

# 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, black friendships are no more diverse in college than in high school despite the colleges blacks attend having substantially smaller black populations. We show that part of the reason for the segregation patterns is that affirmative action results in large differences in academic backgrounds between students of different races and students prefer to form friendships with those of similar academic backgrounds. Within a school, stronger academic backgrounds make interracial 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 last decade. While voters in a small but growing number of states have mandated that admission policies no longer consider race, in the 2003 landmark case *Grutter vs. Bollinger* the U.S. Supreme Court upheld the constitutionality of the affirmative action admissions policy used by the University of Michigan Law School. However, *Fisher vs. University of Texas* has made clear that that the use of race in college admissions is restricted and further restrictions may be imposed once the Supreme Court rules in *Schuette vs. Coalition* 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

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given by Justice Powell for the constitutionality of race-conscious admissions policies in *Regents of the University of California v. Bakke*. The benefits derived from student diversity, however, will likely not merely depend on the racial composition of the student body, but also 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), implying 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, non-targeted 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 as a result of segregation in neighborhoods<sup>1</sup> and schools.<sup>2</sup> Further, even attending a racially diverse high school is not enough to ensure diverse friendships. Both the data we analyze as well as the National Longitudinal Study of Adolescent Health used in Moody (2001) show substantial own-race preferences for friendships in high school.<sup>3</sup> 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 Freshman (NLSF), and the Campus Life and Learning Project (CLL). The NLSF allows us to look at the composition of freshmen year friends at a set of selective schools for students who entered in the fall of 1999. The CLL focuses on just one school, Duke University, but has the advantage of being able to look at friendship composition over time as well as administrative data on admissions officers' rankings.<sup>4</sup>

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<sup>1</sup>Although neighborhood segregation has been declining since the 1960's, substantial residential segregation remains (Glaeser and Vigdor, 2003).

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

<sup>3</sup>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 them. Regardless of the context of the interaction, one of the most salient characteristics affecting the likelihood of interaction is race. This is shown in middle school friendships (Currarini et al. 2010), Facebook friends (Mayer and Puller 2008 and Baker et al. 2011), email (Marmaros and Sacerdote 2006), and roommate selection (Foster 2005).

<sup>4</sup>The CLL focuses on students who entered Duke in 2001 or 2002.

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% versus 7%). The CLL data actually show that black high school friendships were more diverse than freshmen friendships (64% same race versus 68%) and more diverse as freshmen than as seniors (68% same race versus 72%).<sup>5</sup> The numbers for the CLL are particularly striking given that the share of Duke undergraduates who are black was only 8% during this time 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 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 under-predicting 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 similar racial distribution to 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 towards 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.<sup>6</sup> If similarity in academic backgrounds is an important determinant of friendship formation—particularly among those of different races or ethnicities—then affirmative action may result in a lower rate of cross-race friendships.<sup>7</sup>

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<sup>5</sup>Camargo et al. (2010) is one of the few studies that analyzes the dynamics of friendship formation in college. Using data on students at Berea College, they find that whites randomly assigned to a black roommate were more likely to have other black friends as upperclassmen.

<sup>6</sup>Both the NLSF and the CLL show that the within-college black-white SAT score gap is almost twice the Hispanic-white SAT score gap.

<sup>7</sup>The concern that affirmative action may reduce overall interracial friendships despite increasing interracial friend-

We show that similarity in academic backgrounds is a contributing factor to the increased segregation found in college relative to high school. The percentage of black friendships that are same-race is higher for those with SAT scores that are relatively low given the college they attend: marginal black admits on average 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 one’s own 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 under-represented 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.<sup>8</sup>

The rest of the paper proceeds as follows. Section 2 describes our two data sets and lays out 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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ships at top schools was raised by Arcidiacono et al. (2011). Using the same data as Bowen and Bok (1998), they show that, within a school, higher white SAT scores 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 of similarity in academic background is a contributing factor to relationship formation.

<sup>8</sup>Arcidiacono et al. (2011) show that the relationship between college quality and share black is U-shaped: the most diverse colleges are the least-selective and most-selective schools. Similarly, Arcidiacono et al. (2013) show that before racial preferences were banned in California the three UC campuses with the highest share of under-represented minorities were the two most selective (UC Berkeley and UCLA) and the least selective (UC Riverside).

