	All	SAT>1100	SAT<1100
Income < $35,000	-0.043	3.534	-0.247
	(0.291)	(2.67)	(0.322)
Median SAT	0.282	0.482	0.1
	(0.058)***	(0.127)***	(0.118)
Low Inc. X Med. SAT	0	-0.267	-0.006
	(0.022)	(0.218)	(-0.027)
Dist. Sat Below Median	-0.155	-0.171	-0.078
	(0.062)**	(0.083)**	(0.103)
Low Inc. x Dist. Below Median	-0.02	0.075	-0.124
	(0.101)	(0.129)	(0.163)
Dist. SAT above Median	-0.04	-0.12	0.038
	(0.082)	(0.125)	(0.107)
Low Inc. X Dist. Above Median	0.265	0.587	0.124
	(0.156)*	(0.277)**	(0.193)
Pct. Pell Grant	-0.007	-0.002	-0.012
	(0.004)	(0.008)	(0.005)**
Low Inc. X Pct. Pell	-0.001	-0.022	0.007
	(0.007)	(0.013)*	(0.008)
Constant	-6.066	-9.212	-3.924
	(0.644)***	(1.495)***	(1.235)***
Observations	3860	1960	1900

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. All columns include controls for gender, race, high school type and GPA, SAT, % free lunch, parent's education,
  institution type, exp/student and Pct. residential. Robust standard errors in parentheses

Table 9: Multinomial Logit coefficient estimates for major choice in senior year (NLSF)

	Black				Hispanic			
	STEM	Humanities	Soc. Sci.	Bus./Econ.	STEM	Humanities	Soc. Sci.	Bus/Econ
Income <$35,000	7.602	5.76	5.071	0.395	-2.849	-1.598	-4.492	-15.617
	(3.198)**	(7.184)	(2.845)*	(9.681)	(4.567)	(7.713)	(3.58)	(5.274)***
Median SAT	-0.232	-0.482	-0.196	-0.291	-0.016	-0.616	0.017	0.518
	(0.253)	(0.249)*	(0.203)	(0.36)	(0.287)	(0.383)	(0.383)	(0.35)
Low. Inc. X Median SAT	-0.534	-0.348	-0.341	0.022	0.254	0.025	0.351	1.156
	(0.234)**	(0.502)	(0.193)*	(0.694)	(0.318)	(0.514)	(0.259)	(0.364)***
Dist. Below Median	-0.175	-0.289	0.055	-0.069	-0.35	-0.614	0.089	-0.363
	(0.089)**	(0.202)	(0.071)	(0.113)	(0.145)**	(0.236)***	(0.155)	(0.285)
Low. Inc X	-0.152	0.072	-0.131	0.06	-0.029	0.891	-0.238	0.085
Dist. Below Median	(0.21)	(0.391)	(0.171)	(0.315)	-0.195	(0.312)***	(0.189)	(0.466)
Pct. Pell Grant	-0.015	-0.007	-0.004	0.089	0.014	-0.012	-0.009	0.003
	(0.012)	(0.016)	(0.011)	(0.015)***	(0.012)	(0.019)	(0.013)	(0.013)
Low. Inc. X Pct. Pell	-0.023	-0.061	-0.027	-0.028	-0.002	-0.012	0.009	0.061
	(0.022)	(0.046)	(0.023)	(0.034)	(0.018)	(0.035)	(0.018)	(0.028)**
Pct Own Race	-0.014	-0.003	-0.008	0.003	0.002	0.197	0.135	-0.166
	(0.004)***	(0.005)	(0.004)**	(0.005)	(0.044)	(0.087)**	(0.071)*	(0.104)
Constant	-1.56	-1.841	-1.156	-5.928	-2.103	6.14	-2.038	-9.112
	(3.263)	(3.231)	(2.437)	(3.487)*	(2.921)	(4.581)	(4.954)	(4.843)*
Observations	1051	1051	1051	1051	915	915	915	915

	Asian				White			
	STEM	Humanities	Soc. Sci.	Bus/Econ	STEM	Humanities	Soc. Sci.	Bus/Econ
Income <$35,000	1.021	-2.474	-2.578	-9.105	-0.275	0.307	-1.086	1.636
	(4.107)	(8.956)	(3.566)	(5.431)*	(0.829)	(0.741)	(0.928)	(1.12)
Median SAT	0.27	0.811	-0.18	-0.299	-0.023	0.022	-0.321	-0.137
	(0.238)	(0.280)***	(0.259)	(0.245)	(0.178)	(0.341)	(0.185)*	(0.263)
Low. Inc. X Median SAT	-0.03	0.208	0.188	0.68				
	(0.31)	(0.632)	(0.258)	(0.374)*				
Dist. Below Median	-0.106	-0.042	0.34	-0.176	-0.131	-0.303	-0.139	-0.598
	(0.25)	(0.433)	(0.227)	(0.335)	(0.137)	(0.235)	(0.182)	(0.152)***
Low. Inc X	-0.235	-1.022	-1.349	0.205				
Dist. Below Median	(0.344)	(0.488)**	(0.450)***	(0.521)				
Pct. Pell Grant	0.007	0.012	-0.052	-0.008	0.025	0.022	-0.019	-0.003
	(0.01)	(0.014)	(0.013)***	(0.009)	(0.010)**	(0.016)	(0.009)**	(0.013)
Low. Inc. X Pct. Pell	-0.013	-0.015	0.056	-0.001	0.021	0.023	0.082	-0.124
	(0.014)	(0.074)	(0.012)***	(0.028)	(0.035)	(0.034)	(0.031)***	(0.098)
Pct Own Race	-0.032	-0.06	0.038	0.004	0.011	-0.017	-0.003	0.037
	(0.007)***	(0.016)***	(0.010)***	(0.009)	(0.006)**	(0.012)	(0.007)	(0.017)**
Constant	-8.248	-13.969	-0.781	1.329	-6.132	-7.567	0.654	-8.11
	(3.066)***	(4.878)***	(3.44)	(2.787)	(2.522)**	(4.957)	(2.772)	(4.071)**
Observations	958	958	958	958	996	996	996	996

