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Racial Segregation Patterns
in Selective Universities

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Abstract

This paper examines sorting into interracial friendships at selective universities. We show significant friendship segregation, particularly for blacks. Indeed, blacks' friendships are no more diverse in college than in high school, despite the fact that the colleges that blacks attend have substantially smaller black populations. We demonstrate that the segregation patterns occur in part because affirmative action results in large differences in the academic backgrounds of students of different races, with students preferring to form friendships with those of similar academic backgrounds. Within a school, stronger academic backgrounds make whites' friendships with blacks less likely and friendships with Asians more likely. These results suggest that affirmative action admission policies at selective universities, which drive a wedge between the academic characteristics of different racial groups, may result in increased within-school segregation.

1. Introduction

The use of racial preferences in college and university admissions has been one of the most fiercely debated issues in higher education in the past decade. While voters in a small but growing number of states have mandated that admissions policies no longer consider race, in the landmark case *Grutter v. Bollinger* (539 U.S. 306 [2003]), the U.S. Supreme Court upheld the constitutionality of the affirmative action admissions policy used by the University of Michigan Law School. However, *Fisher v. University of Texas at Austin* (133 S. Ct. 2411 [2013]) makes it clear that the use of race in college admissions is restricted and that

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further restrictions may be imposed once the Supreme Court rules in *Schuette v. Coalition to Defend Affirmative Action* (133 S. Ct. 1633 [2013]) next year.

One of the justifications given for racial preferences in admissions is that such policies positively affect all students at the university. The benefits of diversity for all was the primary justification given by Justice Lewis F. Powell, Jr., for the constitutionality of race-conscious admissions policies in *Regents of the University of California v. Bakke* (438 U.S. 265 [1978]). The benefits derived from student diversity, however, will likely not merely depend on the racial composition of the student body but also on the frequency and intensity of social interaction and friendship among students of different races.

Since these policies are employed at only the most selective colleges, their effect on targeted minority students has little effect on overall minority attendance rates but rather influences where minority students enroll (Kane 1998; Arcidiacono 2005). This implies that diversity at one school may come at the expense of diversity at another school. Nonetheless, in addition to the direct benefit of allowing those targeted by racial preferences to attend more selective institutions, nontargeted groups at some schools may benefit from increased diversity on their campuses.

The benefits from diversity in college may be particularly important given the lack of exposure to diverse environments that results from segregation in neighborhoods[1] and schools.[2] Further, even attending a racially diverse high school is not enough to ensure diverse friendships. Both the data that we analyze and the National Longitudinal Study of Adolescent Health used in Moody (2001) show substantial own-race preferences for friendships in high school.[3] Hence, the potential for colleges to improve cross-racial understanding would seem large.

In this paper, we investigate whether this potential is realized on one dimension: friendships with other races. We focus on friendships at selective schools where affirmative action is most salient. We use detailed data from two sources: the National Longitudinal Survey of Freshmen (NLSF) and the Campus Life and Learning (CLL) project. The NLSF allows us to look at the composition of freshman-year friendships at a set of selective schools for students who entered college in the fall of 1999. The CLL project focuses on just one school, Duke University, but has the advantage of being able to look at friendship composition

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[1] Although neighborhood segregation has been declining since the 1960s, substantial residential segregation remains (Glaeser and Vigdor 2003).

[2] Clotfelter, Ladd, and Vigdor (2003) document significant racial segregation in North Carolina schools, particularly for high school students. See Clotfelter (2004) on how segregation patterns have evolved since *Brown v. Board of Education*.

[3] A small but growing economics literature on friendship formation, building on a more established literature in sociology (McPherson, Smith-Lovin, and Cook 2001), documents the tendency for people to interact and form friendships with others who are similar to themselves. Regardless of the context of the interaction, one of the most salient characteristics affecting the likelihood of interaction is race. This is shown for data on middle school friendships (Currarini, Jackson, and Pin 2010), Facebook friends (Mayer and Puller 2008; Baker, Mayer, and Puller 2011), e-mail contacts (Marmaros and Sacerdote 2006), and roommate selection (Foster 2005).

over time as well as administrative data on admissions officers' rankings.[4] Both data sets also contain information on friendship composition in high school as well as measures of high school diversity.

Both data sets reveal substantial segregation in friendships on college campuses, particularly for blacks. Indeed, for black freshmen in the NLSF, the share of their friends who are black is the same in college as it was in their senior year of high school, despite the share of blacks in their high school being almost five times the share of blacks in their college (34 percent versus 7 percent). The CLL project data show that black high school friendships are more diverse than freshman-year friendships (64 percent for same race versus 68 percent for other race) and more diverse during freshman year than during senior year (68 percent for same race versus 72 percent for other race).[5] The numbers for the CLL data are particularly striking given that the share of Duke undergraduates who are black was only 8 percent during this period.

What can explain the high levels of segregation in college, particularly among black students? One possible explanation is that black students have a targeted share of friends of each race and that this target is unaffected by the relative shares of each group in the population. We show that this hypothesis is rejected in the NLSF data. Predicting the share of same-race friends for blacks in college from what occurs in high school results in significantly underpredicting the share of same-race friends in college that is observed in the data, in large part because segregation is a function of the distribution of races in the environment (college or high school): where there is a higher percentage of black students, the share of same-race friends for blacks is also higher. Further, if we consider students who attend high schools that have a racial distribution similar to that of the colleges in the NLSF data, these students have substantially higher shares of same-race friends in college than in high school.

These results point toward the college environment actually being less conducive to cross-racial friendships than the high school environment. One of the contributing factors may be affirmative action, which drives a wedge between the academic backgrounds of majority and minority students and, in particular, a wedge between majority students and black students.[6] If similarity in academic backgrounds is an important determinant of friendship formation—particularly

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[4] The Campus Life and Learning (CLL) project focuses on students who entered Duke University in 2001 or 2002.