## 2.1 National Longitudinal Survey of Freshman

The NLSF follows a cohort of first-time freshman students at selective colleges and universities through their college careers. Equal numbers of whites, blacks, Hispanics, and Asians were sampled at each of the 28 participating schools<sup>9</sup>. In total, 4573 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 freshmen, sophomore, and junior years. The respective response rates for these waves were 96%, 90%, and 84%. Additional information in terms of academic preparation (e.g. SAT scores) and college social experiences (e.g. 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 to national averages. Even for black students, 39% report family incomes above \$75,000. Consistent with national data, females are over-represented, particularly among African Americans.<sup>10</sup>

Partly reflecting affirmative action in 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 whites, and blacks have the lowest average SAT scores, 71 points below Hispanics. Similar to entering test score differentials, Asian and white grades in first year classes are about a third of a grade higher than first years grades for blacks and Hispanics.

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

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<sup>9</sup>Participating schools by type: Liberal arts colleges (Barnard, Bryn Mawr, Denison University, Kenyon, Oberlin, Smith, Swarthmore, Wesleyan, Williams); Private research universities (Columbia, Emory, Georgetown, Miami University (OH), Northwestern, Princeton, Rice, Stanford, Tufts, Tulane, University of Pennsylvania, Notre Dame, Washington University, Yale); Public research universities (Penn State, University of California-Berkeley, University of Michigan-Ann Arbor, University of North Carolina-Chapel Hill); Historically black colleges (Howard University). Given that the aim of this project is to analyze cross-racial friendship, Howard University was dropped from the sample.

<sup>10</sup>See Aucejo (2012) for a discussion of racial differences in the gender gap in college enrollment and attainment.

reports having with each of the other groups. Panel A gives friendships in 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 their group's share of the student population of their 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.<sup>11</sup>

Panel B of Table 2 reports the corresponding friendship shares when the student was a senior in high school as well as the share of students of each race/ethnicity at their 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 their 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 they attend (34% versus 7%). Asians also report the same share of same-race friends both in high school and college, though the high schools Asians attend have only a slightly higher percentage Asian than the colleges they attend (17% versus 14%). On the other hand, both Hispanics and whites report 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 Survey

The Campus Life and Learning Project (CLL) at Duke University is a longitudinal database of consecutive cohorts of students who first enrolled at Duke University in 2001 or 2002. The target population of the CLL project was defined as all undergraduate students in Duke's Trinity College of Arts & Sciences and Pratt School of Engineering. By making use of students' self-reported racial ethnic group from their 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<sup>12</sup>. Each cohort was surveyed via mail in the summer before initial enrollment at the university, where 78 percent of the sample ( $n = 1185$ ) completed the pre-college 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 following enrollment: in the first year of college 71% of students responded to the survey; in

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<sup>11</sup>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.

<sup>12</sup>The database also includes about one third of Bi/Multiracial students, but we are not making use of these observations given that it is difficult to determine the exact racial characteristics of this subgroup.

Table 1: Descriptive Statistics by Race: NLSF

	Black	Hispanic	Asian	White
Female	0.647	0.575	0.549	0.521
Mother's Ed <College Grad.	0.413	0.471	0.299	0.207
Mother's Ed =College Grad.	0.270	0.270	0.366	0.335
Mother's Ed >College Grad.	0.317	0.259	0.335	0.459
Father's Ed <College Grad.	0.387	0.376	0.185	0.145
Father's Ed =College Grad.	0.288	0.232	0.243	0.258
Father's Ed >College Grad.	0.325	0.391	0.572	0.597
Family Income < \$50,000	0.401	0.388	0.242	0.157
\$50,000 ≤ Family Income < 75,000	0.209	0.184	0.182	0.172
Family Income > 75,000	0.390	0.428	0.577	0.672
SAT (Math+Verbal)	1207	1278	1374	1359
	(149)	(140)	(135)	(133)
College Average SAT	1329	1336	1330	1333
	(80)	(80)	(80)	(80)
First semester GPA	2.967	3.080	3.326	3.345
	(0.544)	(0.561)	(0.473)	(0.466)
Observations	717	715	798	831

Notes: 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 is for blacks at 74. College Average SAT refers to the averaging of the 25th percentile and 75th percentile of the SAT scores at the school.