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. All columns include controls for gender, high school GPA
and type, parent's education, exp/student, institution type and Pct. of Majors within each field from Institution. Cell sizes
too small in White sub-sample to estimate full model with low-income interactions. Robust standard errors in parentheses

**Table A1: Average Marginal Effects from Logit Estimation of Probability
of Graduating from original institution within 6 years (NLSF)**

	All	Black	Hispanic	Asian	White
		-			
Income < $35,000	0.1144	0.5314	-0.1007	0.1863	0.1876
Median SAT	*1.7102*	2.1541	1.7857	*1.2865*	*1.4072*
Low Inc. X Med. SAT	0.3599	0.5605	0.5172	0.1886	0.1231
Dist. Sat Below Median	0.0765	*0.1524*	0.0930	0.0220	0.0241
Low Inc. x Dist. Below Median	0.0257	*0.0501*	0.0391	0.0086	
Dist. SAT above Median	0.0397	*0.0134*	*0.0193*	0.0610	*0.0624*
Low Inc. X Dist. Above Median	0.0047	*0.0007*	0.0039	0.0072	0.0056
Pct. Pell Grant	2.3292	2.9993	2.4569	*1.6903*	1.8436
Low Inc. X Pct. Pell	0.5332	0.8026	0.7263	*0.3407*	0.1949
Pct. Own Race		2.0932	0.7179	1.0996	*7.2139*
Observations	3920	1051	915	958	985

Note: Italicized average marginal effects correspond to significant coefficients
   in original logit estimation

**Table A2: Average Marginal Effects (x100) from Logit Estimation of Probability
of Graduating from original institution within 6 years (NELS:88)**

	All	SAT>1100	SAT<1100
Income < $35,000	-0.88	33.48	-5.42
Median SAT	*5.69*	*8.63*	2.19
Low Inc. X Med. SAT	0.00	-4.78	-0.14
Dist. Sat Below Median	*-3.14*	*-3.06*	-1.70
Low Inc. x Dist. Below Median	-0.41	1.35	-2.72
Dist. SAT above Median	-0.82	-2.15	0.82
Low Inc. X Dist. Above Median	*5.36*	*10.50*	2.71
Pct. Pell Grant	0.00	0.00	*-0.01*
Low Inc. X Pct. Pell	0.00	*-0.02*	0.02
Observations	3860	1960	1900

Note: Italicized average marginal effects correspond to significant coefficients
   in original logit estimation

Table A3: Average Marginal Effects (x100) from Multinomial Logit Estimation of College Major Choice by Race

	Black				Hispanic			
	STEM	Humanities	Soc. Sci.	Bus./Econ.	STEM	Humanities	Soc. Sci.	Bus/Econ
Income <$35,000	*50.01*	2.37	*0.90*	-4.85	-5.80	-2.78	-7.07	*-26.31*
Median SAT	-1.43	*-1.85*	-1.36	-1.21	-0.16	-4.16	0.52	3.38
Low. Inc. X Median SAT	*-4.67*	-0.93	*-3.17*	1.06	0.88	-0.99	2.72	*6.38*
Dist. Below Median	*-1.71*	-1.29	1.52	-0.25	*-3.48*	*-3.55*	3.21	-1.67
Low. Inc X Dist Below	-1.42	0.58	-1.60	0.61	-0.91	*6.07*	-4.29	0.49
Pct. Pell Grant	-0.22	-0.05	-0.11	*0.56*	0.21	-0.08	-0.15	0.01
Low. Inc. X Pct. Pell	-0.11	-0.24	-0.22	-0.10	-0.11	-0.11	0.07	*0.37*
Pct Own Race	*-0.14*	0.01	*-0.08*	0.04	-0.34	*1.15*	*1.67*	-1.23

	Asian				White			
	STEM	Humanities	Soc. Sci.	Bus/Econ	STEM	Humanities	Soc. Sci.	Bus/Econ
Income <$35,000	27.60	-4.20	-6.56	*-22.06*	-7.64	1.20	-10.50	24.91
Median SAT	4.47	*4.18*	-2.47	-3.92	0.72	0.68	*-3.34*	-0.72
Low. Inc. X Median SAT	-3.06	0.63	0.85	*6.43*				
Dist. Below Median	-1.85	-0.23	3.61	-1.81	0.18	-1.35	-0.06	*-4.44*
Low. Inc X Dist Below	0.01	*-4.21*	*-11.44*	4.82				
Pct. Pell Grant	0.24	0.09	*-0.49*	-0.05	0.39	0.14	*-0.30*	-0.07
Low. Inc. X Pct. Pell	-0.31	-0.10	*0.56*	-0.03	0.34	0.13	*0.99*	-1.23
Pct Own Race	*-0.53*	*-0.30*	0.46	0.12	*0.13*	-0.17	-0.09	*0.31*

Note: Italicized average marginal effects correspond to significant coefficients in original logit estimation