[5] Camargo, Stinebrickner, and Stinebrickner (2010) conducted one of the few studies that analyze the dynamics of friendship formation in college. Using data on students at Berea College, they find that whites randomly assigned to room with a black student were more likely to have other black friends as upperclassmen.

[6] Both the National Longitudinal Survey of Freshmen (NLSF) and the CLL project show that the within-college black-white SAT score gap is almost twice the Hispanic-white SAT score gap.

among those of different races or ethnicities—then affirmative action may result in a lower rate of cross-race friendships.[7]

We show that similarity in academic backgrounds is a contributing factor in the increased segregation found in college relative to high school. The percentage of black same-race friendships is higher for those whose SAT scores are relatively low given the college they attend: on average, marginal black students who are admitted have a greater share of same-race friends. Ordered probit estimates of the number of friends of different races show that, within a college and in both the NLSF and the CLL data sets, increasing student academic preparation makes cross-racial friendships with blacks less likely while increasing the likelihood of friendships with whites and Asians.

Our results suggest that affirmative action policies are not particularly effective at promoting cross-racial friendships. To be clear, adding more underrepresented minorities at a highly selective school through the use of affirmative action may increase the number of interracial friendships at that school. However, the degree to which this occurs is lessened to the extent that such policies increase the racial gap in academic backgrounds. Further, since affirmative action policies primarily affect the intensive margin (where minorities attend college), not the extensive margin (whether minorities attend college), more interracial interaction at highly selective schools may come at the expense of even more interracial interaction at less selective schools.[8]

The rest of the paper proceeds as follows. Section 2 describes our two data sets and presents the patterns of racial segregation. Section 3 examines differences in interracial interactions in high school and college. Section 4 studies the role of similarity in academic background in interracial friendship formation. Section 5 presents our estimates, quantifying the importance of the similarity in academic background in interracial friendship formation. Section 6 concludes.

2. Data

We begin by describing our two data sets and presenting descriptive evidence on racial segregation, both in high school and in college.

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[7] The concern that affirmative action may reduce overall interracial friendships despite increasing interracial friendships at top schools was raised by Arcidiacono, Kahn, and Vigdor (2011). Using the same data as Bowen and Bok (1998), they show that, within a school, higher SAT scores for whites were associated with higher probabilities of knowing two or more Asians well and lower probabilities of knowing two or more blacks well. Foster (2005) and Mayer and Puller (2008) also find evidence that similarity in academic background is a contributing factor in relationship formation.

[8] Arcidiacono, Kahn, and Vigdor (2011) show that the relationship between college quality and the share of black students is U-shaped: the most diverse colleges are the least-selective and most-selective schools. Similarly, Arcidiacono, Aucejo, and Hotz (2013) show that before racial preferences were banned in California, the three University of California campuses with the highest share of underrepresented minorities were the two most selective (University of California, Berkeley, and University of California, Los Angeles) and the least selective (University of California, Riverside).

2.1. National Longitudinal Survey of Freshmen

The NLSF follows a cohort of first-time freshmen through their college careers at selective colleges and universities. Equal numbers of whites, blacks, Hispanics, and Asians were sampled at each of the 28 participating schools.[9] A total of 4,573 students were surveyed. The baseline survey was administered in the fall of 1999 and compiles detailed information about each student's neighborhood, family, friendship, and educational environments before entering college. Follow-up surveys were administered each spring from 2000 through 2003, when most respondents were finishing their freshman, sophomore, and junior years. The respective response rates for these waves were 96, 90, and 84 percent. Additional information in terms of academic preparation (for example, SAT scores) and college social experiences (for example, friendship) is provided in these follow-up surveys.

Table 1 gives descriptive statistics by race for the NLSF sample. These descriptive statistics are conditional on reporting a test score in wave 3. As noted by Massey et al. (2003), blacks and Hispanics at the included set of schools tend to have less educated and poorer parents than their white and Asian counterparts. As a whole, though, students at these schools are fairly advantaged compared with national averages. Among black students, 39 percent report family incomes above $75,000. Consistent with national data, females are overrepresented, particularly among African Americans.[10]

Partly reflecting the effect of affirmative action on admission policies, average test scores at these schools vary substantially by race. Asians have the highest SAT scores, followed closely by whites. Hispanics have SAT scores that are 81 points below those of whites, and blacks have the lowest average SAT scores, 71 points below those of Hispanics. Similar to test score differentials at college entrance, grades for Asians and whites in first-year classes are about a third of a grade higher than those for blacks and Hispanics.

The NLSF provides rich information about friendship composition before and during a student's college experience. In this regard, surveyed students were asked to identify up to 10 friends and their races. Eighty-nine percent of respondents reported having at least 10 friends. Patterns of interracial friendships are given in Table 2, which displays the share of friendships that each racial or

[9] Participating schools, by type, were liberal arts colleges (Barnard College, Bryn Mawr College, Denison University, Kenyon College, Oberlin College, Smith College, Swarthmore College, Wesleyan University, and Williams College), private research universities (Columbia University, Emory University, Georgetown University, Miami University of Ohio, Northwestern University, Princeton University, Rice University, Stanford University, Tufts University, Tulane University, University of Pennsylvania, University of Notre Dame, Washington University, and Yale University), public research universities (Pennsylvania State University; University of California, Berkeley; University of Michigan at Ann Arbor; and University of North Carolina at Chapel Hill), and a historically black college (Howard University). Given that the aim of this project is to analyze cross-racial friendship, Howard University was dropped from the sample.

[10] See Aucejo (2012) for a discussion of racial differences in the gender gap in college enrollment and attainment.