Table 2: Patterns of Friendships and School Diversity Before and During College: NLSF

<i>Panel A: Share of Friends During College</i>					
		Black	Hispanic	Asian	White
Black	Friend Share	58%	7%	8%	27%
	Pop Share	7%	5%	14%	73%
Hispanic	Friend Share	13%	19%	12%	56%
	Pop Share	7%	6%	15%	72%
Asian	Friend Share	8%	5%	36%	51%
	Pop Share	7%	5%	14%	73%
White	Friend Share	7%	5%	12%	76%
	Pop Share	7%	5%	14%	73%
<i>Panel B: Share of Friends Before College</i>					
		Black	Hispanic	Asian	White
Black	Friend Share	57%	6%	8%	29%
	Pop Share	34%	9%	9%	47%
Hispanic	Friend Share	9%	28%	10%	53%
	Pop Share	14%	25%	11%	50%
Asian	Friend Share	6%	4%	36%	53%
	Pop Share	13%	9%	17%	61%
White	Friend Share	5%	4%	10%	80%
	Pop Share	12%	8%	10%	70%

Notes: 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.



the second year 65% and in the third year 59%.

The pre-college survey provides detailed information of 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 pre-college 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.<sup>13</sup> 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, their personal qualities, and letters of recommendations. The admissions office scored an applicant on each category using a scale of 1 to 5, with 5 being the highest. 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, with less educated parents and lower entering credentials (i.e. SAT 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 white SAT scores 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, where over two-thirds of blacks students at Duke are female.

Table 4 shows friendship patterns over time, where only those who responded to all surveys are included in the sample.<sup>14</sup> 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

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<sup>13</sup>The background for the friendship questions was "Other than your family members, think about your closest friends and most important people in your life."

<sup>14</sup>Results were similar if we did not condition on responding to every survey.

shows that black students have a higher percentage of black friends in college than they did in high school.<sup>15</sup> Note that this is not true for any other racial/ethnic groups: all other groups have a lower share of same-race friends in their freshmen 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 suggests 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 as in college despite the fraction of black students in their high schools being almost five times higher than the fraction of blacks students in their colleges in the NLSF data. Here, we take this comparison a step further by examining the determinants of friendship formation in high school and seeing how well these determinants predict interaction in college.

For each racial/ethnic group, we estimate ordered probits 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 in the racial composition of the college for the racial composition of the high school. We first estimate these ordered probits using just the fraction same-race of the high school and its square (Model 1) and then add female, SAT scores, as well as 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.

Panel A of Table 5 shows the actual number of same-race friends in college for each racial/ethnic group as well as the predicted number of same-race college friends from both Model 1 and Model 2, with Panel B showing similar results for other-race friends. Across all racial/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 based on the high school interactions models. The magnitudes are quite large, with the actual number of same-race friends for blacks over 37% higher than predicted by

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<sup>15</sup>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 3: Descriptive Statistics by Race: CLL

	Black	Hispanic	Asian	White
<i>Demographics</i>				
Female	0.687	0.490	0.465	0.466
Mother BA or more	0.654	0.736	0.740	0.831
Mother Doctorate/Professional Degree	0.102	0.109	0.064	0.108
Father BA or more	0.647	0.782	0.891	0.917
Father Doctorate/Professional Degree	0.188	0.262	0.320	0.375
Family Inc $\leq$ \$50,000	0.347	0.223	0.182	0.094
\$50,000 < Family Inc $\leq$ \$100,000	0.284	0.231	0.263	0.189
Family Inc > \$100,000	0.369	0.547	0.555	0.716
Private School	0.245	0.400	0.272	0.328
SAT (Math + Verbal)	1269	1344	1459	1417
	(107)	(102)	(100)	(102)
<i>Duke Admissions Office Rank</i>				
Achievement	3.700	4.074	4.573	4.253
	(0.856)	(0.810)	(0.633)	(0.871)
Curriculum	4.334	4.705	4.862	4.670
	(0.741)	(0.515)	(0.437)	(0.584)
Essay	3.142	3.246	3.457	3.439
	(0.402)	(0.500)	(0.591)	(0.560)
Personal Qualities	3.234	3.263	3.439	3.457
	(0.452)	(0.467)	(0.603)	(0.574)
Letters of Recommendation	3.459	3.483	3.882	3.785
	(0.582)	(0.520)	(0.545)	(0.618)
Observations	235	204	226	502

Table 4: Friendship Patterns by Race: CLL

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

Table 5: Number of Same-Race and Other-Race Friends in College, Actual and Predicted based on High School Patterns: NLSF

<i>Panel A: Same-Race Friends</i>				
	Black	Hispanic	Asian	White
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
Actual – Model 2	1.49	0.66	0.20	-0.53
<i>Panel B: Other-Race Friends</i>				
	Black	Hispanic	Asian	White
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
Actual – Model 2	-1.20	-0.67	-0.23	0.49
Observations	701	694	789	806

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

Model 2. For Asians and whites the numbers are much less stark, with whites actually having fewer same-race friends than predicted and more other-race friends than predicted, as would be suggested by colleges actually facilitating interracial interaction more than high schools.