Table 1

Descriptive Statistics by Race: National Longitudinal Survey of Freshmen

	Black	Hispanic	Asian	White
Female	.647	.575	.549	.521
Mother's education:				
Less than college degree	.413	.471	.299	.207
College graduate	.270	.270	.366	.335
Beyond college degree	.317	.259	.335	.459
Father's education:				
Less than college degree	.387	.376	.185	.145
College graduate	.288	.232	.243	.258
Beyond college degree	.325	.391	.572	.597
Family income:				
Less than $50,000	.401	.388	.242	.157
$50,000–$75,000	.209	.184	.182	.172
More than $75,000	.390	.428	.577	.672
SAT score (math + verbal)	1,207	1,278	1,374	1,359
	(149)	(140)	(135)	(133)
College average SAT score	1,329	1,336	1,330	1,333
	(80)	(80)	(80)	(80)
First-semester GPA	2.967	3.080	3.326	3.345
	(.544)	(.561)	(.473)	(.466)
N	717	715	798	831

Note. The sample includes all individuals who had a valid test score. Sample sizes are smaller for some variables, particularly father's education. The largest number of missing observations ($N = 74$) is for blacks. College average SAT score is calculated by averaging the 25th and 75th percentile SAT scores at a school. Standard deviations are in parentheses. GPA = grade point average.

ethnic group reports having with each of the other groups. Table 2 shows friendships during college as reported in wave 2 of the survey. All groups show same-race preferences, as each group's share of same-race friends is significantly higher than its share of the student population of its school. Blacks, however, are particularly segregated. While blacks attend colleges that are on average 7 percent black, the share of their friends who are black is 58 percent.[11]

Table 2 reports the corresponding friendship shares before college, when the student was a senior in high school, as well as the share of students of each race or ethnicity at his or her high school. What is remarkable is that, for blacks, the share of same-race friends in high school is the same or slightly lower than the share of same-race friends in college. This occurs despite the fact that the fraction of black students at the typical black respondent's high school is almost five times the fraction of black students at the colleges he or she attends (34 percent versus 7 percent). Asians also report the same share of same-race friends in both high school and college, although the high schools that Asians attend have only a slightly higher Asian population percentage than the colleges they attend (17 percent versus 14 percent). On the other hand, both Hispanics and whites report

[11] It is important to note that while the survey question refers to friends met since attending college, the friends reported may not necessarily be students.

Table 2

Patterns of Friendships and School Diversity before and during College: National Longitudinal Survey of Freshmen

	Black	Hispanic	Asian	White
Freshman Year of College (%):				
Black friends	58	7	8	27
Black population	7	5	14	73
Hispanic friends	13	19	12	56
Hispanic population	7	6	15	72
Asian friends	8	5	36	51
Asian population	7	5	14	73
White friends	7	5	12	76
White population	7	5	14	73
Senior Year of High School (%):				
Black friends	57	6	8	29
Black population	34	9	9	47
Hispanic friends	9	28	10	53
Hispanic population	14	25	11	50
Asian friends	6	4	36	53
Asian population	13	9	17	61
White friends	5	4	10	80
White population	12	8	10	70
N	938	858	906	923

Note. Share of friends before college refers to high school senior year friends. Share of friends during college" refers to freshmen year friends since college began. Numbers of observations are 938, 858, 906, and 923 for blacks, Hispanics, Asians, and whites, respectively.

higher rates of cross-racial friendships in college than in high school, even though their high schools have a higher percentage of black students than their colleges.

2.2. Campus Life and Learning Project

The CLL project at Duke University resulted in a longitudinal database of consecutive cohorts of students who first enrolled at Duke in 2001 or 2002. The target population of the CLL project was defined as all undergraduate students in Duke's Trinity College of Arts and Sciences and Pratt School of Engineering. By making use of students' self-reported racial or ethnic group from their Duke University Office of Undergraduate Admissions (Duke Admissions) application form, the sampling design randomly selected about 356 and 246 white students from the 2001 and 2002 cohorts, respectively, all black and Latino students, and about two-thirds of Asian students in each cohort.[12] Each cohort was surveyed via mail in the summer before initial enrollment at the university, where 78 percent of the sample ($N = 1,185$) completed the precollege mail questionnaire. In the spring semester of the freshman, sophomore, and senior years, each cohort was again surveyed by mail. Response rates declined somewhat in the years

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[12] The database also includes about one-third of the biracial or multiracial students, but we do not make use of these observations given that it is difficult to determine the exact racial characteristics of this subgroup.

following enrollment: in the first year of college, 71 percent of students responded to the survey; in the second year, 65 percent; and in the third year, 59 percent.

The precollege survey provides detailed information on the students' social and family background, prior school experiences, and social networks. In particular, students were asked about their friends before coming to Duke and during their college years. More specifically, the precollege questionnaire asked students to list up to five friends and to provide information about their race, age, and gender. In the follow-up surveys, students were asked to report up to eight friends and to indicate which friends were Duke students.[13] Hence, even though up to eight friends could be listed, the average number of Duke friends listed is less than half that number. Our analysis focuses on Duke friends.

Finally, in addition to the information provided by the surveys, the CLL database provides access to students' confidential records. These records include complete college transcripts, major selection, graduation outcomes, test scores, and Duke Admissions rankings. These private Duke rankings cover the academic achievements of the student, the curriculum of the high school, a review of the application essay, personal qualities of the student, and letters of recommendation. The admissions office scored an applicant on each category using a scale of 1 to 5, with 5 being the highest score. Multiple reviewers were used, and the final score was an average across reviewers.

Descriptive statistics by race are shown in Table 3. The patterns are similar to those in the NLSF—namely, black and Hispanic students come from lower income families and have less educated parents and lower credentials at college entrance (that is, SAT scores and admission officers' rankings) than Asians and whites. The average SAT score for blacks (Hispanics) was 148 (73) points below that of whites. These differences are striking given that the standard deviation of SAT scores for whites is 102 points. Given that Hispanics fall almost exactly halfway between blacks and whites, the extent of affirmative action in admissions is likely stronger for blacks than Hispanics. As with the NLSF, a serious gender imbalance exists in the black student population, with females representing over two-thirds of blacks students at Duke.