These results are surprising given that we might expect colleges to be better able to facilitate interaction across races than high schools. For example, even though blacks attend high schools that are 34% black, the NLSF data reveal that their neighbors while in high school were over 43% black.<sup>16</sup> 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

<sup>16</sup>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.

for blacks using Model 2, *every* school sees blacks having more same-race friends than predicted and less other-race friends than predicted. Not a single school had less segregation than what would be predicted based on 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 be concerned that the high school racial distribution does not overlap with the college racial distribution and hence we are predicting out of sample.

Neither of these concerns have support in the data. Table 6 shows that there are a substantial number of black students who attend colleges with a similar racial distribution to 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 support of the percent black for the colleges in the data set, the mean percent black is the same in high school as in college. Yet, the data show that this sample of black students have one more black friend in college than they do in high school, and correspondingly 0.8 fewer other-race friends in college. The second column further restricts the sample to those attending high schools between 5 and 10 percent black so that the standard deviation of percent in high school is closer to the percent in college. This sample shows black students having 0.9 more black friends 0.7 fewer other race friends in college than in high school despite the share black in high school being 0.6 percentage points higher.<sup>17</sup>

## 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. In this section, we set up the empirical specifications, with the following section describing our results.

The two data sets we use offer different advantages and disadvantages which 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,  $N_{irj}^*$ , then depends on the particular data set. We first describe our specifications for the NLSF and then turn to the CLL data.

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<sup>17</sup>T-tests indicate that the reported differences in friendship between high school and college are statistically significant at 5% level.

## 4.1 NLSF specification

With the NLSF data, we observe large samples of students across many schools. We also have detailed information on the friendship patterns when the individual was a senior in high school. But, 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/ethnic group.

We specify the latent index affecting friendship composition as depending on own-characteristics such as how many friends the individual had of race  $r$  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 which 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:

$$N_{ijr}^* = X_{ir}\beta_{1r} + A_i\beta_{2r} + \delta_{jr} + \epsilon_{ij} \quad (1)$$

where  $\epsilon$  is an unobserved, normally-distributed disturbance term. Hence, (1) is estimated using an ordered probit.

The key coefficient is  $\beta_{2r}$  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/ethnic groups with strong academic backgrounds relative to the school mean as higher levels of academic background will mean this student is more similar to the racial/ethnic group in question.

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

$$G_{ij} = Z_i\alpha + \phi_j + \zeta_{ij} \quad (2)$$

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

$$AI_i = Z_i\hat{\alpha} \quad (3)$$

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

## 4.2 CLL specification

The sample sizes are much smaller in the CLL data because it contains data on only Duke University students. However, the CLL data has two advantages of the NLSF. Namely, we can be fairly confident as to the distribution of various characteristics for each racial/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.

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

$$N_{ir}^* = X_i\theta_{1r} + |A_i - \bar{A}_r|\theta_2 + \epsilon_{ir} \tag{4}$$

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

Like in the specification using the NLSF data, we again use two measures of academic background. 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 office ranking variables, etc.), we specify first year grades,  $G_i$  as following:

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

where  $\zeta_i$  is a disturbance term. Our second measure of academic background is then  $AI_i$ , the student’s academic index defined by:

$$AI_i = Z_i\hat{\gamma} \tag{6}$$

where  $\hat{\gamma}$  are the estimated coefficients from (5).