Table 4 shows friendship patterns over time, where only those who responded to all surveys are included in the sample.[14] As with the NLSF, all racial groups display same-race preferences, with the strongest same-race preferences exhibited among blacks. For example, black students represent 8 percent of the Duke student population; however, their share of same-race friends ranges from 68 to 72 percent between their freshman and senior years in college. Even more striking, Table 4 shows that black students have a higher percentage of black friends

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[13] The prompt for the friendship questions was, "Other than your family members, think about your closest friends and most important people in your life."

[14] Results were similar if we did not condition on responding to every survey.

Table 3

Descriptive Statistics by Race: Campus Life and Learning Project Survey

	Black	Hispanic	Asian	White
Demographics:				
Female	.687	.490	.465	.466
Mother has B.A. degree or more	.654	.736	.740	.831
Mother has doctorate or professional degree	.102	.109	.064	.108
Father has B.A. degree or more	.647	.782	.891	.917
Father has doctorate or professional degree	.188	.262	.320	.375
Family income:				
$50,000 or less	.347	.223	.182	.094
$50,001–$100,000	.284	.231	.263	.189
More than $100,000	.369	.547	.555	.716
Private school	.245	.400	.272	.328
SAT score (math + verbal)	1,269	1,344	1,459	1,417
	(107)	(102)	(100)	(102)
Duke admissions rank:				
Achievement	3.700	4.074	4.573	4.253
	(.856)	(.810)	(.633)	(.871)
Curriculum	4.334	4.705	4.862	4.670
	(.741)	(.515)	(.437)	(.584)
Essay	3.142	3.246	3.457	3.439
	(.402)	(.500)	(.591)	(.560)
Personal qualities	3.234	3.263	3.439	3.457
	(.452)	(.467)	(.603)	(.574)
Letters of recommendation	3.459	3.483	3.882	3.785
	(.582)	(.520)	(.545)	(.618)
N	235	204	226	502

Note. Standard deviations are in parentheses. B.A. = Bachelor of Arts.

in college than they did in high school.[15] Note that this is not true for any other racial or ethnic group: all other groups have a lower share of same-race friends in their freshman year of college than they did in high school.

In summary, both the NLSF and CLL data show significant patterns of same-race preferences. Further, there is little evidence that blacks have more diverse friends in college than they did in high school. Indeed, the CLL data suggest the opposite.

3. Differences in Friendship Formation in High School and College

In Section 2, we showed that black students had similar shares of same-race friends in high school and in college, despite the fraction of black students in their high schools being almost five times higher than the fraction of black students in their colleges, according to the NLSF data. Here, we take this comparison a step

[15] Recall that the shares were virtually identical in the NLSF. One may be concerned that the reason for the difference here is that we focus on Duke friends only. In particular, friends of black Duke students who are not Duke students may be more diverse. This is not the case, however, as same-race preferences for blacks are even higher among non-Duke friends.

Table 4
Friendship Patterns by Race: Campus Life and Learning Project Survey

	Precollege Constant Sample (%)				Total Friends
	Black	Hispanic	Asian	White	
Precollege friends:					
Black	64	4	5	27	4.21
Hispanic	6	27	7	61	4.27
Asian	2	4	45	48	4.01
White	2	1	4	93	4.51
Freshman-year Duke friends:					
Black	68	3	6	23	2.52
Hispanic	9	12	8	71	2.92
Asian	4	3	41	52	2.89
White	5	5	7	83	3.47
Sophomore-year Duke friends:					
Black	72	4	7	17	3.04
Hispanic	11	16	7	65	3.57
Asian	4	4	42	50	3.80
White	4	4	3	88	3.79
Senior-year Duke friends:					
Black	72	3	5	20	3.42
Hispanic	11	12	9	67	4.07
Asian	5	5	48	42	3.82
White	4	5	9	83	4.06
Duke population	8	9	15	68	

Note. The maximum number of precollege friends reported is five, and the maximum number of college friends reported is eight. Values for total friends are the mean number of friends reported.

further by examining the determinants of friendship formation in high school and seeing how well these determinants predict interaction in college.

For each racial or ethnic group, we estimate ordered probit regressions of the number of same-race and other-race high school friends as functions of the racial composition of the high school. We then use these estimates to predict the number of same-race and other-race friends in college, where we substitute the racial composition of the college for the racial composition of the high school. We first estimate these ordered probit regressions using just the fraction of same-race friends in high school and its square (model 1) and then add female, SAT scores, and college fixed effects in an extended model (model 2). Including college fixed effects takes into account that some colleges may draw students who have differing propensities to interact across races.

Table 5 shows the actual number of same-race friends in college for each racial or ethnic group as well as the predicted number of same-race college friends from both model 1 and model 2; it also shows similar results for other-race friends. Across all racial or ethnic groups and outcomes, the predictions of the two models are very similar. The results indicate that blacks and to a lesser extent Hispanics have substantially more same-race friends and fewer other-race friends than what is predicted by the high school interactions models. The magnitudes

Table 5
Actual and Predicted Numbers of Same-Race and Other-Race Friends in College,
Based on High School Patterns: National Longitudinal Survey of Freshmen

	Black	Hispanic	Asian	White
Same-race friends:				
Actual	5.48	1.80	3.54	7.43
Model 1, predicted	3.73	1.04	3.30	8.01
Model 2, predicted	3.98	1.15	3.34	7.96
Model 2, actual	1.49	.66	.20	−.53
Other-race friends:				
Actual	4.11	7.80	6.15	2.33
Model 1, predicted	5.60	8.59	6.40	1.80
Model 2, predicted	5.32	8.47	6.38	1.84
Model 2, actual	−1.20	−.67	−.23	.49
N	701	694	789	806

Note. Model 1 controls for the percentage of same-race friends and its square, where the dependent variable is high school friends of the same race or another race. Model 2 adds controls for female, test scores, and college fixed effects. Estimates of the high school models are used to predict college friendships, replacing the share of same-race friends and its square with the corresponding numbers for college.

are quite large, with the actual number of same-race friends for blacks over 37 percent higher than predicted by model 2. For Asians and whites the numbers are much less stark, with whites having fewer same-race friends than predicted and more other-race friends than predicted, as would be suggested by colleges facilitating interracial interaction more than high schools.

These results are surprising given that we might expect colleges to be better able than high schools to facilitate interaction across races. For example, even though blacks attend high schools that are 34 percent black, the NLSF data reveal that more than 43 percent of their neighbors were black.[16] One would suspect that higher levels of residential segregation in high school would result in more friendship segregation in high school than in college.

Perhaps even more surprising is that when we predict the number of same- and other-race friends for blacks using model 2, every school has blacks with more same-race friends than predicted and fewer other-race friends than predicted. Not a single school had less segregation than what would be predicted on the basis of high school friendships. Regardless of whether the source is indeed affirmative action, the low rates of interracial friendships in college should be of concern.

One may be concerned that perhaps our model is not rich enough to capture features such as students having a preferred racial distribution of friends that will occur regardless of the racial distribution of the population. One may also

[16] Given that high schools draw students from many neighborhoods, we would expect neighborhoods to be more segregated. However, minority students attending elite universities could have been more likely to come from less segregated neighborhoods than their high schools, but this is not the case in the data.

Table 6
Number of Same-Race and Other-Race Friends of Selected Black Students in
High School and College: National Longitudinal Survey of Freshmen

	Restriction 1	Restriction 2
Black friends in college	4.94	5.07
	(3.45)	(3.38)
Black friends in high school	3.91	4.15
	(3.14)	(3.11)
Other-race friends in college	4.78	4.66
	(3.41)	(3.36)
Other-race friends in high school	5.58	5.34
	(3.20)	(3.18)
Black population in college (%)	7.12	7.06
	(1.96)	(1.94)
Black population in high school (%)	7.12	7.65
	(2.50)	(2.19)
School average SAT score	−95.3	−98.7
	(117)	(120)
N	216	185

Note. Restriction 1 uses the sample of black students attending high schools with a black population between 3 and 11 percent, which corresponds to the percentage of black students at the colleges that we consider. Restriction 2 considers black students attending high schools with a black population between 5 and 10 percent. Thirty-one percent of the black sample with valid friendship data satisfy restriction 1, and 26 percent satisfy restriction 2. Standard deviations are in parentheses. Results of t-tests indicate that differences in friendship between high school and college are statistically significant at the 5 percent level.

be concerned that the high school racial distribution does not overlap with the college racial distribution, and hence that we are predicting out of sample.

Neither of these concerns are supported by the data. Table 6 shows that there are a substantial number of black students who attend colleges with a racial distribution similar to that in their high school. The first column shows that when we restrict the black sample to those who attend high schools that are between 3 and 11 percent black, which is the percentage of black students at the colleges in the data set, the mean percentage of black students is the same in high school as in college. Yet the data show that, in this sample, black students have one more black friend in college than they do in high school and, correspondingly, .8 fewer other-race friends in college. The second column further restricts the sample to those attending high schools that are between 5 and 10 percent black so that the standard deviation of the percentage in high school is closer to the percentage in college. This sample shows that black students have .9 more black friends and .7 fewer other-race friends in college than in high school, despite the share of blacks in high school being .6 percentage point higher.

4. Academic Background and Interracial Friendship Formation

Given the disparities in friendship formation between high school and college, we now examine whether differences in academic backgrounds contribute to the

significant segregation observed in college. The two data sets we use offer different advantages and disadvantages that, in turn, affect our specifications. However, in both cases we model the number of friends individual i at school j has of race r, N_{irj}, using an ordered-choice framework. Our specification of the latent index, $N_{irj}^\star$, then depends on the particular data set.

4.1. National Longitudinal Survey of Freshmen Specification

In the NLSF data, we observe large samples of students across many schools. We also have detailed information on friendship patterns when the individual was a senior in high school. However, because it is a sample of students at each school, we do not have information on, for example, the full distribution of academic characteristics at a particular school for a particular racial or ethnic group.

We specify the latent index affecting friendship composition as depending on own-race characteristics such as how many friends of race r the individual had in high school, X_{ir}, and academic background, A_i, where the coefficients on these variables depend on the race of the friends. We also include race-school fixed effects that control for differences in the shares of students of each race as well as differences in average academic backgrounds across schools. The latent index is given by

$$N_{ijr}^\star = X_{ir}\beta_{1r} + A_i\beta_{2r} + \delta_{jr} + \varepsilon_{ij}, \tag{1}$$

where ε is an unobserved, normally distributed disturbance term. Hence, equation (1) is estimated using an ordered probit method.

The key coefficient is β_{2r}, which dictates how academic background translates into friendships with particular races. Note that this coefficient is identified by within-school variation. Hence, the question is whether those with better relative academic backgrounds are more or less likely to have more friends of particular races. If homophily is important, this coefficient will be positive when considering racial or ethnic groups with strong academic backgrounds relative to the school mean, as higher levels of academic background mean that this student is more similar to the racial or ethnic group in question.