## 5 Results

### 5.1 Results from the National Longitudinal Survey of Freshmen

#### 5.1.1 Same-race friends

We begin by estimating ordered probits of the number of same-race friends. Results are presented in Table 7. Panel A displays results where the measure of academic background is the individual's SAT score, and Panel B shows results using the academic index. The first set of columns controls solely for female, SAT scores, and school fixed effects, while the second set adds number of same-race friends in high school and percent of the high school that is 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 not only reflect 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. Black females are more likely to have same-race friends, likely in part due to 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 more same-race friends in college. However, a greater share of same-race students in the population of the student's high school is associated with fewer same-race friends. This results because of 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 on 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, though 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 increased black SAT scores or academic indexes such that their averages matched the averages of the whites at the same school.<sup>18</sup> Increasing black SAT scores to match their

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<sup>18</sup>We do this by adding to a black student at the school  $j$  the mean white SAT score at school  $j$  and subtracting off the mean black SAT score at school  $j$ .

white counterparts lowers the predicted number of same friends by 0.96 and 0.40 for models 1 and 2, respectively, which is 64% and 27% of the gap between what is predicted from the high school model and what actually occurs in college from Table 5.<sup>19</sup> Increasing black academic indexes to match their white counterparts shows even stronger results, lowering the number of black same-race friends by 1.88 and 0.99 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. The format of Table 8 mirrors that of Table 7. Regardless of the measure of academic preparation and regardless of the set of controls, higher levels of academic preparation are associated with fewer black friends. In contrast, higher levels of academic preparation are associated with more white and Asian friends.<sup>20</sup> Note that throughout we are controlling for school fixed effects. 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 black SAT scores and academic indexes to match their white counterparts at the school they attend. We then forecast the number of other-race friends, adding the predictions for Hispanic, Asian, and white other-race friends. Increasing SAT scores of blacks to match their white counterparts increases the number of black other-race friends by 0.77 and 0.36 for models 1 and 2, respectively, or 64% and 30% of the differences in predicted and actual number of other-race college friends from the high school model in Table 5. As with black same-race friends, the results are stronger when we instead increase the academic index for blacks to that of their white counterpart, with predicted increase in the number of other-race

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<sup>19</sup>Results are virtually identical if we use ordinary least squares instead. In this case, the coefficient on SAT (00's) is -0.65 and -0.27 for models 1 and 2 respectively. Both are statistically significant. The predicted changes from increasing black SAT scores to match their white counterparts also show the same patterns, lowering the predicted number of black same-race friends by 0.97 and 0.40 for models 1 and 2, respectively.

<sup>20</sup>No significant differences are found for the number of Hispanic friends.

friends being 1.55 and 0.87 for models 1 and 2, respectively.

## 5.2 Results from the Campus Life and Learning Survey

In order 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 number of other race friends<sup>21</sup> and the key covariate of interest is the (absolute) difference between 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 (i.e. SAT score and our measure of academic index defined in equation 6). Finally, given that CLL collects data on friendship formation at different stages of the college experience, we investigate whether the importance of homophily changes over time (i.e. freshman vs. senior year).

Panel A of Table 9 displays results for freshman and senior year, where the measure of academic background is SAT score, with Panel B showing corresponding estimates using the academic index.<sup>22</sup> The first set of columns controls for gender, indicators for friend race,<sup>23</sup> and absolute difference in academic preparation, while the second set adds a second order polynomial of number of same-race friends in high school, and interactions between friend race and high school racial composition.<sup>24</sup>

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 black SAT scores in a similar to what was done with the NLSF<sup>25</sup> results in a 0.13 and 0.07 increase in the number of other race friends for blacks for the models without and with the additional controls respectively.<sup>26</sup> These numbers are significantly smaller than with

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<sup>21</sup>This implies that for each individual we have three observations (i.e. number of friends for each other racial group).

<sup>22</sup>The numbers of observations in columns 1 to 4 of Panel A are 2616, 2223, 2238 and 1923, respectively, while those for Panel B are 1968, 1695, 1917, and 1656.

<sup>23</sup>Since the outcome variable here is other-race friends of a particular race, these indicator variables act as intercepts when the outcome is the number of other-race friends who are that particular race. The intercepts are expected to be negative as they are relative to number of other-race friends who are white and whites are the dominant group on the campuses in our sample.

<sup>24</sup>The CLL provides some information on high school diversity, i.e. mostly white, half white, mostly non white, or all non white.

<sup>25</sup>Here we add the difference between the average white SAT score (academic index) and the average black SAT score (academic index) to each black students SAT score (academic index).

<sup>26</sup>These calculations involve increasing each black student's academic background 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

the NLSF but this is because the CLL asked for fewer friends (8 instead of 10) and, among those friends, students could list both individuals who were or were not at Duke. On average, black students report less than one other-race Duke friend in the CLL as freshmen. As with the NLSF, the results are stronger when we instead increase the academic index of blacks such that the mean black academic index is the same as whites, increasing the number of race friends by 0.20 and 0.16 for the models without and with the additional controls, respectively.