We use two measures for A_i. First is the individual's SAT score. Second is an academic index (AI) that we constructed based on first-year grades. In particular, we specify the first-year grades that individual i receives at school j as depending on own-race background characteristics (Z_i) such as SAT scores, parental income, parental education, and so on, as well as a school fixed effect, ϕ_j. The school fixed effect captures differences in grading standards across schools. First-year grades, G_{ij}, are then given by

$$G_{ij} = Z_i\alpha + \phi_j + \zeta_{ij}, \tag{2}$$

where ζ_{ij} is a disturbance term. We then use the estimated coefficients $\hat{\alpha}$ to obtain our second measure of A_i using

$$\text{AI}_i = Z_i\hat{\alpha}. \tag{3}$$

The large number of observations in the NLSF permit us to examine both friendships with other races as well as friendships with a student's own race. In this way we can investigate whether homophily on the basis of academic background is important both within racial groups and across racial groups. Hence, we estimate equation (1) considering only same-race friendships with race r and then considering only cross-race friendships with race r.

4.2. Campus Life and Learning Project Specification

The sample sizes are much smaller in the CLL data, which consist of only Duke University students. However, the CLL data have two advantages over the NLSF. Namely, we can be fairly confident as to the distribution of various characteristics for each racial or ethnic group. Further, the friendship questions were asked at multiple points in time, so we can investigate how the importance of homophily changes over time.

Having a small number of observations means that we focus only on other-race friendships. Further, rather than estimate separate models for each racial or ethnic group, we estimate one model and place more structure on the estimating equation. We consider directly the differences between own academic background, A_i, and the average academic background of racial or ethnic group r, $\overline{A}_r$. We then estimate the following equation, where X_i is additional background characteristics (type of high school or racial composition of precollege friends) and ε_{ir} is a normally distributed disturbance term:

$$N^{\star}_{ir} = X_i\theta_{1r} + |A_i - \overline{A}_r|\theta_2 + \varepsilon_{ir}. \tag{4}$$

We then use an ordered probit method to estimate equation (4) separately for other-race friends in freshman and senior years.

As in the specification using the NLSF data, we again use two measures of academic background. The first is SAT score and the second is an academic index constructed from first-year grades. Letting Z_i again indicate observable characteristics of the individual (SAT score, parental income, parental education, Duke Admissions ranking variables, and so on), we specify first-year grades, G_i, as in the following equation:

$$G_i = Z_i\gamma + \zeta_i, \tag{5}$$

where ζ_i is a disturbance term. Our second measure of academic background is then AI_i, the student's academic index defined by

$$\text{AI}_i = Z_i\hat{\gamma}, \tag{6}$$

where $\hat{\gamma}$ is a vector of estimated coefficients from equation (5).

5. Results

5.1. Results from the National Longitudinal Survey of Freshmen

5.1.1. Same-Race Friends

We begin by estimating ordered probit regressions of the number of same-race friends. Results are presented in Table 7, which displays results where the measure of academic background is the individual's SAT score and results using the academic index. The first set of columns controls solely for female, SAT score, and school fixed effects, while the second set adds the number of same-race friends in high school and the percentage of students in the high school who are the same race as the respondent. Note that adding the number of same-race friends in high school may lead us to underestimate the effects of homophily, as this variable could reflect not only tastes but also sorting on academic background in high school.

The qualitative results are similar regardless of the set of controls or the measure of academic background used. Black females are more likely to have same-race friends, likely in part because of the low number of black males relative to black females on college campuses. For all racial groups, having more same-race friends in high school is associated with having more same-race friends in college. However, having a greater share of same-race students in the population of the student's high school is associated with having fewer same-race friends. This results from the controls for same-race friends in high school: if someone has many same-race friends in high school but the school population has very few same-race students, then this is evidence of a strong same-race preference.

The most interesting results are those for the academic background measures. Both higher SAT scores and higher academic indexes are associated with fewer same-race friends if the individual is black or Hispanic, with no effect on the number of same-race friends for either Asians or whites. Using either academic background measure, adding the additional controls for same-race friends in high school about halves the coefficient on the academic background measure, although the results for blacks and Hispanics remain highly significant.

To provide perspective on the magnitude of these effects, on average blacks have 5.5 friends who are of the same race. Using the model estimates, we can calculate how the number of same-race friends changes if we increase blacks' SAT scores or academic indexes such that their averages matched the averages of the whites at the same school. Increasing blacks' SAT scores to match those of their white counterparts lowers the predicted number of same-race friends by .96 and .40 for models 1 and 2, respectively, which is 64 percent and 27 percent of the gap between what is predicted from the high school model and what actually occurs in college from Table 5.[18] Increasing the academic blacks'

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[18] Results are virtually identical if we use ordinary least squares regressions instead. In this case, the coefficient on SAT score (100s) is −.65 and −.27 for models 1 and 2, respectively. Both values are statistically significant. The predicted changes from increasing blacks' SAT scores to match those

Table 7

Ordered Probit Estimates of the Relationship between Academic Preparation and Number of Same-Race Friends: National Longitudinal Survey of Freshmen

	Without High School Controls				With High School Controls			
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
Same-race friends and SAT score:								
SAT score (100s)	−.219**	−.242**	.021	.038	−.110**	−.125**	−.008	.043
	(.032)	(.034)	(.035)	(.034)	(.034)	(.036)	(.036)	(.034)
Female	.258**	−.128	.053	.134+	.152+	−.040	.104	.153+
	(.083)	(.086)	(.077)	(.078)	(.084)	(.088)	(.078)	(.079)
HS same-race friends					.398**	.335**	.284**	.162+
					(.049)	(.048)	(.044)	(.091)
HS same-race friends²/10					−.134**	−.146**	−.067	.016
					(.044)	(.050)	(.044)	(.065)
HS percentage same-race					−.756**	−.501*	−.676*	−.377+
					(.159)	(.252)	(.263)	(.210)
Same-race friends and AI:								
AI	−1.741**	−1.872**	.224	.377	−1.086**	−.986**	−.019	.423
	(.242)	(.266)	(.276)	(.285)	(.278)	(.281)	(.284)	(.288)
Female	.452**	.002	.026	.079	.298**	.004	.113	.096
	(.092)	(.090)	(.080)	(.079)	(.095)	(.091)	(.081)	(.079)
HS same-race friends					.427**	.315**	.279**	.169+
					(.052)	(.050)	(.045)	(.093)
HS same-race friends²/10					−.155**	−.110*	−.059	.016
					(.048)	(.053)	(.045)	(.067)
HS percentage same-race					−1.064**	−.440+	−.829**	−.451*
					(.185)	(.262)	(.279)	(.215)

Note. Standard errors are in parentheses. HS = high school.
+ Significant at the 10% level.
* Significant at the 5% level.
** Significant at the 1% level.

indexes to match those of their white counterparts results in even stronger results, lowering the number of blacks' same-race friends for blacks by 1.88 and .99 for models 1 and 2, respectively.

That the results are significant for blacks and Hispanics is indicative of how affirmative action may be influencing friendships. Namely, with affirmative action introducing a substantial mismatch between the academic characteristics of its beneficiaries and the population of the campus as a whole, beneficiaries end up being friends with other beneficiaries who share their academic backgrounds. Hence, affirmative action, at least on this dimension, may be working to increase segregation.

5.1.2. Other-Race Friends

We next turn to estimates of the number of the other-race friends, with the results presented in Table 8. Regardless of the measure of academic preparation or the set of controls, higher levels of academic preparation are associated with having fewer black friends. In contrast, higher levels of academic preparation are associated with having more white and Asian friends.[19] Note that we are controlling for school fixed effects throughout. Hence, these results are picking up the fact that, on average, blacks have less academic preparation, while whites and Asians have more. The results then suggest that similarity in academic preparation is indicative of more friendship matches.

To get a sense of the importance of the results, we again increase blacks' SAT scores and academic indexes to match those of their white counterparts at the school they attend. We then forecast the number of blacks' other-race friends, adding the predictions for Hispanics', Asians', and whites' other-race friends. Increasing the SAT scores of blacks to match those of their white counterparts increases the number of blacks' other-race friends by .77 and .36 for models 1 and 2, respectively, or 64 percent and 30 percent of the differences in predicted and actual number of other-race college friends from the high school model in Table 5. As with blacks' same-race friends, the results are stronger when we instead increase the academic index for blacks to match that of their white counterparts, with a predicted increase in the number of other-race friends of 1.55 and .87 for models 1 and 2, respectively.

5.2. Results from the Campus Life and Learning Project

To analyze in more detail the role of differences in academic background on friendship formation, we perform a set of ordered probit estimations (by making use of CLL data) where the dependent variable is the number of other-race friends[20] and the key covariate of interest is the (absolute) difference between

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of their white counterparts also show the same patterns, lowering the predicted number of blacks' same-race friends by .97 and .40 for models 1 and 2, respectively.

[19] No significant differences are found for the number of Hispanic friends.

[20] This implies that for each individual we have three observations (namely, the number of friends for each other racial group).

Table 8

Ordered Probit Estimates of the Relationship between Academic Preparation and Number of Other-Race Friends: National Longitudinal Survey of Freshmen

	Without Additional Controls				With Additional Controls			
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
Other-race friends and SAT score								
SAT score (100s)	−.149**	−.014	.099**	.183**	−.103**	−.004	.072**	.101**
	(.021)	(.022)	(.020)	(.019)	(.021)	(.023)	(.021)	(.020)
Female	−.083+	−.052	−.115*	−.027	−.058	−.050	−.108*	−.042
	(.049)	(.054)	(.050)	(.046)	(.050)	(.054)	(.050)	(.046)
Black		.257**	−.166**	−.615**		.230**	−.169**	−.465**
		(.071)	(.066)	(.062)		(.072)	(.066)	(.063)
Hispanic	.408**		.040	.354**	.354**		.028	.218**
	(.061)		(.060)	(.057)	(.061)		(.061)	(.058)
Asian	.070	−.005			.036	−.037		
	(.058)	(.063)			(.059)	(.064)		
Other-race friends and AI:								
AI	−1.084**	−.111	.513**	1.442**	−.753**	.036	.336*	.914**
	(.165)	(.177)	(.160)	(.145)	(.174)	(.180)	(.164)	(.153)
Female	.022	−.048	−.201**	−.145**	.010	−.060	−.169**	−.111*
	(.051)	(.056)	(.052)	(.049)	(.051)	(.057)	(.053)	(.049)
Black		.215*	−.087	−.398**		.235*	−.126	−.314**
		(.095)	(.087)	(.077)		(.096)	(.088)	(.078)
Hispanic	.177*		.080	.595**	.201**		.040	.382**
	(.076)		(.075)	(.068)	(.077)		(.076)	(.068)
Asian	.025	−.048			.018	−.068		
	(.059)	(.065)			(.060)	(.065)		

Note. Standard errors are in parentheses.
+ Significant at the 10% level.
* Significant at the 5% level.
** Significant at the 1% level.

Table 9

Ordered Probit Estimates of the Relationship between Academic Preparation and Number of Other-Race Friends: Campus Life and Learning Project Survey