The effect of academic background on limiting interracial friendship appears to remain fairly constant over time. For black seniors, increasing their academic indexes to match their white counterparts increases the predicted number of other-race friends by 0.21 and 0.13 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 non-targeted 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 background, race-based admissions preferences may limit interracial friendships by increasing racial differentials in academic background.

This paper has investigated friendship formation within and across racial groups at both a large set of elite colleges and universities, and specifically at Duke University, where data allowing for a richer analysis were available. Particular emphasis was placed to study whether patterns of racial segregation in friendship formation do change when students transition from high school to college.

Surprisingly, results show that black 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 friendship formation patterns in high school substantially over-predicts the share of other-race friends black students actually have. Further, data from the CLL show that segregation patterns persist through one's college career.

Our analysis suggests that one of the reasons for the differences in college and high school inter-  

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three predictions.

action is differences in academic backgrounds between minority and majority students – differences that are compounded by affirmative action. Those with stronger academic backgrounds within 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, leading 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 one'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, and racial differentials 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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Table 6: Number of Same-Race and Other-Race Friends in High School and College for Selected Black Students

	Restriction 1	Restriction 2
Black Friends in College	4.94 (3.45)	5.07 (3.38)
Black Friends in High School	3.91 (3.14)	4.15 (3.11)
Other-Race Friends in College	4.78 (3.41)	4.66 (3.36)
Other-Race Friends in High School	5.58 (3.20)	5.34 (3.18)
Population Percent Black in College	7.12% (1.96)	7.06% (1.94)
Population Percent Black in High School	7.12% (2.50)	7.65% (2.19)
SAT Score-School Average	-95.3 (117)	-98.7 (120)
Observations	216	185

Notes: Restriction 1 considers black students attending high schools between 3 and 11 percent black which corresponds to the support of the percent black of the colleges we consider. Restriction 2 considers black students attending high schools between 5 and 10 percent black. 31% of the black sample with valid friendship data satisfy Restriction 1, and 26% satisfy Restriction 2. Standard deviations in parentheses. T-tests indicate that differences in friendship between high school and college are statistically significant at 5% level.

Table 7: Ordered Probit Estimates of the Relationship Between Academic Preparation and Number of Same-Race Friends: NLSF

<i>Panel A: Same-Race Friends and SAT score</i>								
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
SAT (00's)	-0.219*** (0.032)	-0.242*** (0.034)	0.021 (0.035)	0.038 (0.034)	-0.110*** (0.034)	-0.125*** (0.036)	-0.008 (0.036)	0.043 (0.034)
Female	0.258*** (0.083)	-0.128 (0.086)	0.053 (0.077)	0.134* (0.078)	0.152* (0.084)	-0.040 (0.088)	0.104 (0.078)	0.153* (0.079)
HS Same Race Friends					0.398*** (0.049)	0.335*** (0.048)	0.284*** (0.044)	0.162* (0.091)
HS SR Friends Sq/10					-0.134*** (0.044)	-0.146*** (0.050)	-0.067 (0.044)	0.016 (0.065)
HS Percent Same Race					-0.756*** (0.159)	-0.501** (0.252)	-0.676** (0.263)	-0.377* (0.210)
<i>Panel B: Same-Race Friends and Academic Index (AI)</i>								
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
AI	-1.741*** (0.242)	-1.872*** (0.266)	0.224 (0.276)	0.377 (0.285)	-1.086*** (0.278)	-0.986*** (0.281)	-0.019 (0.284)	0.423 (0.288)
Female	0.452*** (0.092)	0.002 (0.090)	0.026 (0.080)	0.079 (0.079)	0.298*** (0.095)	0.004 (0.091)	0.113 (0.081)	0.096 (0.079)
HS Same Race Friends					0.427*** (0.052)	0.315*** (0.050)	0.279*** (0.045)	0.169* (0.093)
HS SR Friends Sq/10					-0.155*** (0.048)	-0.110** (0.053)	-0.059 (0.045)	0.016 (0.067)
HS Percent Same Race					-1.064*** (0.185)	-0.440* (0.262)	-0.829*** (0.279)	-0.451** (0.215)

Table 8: Ordered Probit Estimates of the Relationship Between Academic Preparation and Number of Other-Race Friends: NLSF

<i>Panel A: Other-Race Friends and SAT score</i>								
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
SAT (00's)	-0.149*** (0.021)	-0.014 (0.022)	0.099*** (0.020)	0.183*** (0.019)	-0.103*** (0.021)	-0.004 (0.023)	0.072*** (0.021)	0.101*** (0.020)
Female	-0.083* (0.049)	-0.052 (0.054)	-0.115** (0.050)	-0.027 (0.046)	-0.058 (0.050)	-0.050 (0.054)	-0.108** (0.050)	-0.042 (0.046)
Black		0.257*** (0.071)	-0.166** (0.066)	-0.615*** (0.062)		0.230*** (0.072)	-0.169** (0.066)	-0.465*** (0.063)
Hispanic	0.408*** (0.061)		0.040 (0.060)	0.354*** (0.057)	0.354*** (0.061)		0.028 (0.061)	0.218*** (0.058)
Asian	0.070 (0.058)	-0.005 (0.063)			0.036 (0.059)	-0.037 (0.064)		
Additional Controls	N	N	N	N	Y	Y	Y	Y
<i>Panel B: Other-Race Friends and Academic Index</i>								
	Black	Hispanic	Asian	White	Black	Hispanic	Asian	White
AI	-1.084*** (0.165)	-0.111 (0.177)	0.513*** (0.160)	1.442*** (0.145)	-0.753*** (0.174)	0.036 (0.180)	0.336** (0.164)	0.914*** (0.153)
Female	0.022 (0.051)	-0.048 (0.056)	-0.201*** (0.052)	-0.145*** (0.049)	0.010 (0.051)	-0.060 (0.057)	-0.169*** (0.053)	-0.111** (0.049)
Black		0.215** (0.095)	-0.087 (0.087)	-0.398*** (0.077)		0.235** (0.096)	-0.126 (0.088)	-0.314*** (0.078)
Hispanic	0.177** (0.076)		0.080 (0.075)	0.595*** (0.068)	0.201*** (0.077)		0.040 (0.076)	0.382*** (0.068)
Asian	0.025 (0.059)	-0.048 (0.065)			0.018 (0.060)	-0.068 (0.065)		
Additional Controls	N	N	N	N	Y	Y	Y	Y

Table 9: Ordered Probit Estimates of the Relationship Between Academic Preparation and Number of Other-Race Friends: CLL

<i>Panel A: Other-Race Friends and SAT score</i>				
	Freshman	Senior	Freshman	Senior
$ SAT_i - \overline{SAT}_r $ (00's)	-0.102** (0.040)	-0.123*** (0.045)	-0.086* (0.046)	-0.063 (0.051)
Black friends intercept	-1.410*** (0.087)	-1.554*** (0.094)	-1.014*** (0.230)	-1.051*** (0.258)
Hispanic friends intercept	-1.543*** (0.085)	-1.604*** (0.088)	-1.028*** (0.218)	-1.052*** (0.240)
Asian friends intercept	-1.303*** (0.084)	-1.274*** (0.089)	-0.978*** (0.215)	-0.971*** (0.238)
Female	0.095 (0.063)	0.051 (0.065)	0.092 (0.069)	0.053 (0.071)
Additional				
Controls	N	N	Y	Y
<i>Panel B: Other-Race Friends and Academic Index</i>				
	Freshman	Senior	Freshman	Senior
$ AI_i - \overline{AI}_r $	-0.422** (0.175)	-0.415** (0.180)	-0.400** (0.184)	-0.328* (0.194)
Black friends intercept	-1.304*** (0.105)	-1.492*** (0.113)	-1.208*** (0.247)	-1.129*** (0.285)
Hispanic friends intercept	-1.511*** (0.098)	-1.609*** (0.101)	-1.184*** (0.229)	-1.043*** (0.257)
Asian friends intercept	-1.298*** (0.097)	-1.286*** (0.101)	-1.183*** (0.222)	-1.076*** (0.257)
Female	0.102 (0.072)	0.022 (0.075)	0.087 (0.073)	0.030 (0.076)
Additional				
Controls	N	N	Y	Y

Notes: Dependent variable is number of friends of each the four racial groups besides one's own racial group. Hence, each student has three observations. The intercepts vary with the dependent variable (number of black friends, Hispanic friends, Asian friends, or white friends) and are relative to the white intercept.