	Without Additional Controls		With Additional Controls	
	Freshman	Senior	Freshman	Senior
Other-race friends and SAT score:				
$\lvert SAT_i - \overline{SAT}_r \rvert$ (100s)	−.102*	−.123**	−.086+	−.063
	(.040)	(.045)	(.046)	(.051)
Black friends intercept	−1.410**	−1.554**	−1.014**	−1.051**
	(.087)	(.094)	(.230)	(.258)
Hispanic friends intercept	−1.543**	−1.604**	−1.028**	−1.052**
	(.085)	(.088)	(.218)	(.240)
Asian friends intercept	−1.303**	−1.274**	−.978**	−.971**
	(.084)	(.089)	(.215)	(.238)
Female	.095	.051	.092	.053
	(.063)	(.065)	(.069)	(.071)
N	2,616	2,223	2,238	1,923
Other-race friends and AI:				
$\lvert AI_i - \overline{AI}_r \rvert$	−.422*	−.415*	−.400*	−.328+
	(.175)	(.180)	(.184)	(.194)
Black friends intercept	−1.304**	−1.492**	−1.208**	−1.129**
	(.105)	(.113)	(.247)	(.285)
Hispanic friends intercept	−1.511**	−1.609**	−1.184**	−1.043**
	(.098)	(.101)	(.229)	(.257)
Asian friends intercept	−1.298**	−1.286**	−1.183**	−1.076**
	(.097)	(.101)	(.222)	(.257)
Female	.102	.022	.087	.030
	(.072)	(.075)	(.073)	(.076)
N	1,968	1,695	1,917	1,656

Note. The dependent variable is the number of friends of each of the racial groups other than the student's own (hence, $N = 3$ for each student). The intercepts vary with the dependent variable and are relative to the white intercept. Standard errors are in parentheses.
+ Significant at the 10% level.
* Significant at the 5% level.
** Significant at the 1% level.

own academic preparation and the mean academic preparation of the other racial groups. Following previous specifications, we work with two alternative definitions of academic background (namely, SAT score and our measure of academic index defined in equation [6]). Finally, given that the CLL project collects data on friendship formation at different stages of the college experience, we investigate whether the importance of homophily changes over time (freshman versus senior year).

Table 9 displays results for freshman and senior year, where the measure of academic background is SAT score and corresponding estimates using the academic index. The first set of columns controls for gender, indicators for friends' race,[21] and absolute difference in academic preparation, while the second set

[21] Since the outcome variable here is the number of other-race friends of a particular race, these

adds a second-order polynomial of the number of same-race friends in high school and interactions between friend race and high school racial composition.[22]

Overall, the qualitative results are similar across all specifications. Namely, regardless of the set of controls or college year, similarity in academic background matters for cross-race friendships. For black freshmen, increasing SAT scores in a way similar to what was done with the NLSF[23] results in increases of .13 and .07 in the number of other-race friends for blacks for the models without and with the additional controls, respectively.[24] These numbers are substantially smaller than those obtained in the NLSF, but this is because the CLL surveys asked for information on fewer friends (eight instead of 10) and because, among those friends, students could list both individuals who were and were not at Duke. On average, in the CLL data, black students report less than one other-race Duke friend as freshmen. As with the NLSF, the results for the CLL data are stronger when we instead increase the academic index of blacks such that the mean academic index of blacks is the same as that of whites, increasing the number of other-race friends by .20 and .16 for the models without and with the additional controls, respectively.

The effect of academic background on interracial friendship appears to remain fairly constant over time. Increasing the academic indexes of black students in their senior year to match those of their white counterparts increases the predicted number of other-race friends by .21 and .13 for models without and with the additional controls, respectively.

6. Conclusion

Race-based admissions preferences, commonly used at selective universities in the United States, necessarily involve some trade-off between the benefits accruing to targeted groups and the potential costs borne by other qualified individuals possibly being denied admission. Nonetheless, a common argument in support of such policies is that they have the potential to benefit all students on campus, including those in nontargeted groups, by increasing diversity of the student body. The benefit derived from student diversity, however, is limited by the extent of social interaction among students across races. Furthermore, to the extent that student friendships exhibit homophily on the basis of academic

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indicator variables act as intercepts when the outcome is the number of other-race friends of that particular race. The intercepts are expected to be negative, as they are relative to the number of other-race friends who are white and whites are the dominant group on the campuses in our sample.

[22] The CLL data provide some information on high school diversity—that is, mostly white, half white, mostly nonwhite, or all nonwhite.

[23] Here we add the difference between the average SAT score (academic index) for whites and the average SAT score (academic index) for blacks to each black student's SAT score (academic index).

[24] These calculations involve increasing each black student's academic background level and then using the estimates to predict the number of Hispanic, Asian, and white friends. The total number of other-race friends is the sum of these three predictions.

background, race-based admissions preferences may limit interracial friendships by increasing racial differentials in academic background.

We investigated friendship formation within and across racial groups at both a large set of elite colleges and universities and at Duke University, where data allowing for a richer analysis were available. We placed particular emphasis on studying whether patterns of racial segregation in friendship formation change when students transition from high school to college.

Surprisingly, our results show that blacks' friendships are no more diverse in college than in high school, despite blacks being substantially less represented in their colleges. Indeed, predicting college friendship formation based on patterns of friendship formation in high school substantially overpredicts the share of other-race friends that black students actually have. Furthermore, data from the CLL project show that segregation patterns persist through a student's college career.

Our analysis suggests that one of the reasons for the differences in college and high school interaction is differences in the academic backgrounds of minority and majority students—differences that are compounded by affirmative action. Those with stronger academic backgrounds in a school are more likely to have cross-racial friendships with Asian and white students and less likely to have cross-racial friendships with black students.

These results suggest that affirmative action policies are not particularly effective at promoting interracial friendship formation in college. Moreover, the evidence indicates that these policies, at least as currently implemented, introduce a substantial mismatch between the academic characteristics of targeted groups and the population of the campus as a whole, where beneficiaries are more likely to become friends with same-race individuals who share their academic backgrounds, which leads to increased segregation. We should emphasize, however, that while the rather small number of reported friends used in our analysis may reflect the characteristics of a student's closest friends, it by no means provides a comprehensive measure of the degree of social interaction among students within or across racial groups or among students of varying degrees of similarity in academic preparedness. We also recognize, and our results suggest, that factors in addition to similarity of academic background may determine the degree of same-race friendships. These may include racial differentials in the salience of race and racial solidarity in the use of same-race friendship networks as protective buffering and social support in the face of unwelcoming or hostile environments.

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